Exhibit No.:
Issues: Cost of Capital
Witness: Dr. J. Randall Woolridge
Type Exhibit: Surrebuttal Testimony
Sponsoring party: State of Missouri
Case No.: ER-2007-0002
Surrebuttal Testimony Date: February 27, 2007

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. ER-2007-00002

SURREBUTTAL TESTIMONY

OF

J. RANDALL WOOLRIDGE

ON BEHALF OF

THE STATE OF MISSOURI

Jefferson City, Missouri
February 27, 2007

Exhibit No.:
Issues: Cost of Capital
Witness: Dr. J. Randall Woolridge
Type Exhibit: Surrebuttal Testimony
Sponsoring party: State of Missouri
Case No.: ER-2007-0002
Surrebuttal Testimony Date: February 27, 2007

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. ER-2007-00002

SURREBUTTAL TESTIMONY

OF

J. RANDALL WOOLRIDGE

ON BEHALF OF

THE STATE OF MISSOURI

Jefferson City, Missouri
February 27, 2007

Q. PLEASE STATE YOUR FULL NAME, ADDRESS, AND OCCUPATION.

A. My name is J. Randall Woolridge and my business address is 120 Haymaker Circle, State College, PA 16801. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of the Pennsylvania State University.

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS CASE?

A. Yes. I have Direct and Rebuttal Testimony on behalf of the State of Missouri.

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A. My surrebuttal testimony primarily focuses on issues discussed in the rebuttal testimonies of UE witnesses Dr. James Vander Weide and Ms. Kathleen McShane. These issues include the equity risk premium, the DCF results, the capital structure adjustment, and my test of reasonableness.

DCF Results

Q. PLEASE RESPOND TO DR. VANDER WEIDE AND MS. MCSHANE'S CONTENTION THAT YOU USED AN 'ANNUAL DCF MODEL.'

A. Dr. Vander Weide's contention that I have employed an annual DCF model is simply incorrect. In my Direct Testimony (pages 24-25), I discuss the appropriate adjustment to the dividend yield to reflect growth as presented by Professor Myron Gordon:[1]

> As indicated by Professor Myron Gordon, who is commonly associated with the development of the DCF model for popular use, this is obtained

[1] *Petition for Modification of Prescribed Rate of Return*, Federal Communications Commission, Docket No. 79-05, Direct Testimony of Myron J. Gordon and Lawrence I. Gould at 62 (April 1980).

by: (1) multiplying the expected dividend over the coming quarter by 4, and (2) dividing this dividend by the current stock price to determine the appropriate dividend yield for a firm, which pays dividends on a quarterly basis

Because firms tend to announce changes in dividends at different times during the year, it is common to adjust the dividend yield by some fraction of the annual projected growth rate. As such, the dividend yield computed based on presumed growth over the coming quarter as opposed to the coming year can be quite different. This approach contrasts with that of Dr. Vander Weide and Ms. McShane who argue that the dividend yield must be adjusted to reflect the quarterly payment of dividends. Professor Richard Bower has studied the quarterly compounding issue in using the DCF model to estimate an equity cost rate. Bower acknowledges the timing issue and downward bias addressed by Dr. Vander Wide and Ms. McShane. However, as I highlighted in my Rebuttal Testimony, Bower has noted: [2] "As a measure of required return, the conventional cost of equity calculation (K*), ignoring quarterly compounding and even without adjustment for fractional periods, serves very well."

Q. PLEASE REVIEW THE ISSUE OF THE EXPECTED GROWTH RATE IN THE DCF MODEL.

A. The major area of disagreement in the application of the DCF model involves the estimation of the expected growth rate. Dr. Vander Weide and I have used the

[2] See Richard Bower, The N-Stage Discount Model and Required Return: A Comment," *Financial Review* (February 1992), pp 141-9.

constant growth DCF approach. Ms. McShane uses both constant growth and two-stage growth DCF approaches. In the two-stage growth DCF model, she utilizes projected GDP growth as her second-stage growth rate.

Q. WHAT ARE THE ERRORS IN THE EXPECTED DCF GROWTH RATES OF THE COMPANY RATE OF RETURN WITNESSES?

A. There are three primary problems in the DCF analyses of the two company witnesses. First, both of the Company witnesses rely on the forecasted earning per share (EPS) of Wall Street analysts and/or the *Value Line Investment Survey* in determining a growth rate measure for their DCF models. I have used both historic and projected growth rate measures, and have evaluated growth in dividends, book value, and earnings per share. I have provided evidence in my Rebuttal Testimony that there is a positive bias to the EPS growth rate projections of both Wall Street analysts and *Value Line* for not only companies in general, but also for electric utilities. Especially with respect to the forecasts of Wall Street analysts, this is a well-known phenomenon in the markets and therefore investors would discount analysts' projections in arriving at an expected growth rate. Furthermore, due to this well known bias, it is also more likely that investors would look to historical growth rates, especially since historical growth is provided to investors by virtually all financial information services.

Second, both of the Company witnesses have relied solely on EPS growth, and have ignored growth in dividends and book value per share. According to the DCF model, EPS, DPS, and BVPS should all grow at the same rate. Furthermore,

the cash flows in the DCF model are dividends and not earnings. As shown in Exhibit_JRW-4 of my Direct Testimony, the average expected DPS growth rate for my 34 company proxy group is 4.5%. Any growth rate indictor other than projected EPS growth has been ignored by the Company witnesses.

Finally, Ms. McShane has provided no justification for her use of the projected GDP growth as the long-term growth rate expectation in her two-stage DCF model. If Ms. McShane can provide no logical explanation or justification for using expected GDP growth as a growth rate proxy, her two-stage DCF model should be rejected.

Q. DR. VANDER WEIDE CRITICIZES YOU FOR USING THE INTERAL GROWTH METHOD IN ARRIVING AT A DCF GROWTH RATE. PLEASE RESPOND.

A. Dr. Vander Weide's criticizes me for (1) using the internal growth rate method, and (2) using the projected ROEs of the comparable companies in establishing an internal growth rate. With respect to (2), the projected ROEs include earnings from unregulated and non-electric utility operations and so the internal growth rate method may overestimate growth. Nonetheless, with respect to (1), the real issue is that whereas Dr. Vander Weide has used one method to measure expected growth (Wall Street analysts' EPS growth rate forecasts), I have used multiple methods, including both historic and projected growth in EPS, DPS, and BVPS as well as internal growth (b * r). Hence, internal growth is only one of a number of factors I evaluated in determining a DCF growth rate. Furthermore, contrary to

the contentions of Dr. Vander Weide, I have included a measure that captures 'external growth' since I have used *Value Line*'s projected BVPS.

Q. DR. VENDER WEIDE CONTENDS THAT YOU SHOULD HAVE USED MARKET VALUE WEIGHTS IN COMPUTING AVERAGES FOR DCF GROWTH RATES, BETAS, AND THE LIKE. PLEASE RESPOND.

A. I addressed this issue to some degree in my Rebuttal Testimony. Dr. Vander Weide has weighted his DCF results as well as betas using the market values of the companies in his electric utility group. This approach ends up giving the greatest weights to companies with business interests outside of the electric utility industry. These companies also have the highest DCF equity cost rates. For the electric utility group, Dominion Resources and TXU are two of the largest companies and have the two highest equity cost rate estimates of 14.81% and 14.15%. They also receive only 31% and 22%, respectively from regulated electric utility service.

Equity Risk Premium

Q. PLEASE DISCUSS THE EQUITY RISK PREMIUM ISSUE IN THIS PROCEEDING.

A. One of the most important points of contention in this proceeding is the magnitude of the equity risk premium (ERP). This includes the ERPs used by Dr. Vender Weide and Ms. McShane in their RP and CAPM analyses as well as the ERP which I use in my CAPM. The alternative ERP estimation approaches and results are summarized below.

Dr. Vander Weide and Ms. McShane's CAPM ERP - Both Dr. Vander Weide and Ms. McShane use historical and ex ante ERP estimates in their CAPM approaches. The historical ERP is measured as the difference between arithmetic mean stock returns and bond returns as complied by Ibbotson Associates. The ex ante ERPs are determined by using a DCF model to estimate expected market returns with analysts' projected EPS growth rate forecasts for the S&P 500 as the growth rate measure. Dr. Vander Weide uses historical and projected ERPs of 7.10% and 8.35%. Ms. McShane estimates historical and projected ERPs in the range of 7.0%-7.10% and 7.2%-7.7%.

Dr. Vander Weide and Ms. McShane's RP ERPs - In their RP approaches, both Dr. Vander Weide and Ms. McShane compute a historical ERP as the difference in the arithmetic mean stock and bond returns computed for different time periods for several different indexes, including S&P and Moody's electric utility and gas distribution indexes as well as the S&P 500. The bond returns are for long-term public utility bonds. Both Dr. Vander Weide and Ms. McShane also compute a DCF-based ERP by estimating an expected stock return using the DCF model and subtracting a measure of interest rates. The expected return is computed for utilities using the DCF model with analysts' EPS growth rate forecasts for the growth rate. Dr. Vander Weide employs 'A' rated utility yields as a measure of interest rates, while Ms. McShane uses the ten-year Treasury yield. The ERPs for their RP studies range from 4.23% for Dr. Vander Weide ex ante ERP for his Electric Utility Group to 6.3% for Ms. McShane's historical ERP for the S&P Gas Distribution Companies.

My CAPM ERP - The ERP for my CAPM is based on the results of 19 studies published over the last decade which have estimated a long-term ERP. These include ERPs (1) estimated using historical stock and bond returns, (2) developed by estimating expected stock market returns from fundamental data (primarily earnings and dividends) and then subtracting the risk-free rate of interest, and (3) determined from surveys of financial professionals including financial forecasters, CFOs, and academics. My ERP, developed on page 3 of Exhibit_(JRW-8), is 4.20%.

Q. WHAT ARE THE ERRORS IN THE EQUITY RISK PREMIUMS DEVELOPED AND USED BY THE TWO COMPANY WITNESSES?

A. The errors in the ERP approaches employed by the two Company witnesses are detailed in my Rebuttal Testimony. In short, these errors include:

(1) the myriad of empirical problems associated with the use of historical stock and bond returns to estimate an expected ERP which lead to an overstated ERP. These issues include: (a) biased historical bond returns, (b) the arithmetic versus the geometric mean return, (c) unattainable and biased historical stock returns, (d) survivorship bias, (e) the "Peso Problem," (f) market conditions today are significantly different than the past, and (g) changes in risk and return.

(2) the fact that the ex ante ERP models all rely on the upwardly biased EPS growth rate forecasts of Wall Street analysts and the *Value Line Investment Survey* which result in inflated estimates of the ERP. Dr. Vander Weide cites a study he conducted almost twenty years ago to support the use of analysts' EPS growth rate forecasts.

However, as I detail in my Rebuttal Testimony, this study is very dated and includes a number or methodological errors. Furthermore, as I also discuss and demonstrate in my Rebuttal testimony, Wall Street analysts' and *Value Line* EPS growth rate forecasts are upwardly biased estimates of actual EPS growth for companies in general as well as for electric utilities.

Q. DR. VANDER WEIDE CITES THE UPDATED RESULTS OF THE IBBOTSON – CHEN 'BUILDING BLOCKS' APPROACH. PLEASE RESPOND.

A. The results cited by Dr. Vander Weide with reference to the Ibbotson-Chen 'Building Blocks' approach refer to their use of historical inputs in obtaining an equity risk premium. I discuss the problem with this approach in my Rebuttal Testimony. The primary problem is that current market inputs are different from the historical norms. For example, the historical dividend yield used by Ibbotson and Chen was 4.3%. However, the current market dividend yield, which reflects the dividend yield that investors expect to earn going forward from today, is only 1.8%.

Q. ARE DR. VANDER WEIDE' AND MS. MC SHANE'S EQUITY RISK PREMIUMS REFLECTIVE OF THOSE USED IN THE REAL WORLD OF FINANCE?

A. No. Neither of the Company witnesses cite or employ the ERP results of numerous published studies and results from leading academics, investment banks and consulting firms as well as surveys of CFOs and financial forecasters. This is especially ironic for Dr. Vander Weide since the CFO Survey is co-sponsored by his

our academic institution – Duke University! These later sources – investment banks, consulting firms, and CFOs - use the equity risk premium concept every day in making financing, investment, and valuation decisions. Their results, which reflect the level of the equity risk premium as it is applied in the real world of finance, indicate an equity risk premium in the 3-4 percent range and not in the 6-7 percent range. Hence, the ERPs of the Company witnesses are not reflective of how financial professionals in the real world view and employ the ERP.

Capital Structure Adjustment

Q. PLEASE DISCUSS THE CAPITAL STRUCTURE ADJUSTMENT EMPLOYED BY BOTH DR. VANDER WEIDE AND MS. MCSHANE.

A. Both Company rate of return witnesses apply a capital structure adjustment to their over fair rate of return results. This adjustment increases the equity cost rates of Dr. Vander Weide and Ms. McShane by .70% and 1.00%, respectively. The presumption behind the adjustment is that (1) the market values are greater than book values for utilities, and (2) the overall rate of return is applied to a book value capitalization in the ratemaking process. As I discuss in my Rebuttal Testimony, this adjustment is erroneous and unwarranted, has not been widely accepted or adopted in the regulatory rate making process, and produces illogical results. On this latter issue, the adjustment is illogical since it results in a higher estimated equity cost rate and recommended return on equity for a more successful, high market-to-book utility and a lower estimated equity cost rate and return on equity for a less

successful, low market-to-book utility. Therefore, the adjustment will result in even higher market-to-book ratios for utilities with relatively high ROEs and even lower market-to-book ratios for utilities with relatively low ROEs.

Test of Reasonableness

Q. BOTH DR. VANDER WEIDE AND MS. MCSHANE ATTEMPT TO DISCREDIT YOUR TEST OF REASONABLENESS FOR YOUR 9.0% ROE RECOMMENDATION. PLEASE RESPOND.

A. Is assessing the reasonableness of my equity cost rate recommendation, I have compared the returns on equity and market-to-book ratios. As I highlighted in my Direct Testimony, the basis for this test comes from standard financial theory as summarized in a classic Harvard Business School. On page 2 of that case study, the author describes the relationship between return on equity and market-to-book ratio:[3]

> For a given industry, more profitable firms – those able to generate higher returns per dollar of equity – should have higher market-to-book ratios. Conversely, firms which are unable to generate returns in excess of their cost of equity should sell for less than book value.

Profitability	*Value*
If ROE > K	*then Market/Book > 1*
If ROE = K	*then Market/Book =1*
If ROE < K	*then Market/Book < 1*

[3] Benjamin Esty, "A Note on Value Drivers," Harvard Business School, Case No. 9-297-082, April 7, 1997.

Dr. Vander Weide and Ms. McShane reject this test of reasonableness. As evidence, they point to examples of situations where companies are earning negative ROEs and yet have market-to-book ratios greater than 1.0. Obviously, such situations result from a short-term short-fall in earnings and so investors believe these companies will soon be earning a higher return on common equity. Actually, this situation highlights why Dr. Vander Weide, Ms. McShane, and myself have all the averages of groups of electric utility companies in determining an equity cost rate for the Company. This approach negates or minimizes the impact of short-term distortions in data for individual companies in estimating an equity cost rate. For example, Dr. Vander Weide shows DCF growth rates/equity cost rates of 10.50%/14.81% for Dominion Resources and 2.93%/7.27% for American Electric Power. Whereas these observations appear to be out of the range of reasonableness for an equity cost rate for the Company, their impact is minimized because they are used in conjunction with the results of 33 other companies. The same is true for my test of reasonableness.

Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union	)	
Electric Company to Modify Its Tariff to	)	Case No. ER-2007-0002
Begin the Implementation of Its Regulatory Plan	)	

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA	)	
	)	**SS.**
COUNTY OF CENTRE	)	

BEFORE ME, the undersigned notary public, this day personally appeared J. RANDALL WOOLRIDGE, to me known, who being duly sworn according to law, deposes and says:

"My name is J. Randall Woolridge. I am of legal age and a resident of the Commonwealth of Pennsylvania. I certify that the foregoing testimony and exhibits, offered by me on behalf of the State of Missouri, are true and correct to the best of my knowledge and belief."

J. Randall Woolridge

SUBSCRIBED AND SWORN to before me, a notary public, on this 22nd day of February, 2007.

Notary Public in the Commonwealth of Pennsylvania

My Commission Expires: 11-10-07

NOTARIAL SEAL
Ronald E. Flebotte, Notary Public
State College, Centre County
My commission expires November 10, 2007