NORTHERN UTILITIES, INC.

DIRECT TESTIMONY

OF

ROBERT B. HEVERT

Exhibit RBH-1

New Hampshire Public Utilities Commission

Docket No. DG 17-070

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LIST OF SCHEDULES

I. INTRODUCTION

Q. Please state your name, affiliation and business address.

A. My name is Robert B. Hevert. I am a Partner of ScottMadden, Inc. ("ScottMadden"). My business address is 1900 West Park Drive, Suite 250, Westborough, MA 01581.

Q. On whose behalf are you submitting this testimony?

A. I am submitting this testimony before the New Hampshire Public Utilities Commission ("Commission") on behalf of Northern Utilities, Inc. ("Northern" or the "Company").

Q. Please describe your educational background.

A. I hold a Bachelor's degree in Business and Economics from the University of Delaware, and an MBA with a concentration in Finance from the University of Massachusetts. I also hold the Chartered Financial Analyst designation.

Q. Please describe your experience in the energy and utility industries.

A. I have worked in regulated industries for over twenty-five years, having served as an executive and manager with consulting firms, a financial officer of a publicly traded natural gas utility (at the time, Bay State Gas Company), and an analyst at a telecommunications utility. In my role as a consultant, I have advised numerous energy and utility clients on a wide range of financial and economic issues, including corporate and asset-based transactions, asset and enterprise valuation, transaction due diligence, and strategic matters. As an expert witness, I have provided testimony in over 150 proceedings regarding various financial and regulatory matters before numerous state utility regulatory agencies, the Federal Energy Regulatory Commission, and the Province

of Alberta, Canada. A summary of my professional and educational background, including a list of my testimony in prior proceedings, is included in Schedule RBH-1.

II. PURPOSE AND OVERVIEW OF TESTIMONY

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to present evidence and provide a recommendation regarding the Company's Cost of Equity (sometimes referred to as the "Return on Equity" or "ROE") and to provide an assessment of the capital structure and cost of debt to be used for ratemaking purposes, as proposed in the testimony of Northern Witness Paul Normand. My analyses and conclusions are supported by the data presented in Schedule RBH-2 through Schedule RBH-12, which have been prepared by me or under my direction.

Q. What are your conclusions regarding the appropriate Cost of Equity and capital structure for the Company?

A. My analyses indicate that the Company's Cost of Equity currently is in the range of 10.00 percent to 10.60 percent. Based on the quantitative and qualitative analyses discussed throughout my testimony, I conclude that an ROE of 10.30 percent is reasonable and appropriate. That ROE, together with the Company's proposed capital structure and cost of debt, produces an overall Rate of Return of 8.30 percent. As to its proposed capital structure, I conclude that the Company's proposal is consistent with the capital structures that have been in place over several fiscal quarters at comparable operating utility companies. Given the consistency of its proposal with similarly situated utility companies, I believe the Company's proposed capital structure is reasonable and

appropriate. Regarding the cost of debt, the Company has proposed its actual net cost rate of 6.16 percent,[1] which I find reasonable and appropriate.

Q. Please provide a brief overview of the analyses that leads to your ROE recommendation.

A. Equity analysts and investors use multiple methods to develop their return requirements for investments. In order to develop my ROE recommendation, I relied on three widely-accepted approaches: The Constant Growth and Multi-Stage forms of the Discounted Cash Flow ("DCF") model, the Capital Asset Pricing Model ("CAPM"); and the Bond Yield Plus Risk Premium approach.

My recommendations and conclusions consider the risks associated with (1) the Company's comparatively small size; and (2) flotation costs associated with equity issuances. Although I did not make any explicit adjustments to my ROE estimates for those factors, I did take them into consideration in determining the range in which the Company's Cost of Equity likely falls.

Q. How is the remainder of your testimony organized?

A. The remainder of my testimony is organized as follows:

- Section III – Provides a summary of my conclusions and recommendations;
- Section IV – Discusses the regulatory guidelines and financial considerations pertinent to the development of the cost of capital;

[1] *See*, Schedule RevReq 6-4.

- Section V – Explains my selection of the proxy group used to develop my analytical results;
- Section VI – Explains my analyses and the analytical bases for my ROE recommendation;
- Section VII – Provides a discussion of specific business risks that have a direct bearing on the Company's Cost of Equity;
- Section VIII – Highlights the current capital market conditions and their effect on the Company's Cost of Equity;
- Section IX – Addresses the reasonableness of the Company's proposed capital structure;
- Section X – Addresses the reasonableness of the Company's proposed Cost of Debt; and
- Section XI – Summarizes my conclusions and recommendations.

III. SUMMARY OF CONCLUSIONS

Q. What are the key factors considered in your analyses and upon which you base your recommended ROE?

A. My analyses and recommendations considered the following:

- The *Hope* and *Bluefield* decisions[2] that established the standards for determining a fair and reasonable allowed return on equity including: consistency of the allowed return with other businesses having similar risk; adequacy of the return to provide

[2] *Bluefield Waterworks & Improvement Co. v. Public Service Comm'n of West Virginia*, 262 U.S. 679 (1923); *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944).

access to capital and support credit quality; and that the end result must lead to just and reasonable rates.

- The Company's business risks relative to the proxy group of comparable companies and the implications of those risks in arriving at the appropriate ROE.
- The effect of the current capital market conditions on investors' return requirements.

Q. What are the results of your analyses?

A. The results of my analyses are summarized in Table 1.

Table 1: Summary of Analytical Results

Discounted Cash Flow	***Mean Low***	***Mean***	***Mean High***
Constant Growth DCF			
30-Day Constant Growth DCF	7.47%	9.25%	11.59%
90-Day Constant Growth DCF	7.57%	9.36%	11.69%
180-Day Constant Growth DCF	7.68%	9.47%	11.81%
Multi-Stage DCF (Gordon Method)			
30-Day Multi-Stage DCF	8.21%	8.61%	9.20%
90-Day Multi-Stage DCF	8.31%	8.73%	9.34%
180-Day Multi-Stage DCF	8.42%	8.85%	9.48%
Multi-Stage DCF (Terminal P/E)			
30-Day Multi-Stage DCF	7.91%	9.05%	10.54%
90-Day Multi-Stage DCF	8.22%	9.37%	10.87%
180-Day Multi-Stage DCF	8.53%	9.69%	11.19%
CAPM Results		***Bloomberg Derived Market Risk Premium***	***Value Line Derived Market Risk Premium***
Average Bloomberg Beta Coefficient			
Current 30-Year Treasury (2.97%)		9.53%	9.99%
Near Term Projected 30-Year Treasury (3.43%)		9.99%	10.45%
Average Value Line Beta Coefficient			
Current 30-Year Treasury (2.97%)		10.77%	11.31%
Near Term Projected 30-Year Treasury (3.43%)		11.23%	11.77%
	Low	***Mid***	***High***
Bond Yield Risk Premium	9.93%	9.99%	10.24%
Flotation Costs		0.11%	

Based on the analytical results presented in Table 1, and in light of the considerations discussed throughout the balance of my testimony regarding the Company's business and regulatory risks relative to the proxy group, it is my view that an ROE of 10.30 percent is

reasonable and appropriate.

IV. REGULATORY GUIDELINES AND FINANCIAL CONSIDERATIONS

Q. Please provide a brief summary of the guidelines established by the United States Supreme Court (the "Court") for the purpose of determining a utility's ROE.

A. The Court established the guiding principles for establishing a fair return for capital in two cases: (1) *Bluefield Water Works and Improvement Co. v. Public Service Comm'n of West Virginia* ("*Bluefield"*); and (2) *Federal Power Comm'n v. Hope Natural Gas Co.* ("*Hope"*).[3] In those cases, the Court recognized that the fair rate of return on equity should be (1) comparable to returns investors expect to earn on other investments of similar risk, (2) sufficient to assure confidence in the company's financial integrity, and (3) adequate to maintain and support the company's credit and to attract capital.

Q. Does New Hampshire precedent provide similar guidance?

A. Yes. The Commission's decision in Order No. 24,972 indicates that the Commission adheres to the capital attraction standard articulated in the Hope and Bluefield decisions.[4] That Order also states that the Commission is:

> [B]ound to set a rate of return that falls within a zone of reasonableness, neither so low to result in a confiscation of company property, nor so high as to result in extortionate charges to customers. A rate falling within the zone should, at a minimum, be sufficient to yield the cost of debt and equity capital necessary to provide the assets required for the discharge of the company's responsibility.[5]

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[3] *Bluefield Waterworks & Improvement Co., v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923); *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944).

[4] *See*, *Unitil Natural Gas, Inc. d/b/a National Grid NH*, Docket DG 08-009, Order No. 24,972 at 54-55 (May 29, 2009).

[5] *Ibid*., at 54. *See also*, *Appeal of Conservation Law Foundation*, 127 N.H. 606, 635 (1986).

Based on those standards, the authorized ROE should provide the Company with the opportunity to earn a fair and reasonable return, and should enable efficient access to external capital under a variety of market conditions.

V. PROXY GROUP SELECTION

Q. As a preliminary matter, why is it necessary to select a group of proxy companies to determine the Cost of Equity for Northern?

A. Because the ROE is a market-based concept, and Northern is not a publicly traded entity, it is necessary to establish a group of comparable publicly traded companies to serve as its "proxy." Even if Northern were a publicly traded entity, short-term events could skew its market value during a given period of time. A significant benefit of using a proxy group is that it serves to moderate the effects of anomalous, temporary events associated with any one company.

Q. Does the selection of a proxy group suggest that analytical results will be tightly clustered around average (*i.e.*, mean) results?

A. No. The DCF approach, for example, defines the Cost of Equity as the sum of the expected dividend yield and projected long-term growth. Despite the care taken to ensure risk comparability, market expectations with respect to future risks and growth opportunities will vary from company to company. Therefore, even within a group of similarly situated companies, it is common for analytical results to reflect a seemingly wide range. At issue, then, is how to estimate the Cost of Equity from within that range. That determination necessarily must consider a wide range of both empirical and

qualitative information.

Q. Please provide a summary profile of Northern.

A. Northern is a wholly owned subsidiary of Unitil Corporation, providing natural gas distribution service to approximately 32,000 customers in New Hampshire.[6]

Q. How did you select the companies included in your proxy group?

A. I began with the universe of companies that Value Line classifies as Electric Utilities and Natural Gas Utilities and applied the following screening criteria:

- Because certain of the models used in my analyses assumes that earnings and dividends grow over time, I excluded companies that do not consistently pay quarterly cash dividends;
- To ensure that the growth rates used in my analyses are not biased by a single analyst, all the companies in my proxy group have been covered by at least two utility industry equity analysts;
- All the companies in my proxy group have investment grade senior unsecured bond and/or corporate credit ratings from S&P;
- To incorporate companies that are primarily regulated gas distribution utilities, I have only included companies with at least 30.00 percent of operating income derived from regulated natural gas utility operations; and

[6] Northern Utilities, *Annual Report to the Public Utilities Commission of the State of New Hampshire*, Year Ended December 31, 2016, at 2.

- I eliminated companies that are currently known to be party to a merger, or other significant transaction.

Q. Based on those criteria, what is the composition of your proxy group?

A. The criteria discussed above results in a proxy group of the following nine companies provided in Table 2 below.

Table 2: Proxy Group

Company	Ticker
Atmos Energy Corporation	ATO
Black Hills Corporation	BKH
CenterPoint Energy, Inc.	CNP
Chesapeake Utilities Corporation	CPK
Northwest Natural Gas Company	NWN
Sempra Energy	SRE
Southwest Gas Corporation	SWX
Spire Inc.	SR
Vectren Corporation	VVC

Q. Do you believe that nine companies constitute a sufficiently large proxy group for the purpose of determining the Cost of Equity for a utility?

A. Yes, I do. Because all analysts use some form of screening process to develop proxy groups, those groups, by definition, are not randomly drawn from a larger population. Consequently, there is no reason to place more reliance on the range of results derived from a larger, but potentially less comparable proxy group simply by virtue of the larger number of observations. Moreover, because I am using market-based data, my analytical results will not necessarily be tightly clustered around a central point. Results that may be somewhat dispersed, however, do not suggest that the screening approach is

inappropriate or the results less meaningful. Including companies whose fundamental comparability to the subject company is tenuous, simply for the purpose of expanding the number of observations, does not add relevant information to the analysis.

VI. COST OF EQUITY ESTIMATION

Q. Please briefly discuss the ROE in the context of the regulated rate of return.

A. Regulated utilities primarily use common stock and long-term debt to finance their capital investments. The overall rate of return ("ROR") weighs the costs of the individual sources of capital by their respective book values. Whereas the costs of debt and preferred stock can be directly observed, the Cost of Equity cannot; rather, it must be estimated from market-based information.

Q. How is the required ROE determined?

A. The ROE is estimated by applying various financial models to market-based data. By their very nature, those models produce a range of results, from which the market-required ROE must be determined. As discussed throughout my testimony, that determination must be based on a comprehensive review of relevant data and information, and does not necessarily lend itself to a strict mathematical solution. The key consideration in determining the ROE is to ensure the overall analysis reasonably reflects investors' view of the financial markets in general, and the subject company (in the context of the proxy companies) in particular.

Although several models have been developed for that purpose, all are subject to limiting assumptions or other constraints. Consequently, many finance texts recommend using

multiple approaches to estimate the Cost of Equity.[7] When faced with the task of estimating the Cost of Equity, analysts and investors are inclined to gather and evaluate as much relevant data as reasonably can be analyzed and, therefore, rely on multiple analytical approaches.

Lastly, as a practical matter no individual model is more reliable than all others under all market conditions. Therefore, it is both prudent and appropriate to use multiple methods to mitigate the effects of assumptions and inputs associated with any single approach. As such, I have considered the Constant Growth and Multi-Stage forms of the DCF model, the Capital Asset Pricing Model, and the Bond Yield Plus Risk Premium approach.

Constant Growth DCF Model

Q. Are DCF models widely used in regulatory proceedings?

A. Yes. In my experience, the Constant Growth DCF model is widely recognized in regulatory proceedings, as well as in financial literature. Nonetheless, neither the DCF nor any other model should be applied without considerable judgment in the selection of data and the interpretation of results.

Q. Please describe the DCF approach.

A. The Constant Growth DCF approach is based on the theory that a stock's current price represents the present value of all expected future cash flows. In its simplest form, the

[7] *See*, for example, Eugene Brigham, Louis Gapenski, Financial Management: Theory and Practice, 7th Ed., 1994, at 341; and Tom Copeland, Tim Koller and Jack Murrin, Valuation: Measuring and Managing the Value of Companies, 3rd ed., 2000, at 214.

Constant Growth DCF model expresses the Cost of Equity as the discount rate that sets the current price equal to expected cash flows:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_\infty}{(1+k)^\infty} \qquad \text{Equation [1]}$$

where P represents the current stock price, $D_1 \ldots D_\infty$ represent expected future dividends, and k is the discount rate, or required ROE. Equation [1] is a standard present value calculation that can be simplified and rearranged into the familiar form:

$$k = \frac{D(1+g)}{P_0} + g \qquad \text{Equation [2]}$$

Equation [2] often is referred to as the "Constant Growth DCF" model, in which the first term is the expected dividend yield and the second term is the expected long-term annual growth rate.

Q. What assumptions are required for the Constant Growth DCF model?

A. The Constant Growth DCF model assumes: (1) a constant average annual growth rate for earnings and dividends; (2) a stable dividend payout ratio; (3) a constant price-to-earnings ("P/E") multiple, and; (4) a discount rate greater than the expected growth rate. Under those assumptions, dividends, earnings, book value, and the stock price all grow at the same, constant rate. The model further assumes that the current Cost of Equity (that is, the model's results) will remain unchanged, in perpetuity.

Q. What market data did you use to calculate the dividend yield component of your DCF model?

A. The dividend yield is based on the proxy companies' current annualized dividend, and

average closing stock prices over the 30-, 90-, and 180-trading day periods as of April 28, 2017.

Q. Why did you use three averaging periods to calculate an average stock price?

A. I did so to ensure that the model's results are not skewed by anomalous events that may affect stock prices on any given trading day. At the same time, the averaging period should be reasonably representative of expected capital market conditions over the long term. In my view, using 30-, 90-, and 180-day averaging periods reasonably balances those concerns.

Q. Did you make any adjustments to the dividend yield to account for periodic growth in dividends?

A. Yes. Because utilities increase their quarterly dividends at different times throughout the year, it is reasonable to assume that dividend increases will be evenly distributed over calendar quarters. Given that assumption, it is appropriate to calculate the expected dividend yield by applying one-half of the long-term growth rate to the current dividend yield. *See*, Schedule RBH-2. That adjustment ensures that the expected dividend yield is representative of the coming twelve-month period, and does not overstate the dividends to be paid during that time.

Q. Is it important to select appropriate measures of long-term growth in applying the DCF model?

A. Yes. In its Constant Growth form, the DCF model (*i.e.*, as presented in Equation [2] above) assumes a single growth estimate in perpetuity. Accordingly, to reduce the long-

term growth rate to a single measure, one must assume a fixed payout ratio, and the same constant growth rate for earnings per share ("EPS"), dividends per share, and book value per share. Because dividends are sustained by earnings growth, the model should incorporate a variety of measures of long-term earnings. That can be accomplished by averaging those measures of long-term growth that tend to be least influenced by capital allocation decisions that companies may make in response to near-term changes in the business environment. Because such decisions may directly affect near-term dividend payout ratios, estimates of earnings growth are more indicative of long-term investor expectations than are dividend growth estimates. Therefore, for the purposes of the Constant Growth DCF model, growth in EPS represents the appropriate measure of long-term growth.

Q. Please summarize the findings of academic research on the appropriate measure for estimating equity returns using the DCF model.

A. The relationship between various growth rates and stock valuation metrics has been the subject of much academic research.[8] As noted over 40 years ago by Charles Phillips in The Economics of Regulation:

> For many years, it was thought that investors bought utility stocks largely on the basis of dividends. More recently, however, studies indicate that the market is valuing utility stocks with reference to total per share earnings, so that the earnings-price ratio has assumed increased emphasis in rate cases.[9]

Phillips' conclusion continues to hold true. Subsequent academic research clearly and

[8] *See*, Harris, Robert, *Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return*, Financial Management (Spring 1986).

[9] Charles F. Phillips, Jr., The Economics of Regulation, at 285 (Rev. ed. 1969).

consistently has indicated that measures of earnings and cash flow are strongly related to returns, and that analysts' forecasts of growth are superior to other measures of growth in predicting stock prices.[10] For example, Vander Weide and Carleton state that "[our] results … are consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy-and-sell decisions."[11] Other research specifically notes the importance of analysts' growth estimates in determining the Cost of Equity, and in the valuation of equity securities. Dr. Robert Harris noted "a growing body of knowledge shows that analysts' earnings forecasts are indeed reflected in stock prices." Citing Cragg and Malkiel, Dr. Harris notes that those authors "found that the evaluations of companies that analysts make are the sorts of ones on which market valuation is based."[12] Similarly, Brigham, Shome, and Vinson noted that "evidence in the current literature indicates that (i) analysts' forecasts are superior to forecasts based solely on time series data, and (ii) investors do rely on analysts' forecasts."[13]

To that point, the research of Carleton and Vander Weide demonstrates that earnings growth projections have a statistically significant relationship to stock valuation levels,

[10] *See, e.g.*, Christofi, Christofi, Lori and Moliver, *Evaluating Common Stocks Using Value Line's Projected Cash Flows and Implied Growth Rate*, Journal of Investing (Spring 1999); Harris and Marston, *Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts*, Financial Management, 21 (Summer 1992); and Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management (Spring 1988).

[11] Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management (Spring 1988). The Vander Weide and Carleton study was updated in 2004 under the direction of Dr. Vander Weide. The results of the updated study were consistent with the original study's conclusions.

[12] Robert S. Harris, *Using Analysts' Growth Forecasts to Estimate Shareholder Required Rate of Return*, Financial Management (Spring 1986).

[13] Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, Financial Management (Spring 1985).

while dividend growth rates do not.[14] Those findings suggest investors form their investment decisions based on expectations of growth in earnings, not dividends. Consequently, earnings growth, not dividend growth, is the appropriate estimate for the purpose of the Constant Growth DCF model.

Q. Please summarize your inputs to the Constant Growth DCF model.

A. I used the following inputs for the price and dividend terms:

1. The average daily closing prices for the 30-, 90-, and 180-trading days ended April 28, 2017, for the term P_0; and
2. The annualized dividend per share as of April 28, 2017, for the term D_0.

I then calculated my DCF results using each of the following growth terms:

1. The Zack's consensus long-term earnings growth estimates;
2. The First Call consensus long-term earnings growth estimates;
3. The Value Line long-term earnings growth estimates; and
4. The retention growth rate.

Q. Please describe the Retention Growth estimate as applied in your Constant Growth DCF model.

A. The Retention Growth model, which is a generally recognized and widely taught method of estimating long-term growth, is an alternative approach to the use of analysts' earnings growth estimates. In essence, the model is premised on the proposition that a firm's growth is a function of its expected earnings, and the extent to which it retains earnings to

[14] *See*, Vander Weide and Carleton, *Investor Growth Expectations: Analysts vs. History*, The Journal of Portfolio Management (Spring 1988).

invest in the enterprise. In its simplest form, the model represents long-term growth as the product of the retention ratio (i.e., the percentage of earnings not paid out as dividends, referred to below as ("b") and the expected return on book equity (referred to below as "r")). Thus, the simple "b x r" form of the model projects growth as a function of internally generated funds. That form of the model is limiting, however, in that it does not provide for growth funded from external equity.

The "br + sv" form of the Retention Growth estimate used in my DCF analysis is meant to reflect growth from both internally generated funds *(i.e.,* the "br" term) and from issuances of equity *(*i.e., the "sv" term). The first term, which is the product of the retention ratio (i.e., "b", or the portion of net income not paid in dividends) and the expected return on equity *(*i.e., "r") represents the portion of net income that is "plowed back" into the Company as a means of funding growth. The "sv" term is represented as:

$$\left(\frac{m}{b} - 1\right) \; x \; Growth \; rate \; in \; Common \; Shares \quad \text{Equation [3]}$$

where: $\frac{m}{b}$ is the Market-to-Book ratio.

In this form, the "sv" term reflects an element of growth as the product of (a) the growth in shares outstanding, and (b) that portion of the market-to-book ratio that exceeds unity. As shown in Schedule RBH-3, all of the components of the Retention Growth Model can be derived from data provided by Value Line.

Q. How did you calculate the high and low DCF results?

A. I calculated the mean high DCF results by using the maximum EPS growth rate estimate

as reported by Value Line, Zack's, and First Call, as well as the retention growth rate, in combination with the dividend yield for each of the proxy companies. The mean high result simply is the average of the maximum DCF results for the proxy group as a whole. I applied a similar approach to calculate the proxy group mean low results, using the minimum of the Value Line, Zack's, First Call, and retention growth estimates for each proxy company.

The Constant Growth DCF model is predicated on a number of assumptions, one of which is that the Price/Earnings ratio will remain constant, in perpetuity. Because the utility sector P/E ratios have expanded to the point that they recently have exceeded both their long-term average and the market P/E ratio, Constant Growth DCF model's results should be viewed with caution. As such, it is appropriate to consider additional methods, such as the CAPM approach and the Bond Yield Plus Risk Premium model, to corroborate the DCF-based estimates, and to indicate where the Company's Cost of Equity likely falls within the range of DCF-based results.

Multi-Stage DCF Model

Q. What other forms of the DCF model have you considered?

A. To address some of the limiting assumptions underlying the Constant Growth form of the DCF model, I also considered the results of a Multi-Stage (three-stage) DCF Model. The Multi-Stage model, which is an extension of the Constant Growth form, enables the analyst to specify growth rates over three discreet stages. As with the Constant Growth form of the DCF model, the Multi-Stage form defines the Cost of Equity as the discount rate that sets the current price equal to the discounted value of future cash flows. Unlike

the Constant Growth form, however, the Multi-Stage model must be solved in an iterative fashion.

Q. Please now summarize why you have included the Multi-Stage DCF method in your Cost of Equity estimation.

A. First, it is both prudent and appropriate to use multiple methods to mitigate the effects of assumptions and inputs associated with any single approach. Second, the Constant Growth DCF model assumes that earnings, dividends and book value will grow at the same, constant rate in perpetuity; that the payout ratio will remain constant in perpetuity; and that the Price/Earnings ratio will remain constant. In addition, the model assumes that the return required today will be the same return required every year in the future. As discussed above, those assumptions are not likely to hold. In particular, it is likely that over time, payout ratios will increase from their current levels. In addition, to the extent that long-term interest rates increase over the next few years as the Federal Reserve continues its process of policy "normalization", it is likely that the Cost of Equity also will increase. In my view, the Multi-Stage DCF model enables analysts to consider those issues, and to address the limiting, but likely unrealistic assumptions underlying the Constant Growth form of the model.

Q. Please describe the structure of your Multi-Stage DCF model.

A. As noted above, the Multi-Stage DCF model sets the subject company's stock price equal to the present value of future cash flows received over three "stages." In the first two stages, "cash flows" are defined as projected dividends. In the third stage, "cash flows" equal both dividends and the expected price at which the stock will be sold at the end of

the period (*i.e.*, the "terminal price"). The terminal price is calculated based on the Gordon model, which defines the price as the expected dividend divided by the difference between the Cost of Equity (*i.e.*, the discount rate) and the long-term expected growth rate (that is, the terminal price is defined by the present value of the remaining cash flows in perpetuity). In each stage, the dividend is the product of the projected earnings per share and the expected dividend payout ratio. A summary description of the model is provided in Table 3 (below).

Table 3: Multi-Stage DCF Structure

	Stage			
Component	**0**	**First**	**Second**	**Terminal**
Cash Flow	Initial Stock Price	Expected Dividend	Expected Dividend	Expected Dividend + Terminal Value
Inputs	• Stock Price • Earnings Per Share ("EPS") • Dividends Per Share ("DPS")	• Expected EPS • Expected DPS	• Expected EPS • Expected DPS	• Expected EPS • Expected DPS • Terminal Value
Assumptions	• 30-, 90-, and 180-day average stock price	• EPS Growth Rate • Payout Ratio	• Growth Rate Change • Payout Ratio Change	• Long-term Growth Rate • Long-term Payout Ratio

Q. What are the analytical benefits of your three-stage model?

A. The principal benefits relate to the flexibility provided by the model's structure. Because the model provides the ability to specify near, intermediate, and long-term growth rates, for example, it avoids the sometimes-limiting assumption that the subject company will

grow at the same, constant rate in perpetuity. In addition, by calculating the dividend as the product of earnings and the payout ratio, the model accommodates assumptions regarding the timing and extent of changes in the payout ratio to reflect, for example, increases or decreases in expected capital spending, or transition from current payout levels to long-term expected levels. In that regard, because the model relies on multiple sources of earnings growth rate assumptions, it is not limited to a single source, such as Value Line, for all inputs, and therefore mitigates the potential bias associated with relying on a single source of growth estimates.[15]

The model also enables the analyst to assess the reasonableness of the inputs and results by reference to certain market-based metrics. For example, the stock price estimate can be divided by the expected earnings per share in the final year to calculate the terminal P/E ratio. Similarly, the terminal P/E ratio can be divided by the terminal growth rate to develop a Price to Earnings Growth ("PEG") ratio. To the extent that the projected P/E or PEG ratios are inconsistent with either historical or expected levels, it may indicate incorrect or inconsistent assumptions within the balance of the model.

Q. Please summarize your inputs to the Multi-Stage DCF model.

A. I applied the Multi-Stage model to the proxy group described earlier in my testimony. My assumptions with respect to the various model inputs are described in Table 4 (below).

[15] *See*, for example, Harris and Marston, *Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts*, Financial Management, 21 (Summer 1992).

Table 4: Multi-Stage DCF Model Assumptions

	Stage			
Component	**Initial**	**First**	**Transition**	**Terminal**
Stock Price	30-, 90-, and 180-day average stock price as of April 28, 2017			
Earnings Growth	2015 actual EPS escalated by Period 1 growth rate	EPS growth as average of (1) Value Line; (2) Zack's; (3) First Call; and (4) Retention Growth rates	Transition to Long-term GDP growth	Long-term GDP growth
Payout Ratio		Value Line company-specific	Transition to long-term industry payout ratio	Long-term industry average
Terminal Value				Expected dividend in final year divided by solved Cost of Equity less long-term growth rate

Q. How did you calculate the long-term Gross Domestic Product ("GDP") growth rate?

A. The long-term growth rate of 5.48 percent is based on the real GDP growth rate of 3.22 percent from 1929 through 2016, and an inflation rate of 2.19 percent. The GDP growth rate is calculated as the compound growth rate in the chain-weighted GDP for the period from 1929 through 2016.[16] The rate of inflation of 2.19 percent is an average of two components: (1) the compound annual forward rate starting in ten years (*i.e.*, 2027, which

[16] *See*, Bureau of Economic Analysis, "Current-Dollar and 'Real' Gross Domestic Product," April 28, 2017 update.

is the beginning of the terminal period) based on the 30-day average spread between yields on long-term nominal Treasury Securities and long-term Treasury Inflation Protected Securities, known as the "TIPS spread" of 2.08 percent;[17] and (2) and the projected Blue Chip Financial Forecast of the CPI for 2023 – 2027 of 2.30 percent.[18]

In essence, the real GDP growth rate projection is based on the assumption that absent specific knowledge to the contrary, it is reasonable to assume that over time, real GDP growth will revert to its long-term mean. In addition, because estimating the Cost of Equity is a market-based exercise, it is important to reflect, to the extent possible, the sentiments and expectations of investors; those expectations are directly captured in the market-based measure of inflation. In that important respect, the TIPS spread represents the collective views of investors regarding long-term inflation expectations. Equally important, by using forward yields, we are able to infer the level of long-term inflation expected by investors as of the terminal period of the Multi-Stage model (that is, ten years in the future).

Q. What were your specific assumptions regarding the payout ratio?

A. As noted in Table 4, the first two periods rely on the first year and long-term projected payout ratios reported by Value Line for each of the proxy group companies.[19] Then by the end of the second period (*i.e.*, the end of year 10), it is assumed that the payout ratio

[17] *See*, Board of Governors of the Federal Reserve System, "Table H.15 Selected Interest Rates."
[18] *Blue Chip Financial Forecasts*, December 1, 2016, at 14.
[19] As reported in the Value Line Investment Survey as "All Div'ds to Net Prof."

will converge to the long-term industry average of 65.58 percent.[20]

Q. What was your principal assumption regarding the terminal value?

A. Although I performed a series of analyses in which the terminal value is calculated based on the assumed long-term nominal GDP growth rate,[21] I also completed a series of analyses in which the terminal value is based on the current P/E ratio.[22] The results of those analyses are shown in Table 5, below.

Q. How did you reflect the Mean Low Constant Growth DCF results in developing your ROE range and recommendation?

A. In my view, the mean low results are well below a reasonable estimate of the Company's ROE. For example, of 1,054 natural gas rate cases since 1980, only two included an authorized ROE below 9.00 percent.[23] As noted earlier, the Constant Growth DCF model is subject to certain assumptions, one of which is that the calculated Cost of Equity will remain constant in perpetuity. Given that no case has included an authorized ROE as low as the mean low constant growth DCF results since at least 1980, and knowing that market data suggests the potential for increases in interest rates in the future, I believe that it is unreasonable to conclude that the mean low results are meaningful estimates of the Company's forward-looking Cost of Equity.

[20] Source: Bloomberg Professional
[21] *See*, Schedule RBH-4.
[22] Defined as the 30-day average of the proxy group P/E ratio, calculated as an Index.
[23] Source: Regulatory Research Associates. See also Schedule RBH-8.

Q. If you do not believe the mean low results of your DCF models are reasonable, why have you provided them throughout your testimony?

A. Although I do not believe they should be given meaningful weight, it is important to provide transparency in the presentation of analyses. As such, I have provided the mean low results, which reflect the converse calculation of the mean high results. To be clear, the mean low DCF results are based entirely on the lowest growth rates. The mean results, for both the Constant Growth and Multi-Stage DCF models, are based on the average growth rate, including the lowest (and highest) estimates. Consequently, my DCF analyses certainly reflect the low projected growth rates.

Q. What are the results of the DCF analysis?

A. The Constant Growth and Multi-Stage DCF results are summarized in Table 5, below (*see* also Schedule RBH-2 and Schedule RBH-4).

Table 5: DCF Results

Constant Growth DCF	***Low***	***Mean***	***High***
30-Day Average	7.47%	9.25%	11.59%
90-Day Average	7.57%	9.36%	11.69%
180-Day Average	7.68%	9.47%	11.81%
Multi-Stage DCF (Gordon Method)	***Low***	***Mean***	***High***
30-Day Average	8.21%	8.61%	9.20%
90-Day Average	8.31%	8.73%	9.34%
180-Day Average	8.42%	8.85%	9.48%
Multi-Stage DCF (Terminal P/E)	***Low***	***Mean***	***High***
30-Day Average	7.91%	9.05%	10.54%
90-Day Average	8.22%	9.37%	10.87%
180-Day Average	8.53%	9.69%	11.19%

As discussed in more detail in Section VII, analytical models and their results must be considered in the context of the current capital market environment. There is no single analytical model used to estimate the Cost of Equity which is appropriate under all market conditions. Because DCF-based methods rely heavily on current market prices, and given that recent utility valuations are high relative to historical measures,[24] the mean results likely understate the Company's Cost of Equity. It is for that reason that it is important to consider various methods and their results to corroborate the DCF-based results.

Q. Did you undertake any additional analyses to support your ROE recommendation?

A. Yes. To provide additional information as to where the ROE likely falls within the range of DCF-based results, I also applied the CAPM and Risk Premium analyses, both of which are discussed below.

CAPM Analysis

Q. Please briefly describe the general form of the CAPM analysis.

A. The CAPM is a risk premium approach that estimates the Cost of Equity for a given security as a function of a risk-free return plus a risk premium (to compensate investors for the non-diversifiable or "systematic" risk of that security). As shown in Equation [4], the CAPM is defined by four components, each of which theoretically must be a forward-looking estimate:

$$K_e = r_f + \beta(r_m - r_f) \qquad \text{Equation [4]}$$

[24] That issue is discussed in more detail in Section VII.

where:

K_e = the required market ROE for a security;

β = the Beta coefficient of that security;

r_f = the risk-free rate of return; and

r_m = the required return on the market as a whole.

In Equation [4], the term ($r_m - r_f$) represents the Market Risk Premium.[25] According to the theory underlying the CAPM, since unsystematic risk can be diversified away by adding securities to their investment portfolio, investors should be concerned only with systematic or non-diversifiable risk. Non-diversifiable risk is measured by the Beta coefficient, which is defined as:

$$\beta_j = \frac{\sigma_j}{\sigma_m} x \rho_{j,m} \qquad \text{Equation [5]}$$

Where σ_j is the standard deviation of returns for company "*j*," σ_m is the standard deviation of returns for the broad market (as measured, for example, by the S&P 500 Index), and $\rho_{j,m}$ is the correlation of returns in between company *j* and the broad market. The Beta coefficient therefore represents both relative volatility (*i.e.*, the standard deviation) of returns, and the correlation in returns between the subject company and the overall market.

Intuitively, higher Beta coefficients indicate that the subject company's returns have been relatively volatile, and have moved in tandem with the overall market. Consequently, if a

[25] The Market Risk Premium is defined as the incremental return of the market over the risk-free rate.

company has a Beta coefficient of 1.00, it is as risky as the market and does not provide any diversification benefit.

Q. What assumptions regarding the risk-free rate did you include in your CAPM analysis?

A. Because utility equity is a long-duration investment, I used two different estimates of the risk-free rate: (1) the current 30-day average yield on 30-year Treasury bonds (*i.e.*, 2.97 percent); and (2) the near-term projected 30-year Treasury yield (*i.e.*, 3.43 percent).[26]

Q. Why have you relied upon the 30-year Treasury yield for your CAPM analysis?

A. In determining the security most relevant to the application of the CAPM, it is important to select the term (or maturity) that best matches the life of the underlying investment. Natural gas utilities typically are long-duration investments and as such, the 30-year Treasury yield is more suitable for the purpose of calculating the Cost of Equity.

Q. Please describe your ex-ante approach to estimating the Market Risk Premium.

A. The *ex-ante* Market Risk Premium reflects the expected market required return, less the current 30-year Treasury yield. To estimate the expected market return, I calculated the average ROE based on the Constant Growth DCF model. To do so, I relied on data from Bloomberg, and Value Line. For both sources, I calculated the average expected dividend yield (using the same one-half growth rate assumption described earlier) and combined that amount with the average projected earnings growth rate to arrive at the

[26] *See*, Blue Chip Financial Forecasts, Vol. 36, No. 5, May 1, 2017, at 2. Consensus projections of the 30-year Treasury yield for the six quarters ending the third quarter 2018.

average DCF result. I then subtracted the current 30-year Treasury yield from that amount to arrive at the market DCF-derived *ex-ante* Market Risk Premium estimate. The results of those two calculations are provided in Schedule RBH-5.

Q. What Beta coefficients did you use in your CAPM analysis?

A. My approach includes the average reported Beta coefficient from Bloomberg and Value Line for each of the proxy companies (*see,* Schedule RBH-6). Value Line calculates the Beta coefficient over a five-year period, whereas Bloomberg's calculation is based on two years of data; both services adjust their calculated (or raw) Beta coefficients to reflect the tendency of the Beta coefficient to regress to the market mean of 1.00 (*see*, Schedule RBH-6).

Q. What are the results of your CAPM analysis?

A. The results of my CAPM analysis are summarized in Table 6, below (*see* also Schedule RBH-7).

Table 6: Summary of CAPM Results

	Bloomberg Derived Market Risk Premium	***Value Line Derived Market Risk Premium***
Average Bloomberg Beta Coefficient		
Current 30-Year Treasury (2.97%)	9.53%	9.99%
Near Term Projected 30-Year Treasury (3.43%)	9.99%	10.45%
Average Value Line Beta Coefficient		
Current 30-Year Treasury (2.97%)	10.77%	11.31%
Near Term Projected 30-Year Treasury (3.43%)	11.23%	11.77%

Bond Yield Plus Risk Premium Approach

Q. Please generally describe the Bond Yield Plus Risk Premium approach.

A. This approach is based on the basic financial principle that because equity investors bear the residual risk associated with ownership, they require a premium over the return they would have earned as a bondholder. That is, because returns to equity holders are riskier than returns to bondholders, equity investors must be compensated for that additional risk. Risk premium approaches therefore estimate the Cost of Equity as the sum of the equity risk premium and the yield on a particular class of bonds. The equity risk premium typically is estimated using a variety of approaches, some of which incorporate *ex-ante*, or forward-looking estimates of the Cost of Equity, and others that consider historical, or *ex-post*, estimates. An alternative approach is to use actual authorized returns for natural gas utilities to estimate the Equity Risk Premium.

Q. Please explain how you performed your Bond Yield Plus Risk Premium analysis.

A. I first defined the Risk Premium as the difference between the authorized ROE and the

then-prevailing level of long-term (i.e., 30-year) Treasury yield. I then gathered data for 1,054 natural gas rate proceedings between January, 1980 and April 28, 2017. In addition to the authorized ROE, I also calculated the average period between the filing of the case and the date of the final order (the "lag period"). To reflect the prevailing level of interest rates during the term of the proceedings, I calculated the average 30-year Treasury yield over the average lag period (approximately 188 days).

Because the data covers a number of economic cycles,[27] the analysis also may be used to assess the stability of the Equity Risk Premium, which is not constant; prior research has shown that it is directly related to expected market volatility, and inversely related to the level of interest rates.[28] That finding is particularly relevant given the historically low level of current Treasury yields.

Q. How did you model the relationship between interest rates and the Equity Risk Premium?

A. I modeled the relationship using regression analysis, in which the observed Equity Risk Premium is the dependent variable, and the average 30-year Treasury yield is the independent variable. Relative to the long-term historical average, the analytical period includes interest rates and authorized ROEs that are quite high during one period (*i.e.*, the 1980s) and that are quite low during another (*i.e.*, the post-Lehman bankruptcy period).

[27] *See*, National Bureau of Economic Research, *U.S. Business Cycle Expansion and Contractions*.

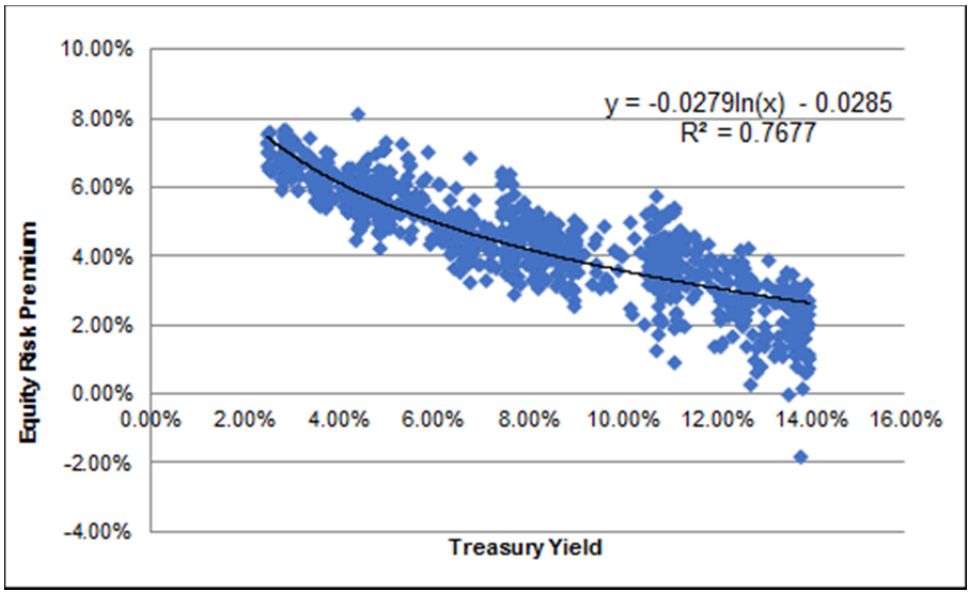
[28] *See*, *e.g.*, Robert S. Harris and Felicia C. Marston, *Estimating Shareholder Risk Premia Using Analysts' Growth Forecasts*, Financial Management, Summer 1992, at 63-70; Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, Financial Management, Spring 1985, at 33-45; and Farris M. Maddox, Donna T. Pippert, and Rodney N. Sullivan, *An Empirical Study of Ex Ante Risk Premiums for the Electric Utility Industry*, Financial Management, Autumn 1995, at 89-95.

To account for that variability, I used the semi-log model, in which the Equity Risk Premium is expressed as a function of the natural log of the 30-year Treasury yield:

$$RP = \alpha + \beta(LN(T_{30})) \quad \text{Equation [6]}$$

As shown on Chart 1 (below), the semi-log form is useful when measuring an absolute change in the dependent variable (in this case, the Risk Premium) relative to a proportional change in the independent variable (the 30-year Treasury yield).

Chart 1: Equity Risk Premium



As Chart 1 illustrates, over time there has been a statistically significant, negative relationship between the 30-year Treasury yield and the Equity Risk Premium. Consequently, simply applying the long-term average Equity Risk Premium of 4.57 percent would significantly understate the Cost of Equity and produce results well below any reasonable estimate. Based on the regression coefficients in Chart 1, however, the implied ROE is between 9.93 percent and 10.24 percent (*see*, Schedule RBH-8).

VII. BUSINESS RISKS AND OTHER CONSIDERATIONS

Q. What additional information did you consider in assessing the analytical results noted above?

A. Because the analytical methods discussed above provide a range of estimates, there are several additional factors that should be taken into consideration when establishing a reasonable range for the Company's Cost of Equity. Those factors include the Company's comparatively small size and the costs associated with the flotation of common stock.

Small Size Premium

Q. Please explain the risk associated with small size.

A. Both the financial and academic communities have long accepted the proposition that the Cost of Equity for small firms is subject to a "size effect".[29] Although empirical evidence of the size effect often is based on studies of industries beyond regulated utilities, utility analysts also have noted the risks with associated small market capitalizations. Specifically, Ibbotson Associates noted:

> For small utilities, investors face additional obstacles, such as smaller customer base, limited financial resources, and a lack of diversification across customers, energy sources, and geography. These obstacles imply a higher investor return.[30]

Small size, therefore, leads to two categories of increased risk for investors: (1) liquidity risk (*i.e.*, the risk of not being able to sell one's shares in a timely manner due to the relatively thin market for the securities); and (2) fundamental business risks.

[29] *See*, Mario Levis, *The record on small companies: A review of the evidence*, Journal of Asset Management 2, March 2002, at 368-397, for a review of literature relating to the size effect.

[30] Michael Annin, *Equity and the Small-Stock Effect*, Public Utilities Fortnightly, October 15, 1995.

Q. How does Northern compare in size to the proxy companies?

A. Northern is significantly smaller than the average for the proxy companies, both in terms of number of customers and market capitalization. Because Northern is not a separately traded entity, an estimate of its stand-alone market capitalization must be calculated. To do so, I applied the median market to book ratio for the seven-member proxy group to Northern's implied equity of $68 million.[31] The implied market capitalization based on that calculation is $155 million, which is approximately 4.00 percent of the median level of the proxy group.

Q. How did you evaluate the risks associated with the Company's relatively small size?

A. In its *2016 Valuation Handbook*, Duff & Phelps calculates the size premium for deciles of market capitalizations relative to the S&P 500 Index. As shown on Schedule RBH-9, based on recent market data, the average market capitalization of the proxy group is approximately $7.44 billion, and the median market capitalization of the proxy group is $3.98 billion, which correspond to the fourth decile of Duff & Phelps's market capitalization data. Using the median market capitalization in the Duff & Phelps analysis, the proxy group has a size premium of 0.99 percent. The implied market capitalization for Northern is approximately $67.98 million, which falls within the tenth decile and corresponds to a size premium of 5.60 percent (or 560 basis points). The difference between those size premiums is 461 basis points (5.60 percent – 0.99 percent). However, rather than propose a specific adjustment, I considered the effect of small size

[31] Stockholder equity was calculated by applying the proposed equity ratio of 51.70 percent to the proforma rate base for Northern Utilities of $131 million (*see,* Schedule RevReq-5).

in determining where the Company's ROE falls within the range of results.

Flotation Costs

Q. What are flotation costs?

A. Flotation costs are the costs associated with the sale of new issues of common stock. These include out-of-pocket expenditures for preparation, filing, underwriting, and other costs of issuance.

Q. Why is it important to recognize flotation costs in the allowed ROE?

A. To attract and retain new investors, a regulated utility must have the opportunity to earn a return that is both competitive and compensatory. To the extent a company is denied the opportunity to recover prudently-incurred flotation costs, actual returns will fall short of expected (or required) returns, thereby diminishing its ability to attract adequate capital on reasonable terms.

Q. Are flotation costs part of the utility's invested costs or part of the utility's expenses?

A. Flotation costs are part of capital costs, which are properly reflected on the balance sheet under "paid in capital" rather than current expenses on the income statement. Flotation costs are incurred over time, just as investments in rate base or debt issuance costs. As a result, the great majority of flotation costs is incurred prior to the test year, but remains part of the cost structure during the test year and beyond.

Q. Do the DCF and CAPM models already incorporate investor expectations of a return in order to compensate for flotation costs?

A. No. The models used to estimate the appropriate ROE assume no "friction" or transaction costs, as these costs are not reflected in the market price (in the case of the DCF model) or risk premium (in the case of the CAPM and the Bond Yield Plus Risk Premium model). Therefore, it is appropriate to consider flotation costs when determining where within the range of reasonable results Northern's return likely falls.

Q. Is the need to consider flotation costs recognized by the academic and financial communities?

A. Yes. The need to reimburse investors for equity issuance costs is recognized by the academic and financial communities in the same spirit that investors are reimbursed for the costs of issuing debt. That treatment is consistent with the philosophy of a fair rate of return. As explained by Dr. Shannon Pratt:

> Flotation costs occur when a company issues new stock. The business usually incurs several kinds of flotation or transaction costs, which reduce the actual proceeds received by the business. Some of these are direct out-of-pocket outlays, such as fees paid to underwriters, legal expenses, and prospectus preparation costs. Because of this reduction in proceeds, the business's required returns must be greater to compensate for the additional costs. Flotation costs can be accounted for either by amortizing the cost, thus reducing the net cash flow to discount, or by incorporating the cost into the cost of equity capital. Since flotation costs typically are not applied to operating cash flow, they must be incorporated into the cost of equity capital.[32]

[32] Shannon P. Pratt, Roger J. Grabowski, Cost of Capital: Applications and Examples, 4th ed. (John Wiley & Sons, Inc., 2010), page 586.

Q. How did you calculate the flotation cost recovery adjustment?

A. I modified the DCF calculation to provide a dividend yield that would reimburse investors for issuance costs. My flotation cost adjustment recognizes the costs of issuing equity that were incurred by the Company and the proxy group companies in their most recent two issuances. As shown in Schedule RBH-10, an adjustment of 0.11 percent (*i.e.*, 11 basis points) reasonably represents flotation costs for the Company.

Q. Are you proposing to adjust your recommended ROE by 11 basis points to reflect the effect of flotation costs on Northern's ROE?

A. No, I am not. Rather, I have considered the effect of flotation costs, in addition to the Company's other business risks, in determining where the Company's ROE falls within the range of results.

VIII. CAPITAL MARKET ENVIRONMENT

Q. Do economic conditions influence the required cost of capital and required return on common equity?

A. Yes. As discussed in Section VI, the models used to estimate the Cost of Equity are meant to reflect, and therefore are influenced by, current and expected capital market conditions. As such, it is important to assess the reasonableness of any financial model's results in the context of observable market data. To the extent that certain ROE estimates are incompatible with such data or inconsistent with basic financial principles, it is appropriate to consider whether alternative estimation techniques are likely to provide more meaningful and reliable results.

Q. Do you have any general observations regarding the relationship between Federal Reserve monetary policy, capital market conditions, and Northern's Cost of Equity?

A. Yes, I do. Much has been reported about the Federal Reserve's Quantitative Easing policy and its effect on interest rates. Although the Federal Reserve completed its Quantitative Easing initiative in October 2014, it was not until December 2015 that it raised the Federal Funds rate, and began the process of rate normalization.[33] Therefore, a significant issue is how investors will react as that process continues, and eventually is completed. A viable outcome is that investors will perceive greater chances for economic growth, which will increase the growth rates included in the Constant Growth DCF model. At the same time, higher growth and the absence of Federal market intervention could provide the opportunity for interest rates to increase, thereby increasing the dividend yield portion of the DCF model. In that case, both terms of the Constant Growth DCF model would increase, producing increased ROE estimates.

More recently, interest rates have risen and become increasingly volatile. In the equity markets, sectors that historically have included dividend-paying companies have lost value, as increasing interest rates have provided investors with other sources of current yields. Because those dynamics affect different models in different ways, under current market conditions it would be unwise to rely on a single method to estimate the Company's Cost of Equity. A more reasoned approach is to understand the relationships among Federal Reserve policies, interest rates, and measures of market risk, and to assess how those factors may affect different models and their results. As discussed throughout

[33] *See*, Federal Reserve Press Release (December 16, 2015).

my Direct Testimony, the current market is one in which it is very important to consider a broad range of data and models when determining the Cost of Equity.

Q. Please summarize the effect of recent Federal Reserve policies on interest rates and the cost of capital.

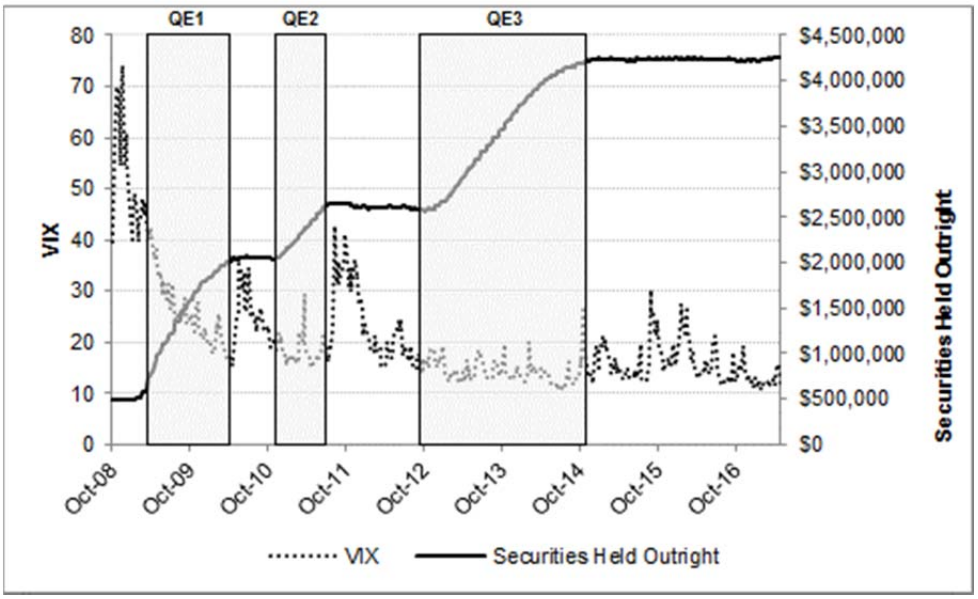
A. Beginning in 2008, the Federal Reserve proceeded on a steady path of initiatives intended to lower long-term Treasury yields.[34] The Federal Reserve policy actions "were designed to put downward pressure on longer-term interest rates by having the Federal Reserve take onto its balance sheet some of the duration and prepayment risks that would otherwise have been borne by private investors."[35] Under that policy, "Securities held outright" on the Federal Reserve's balance sheet increased from approximately $489 billion at the beginning of October 2008 to $4.25 trillion by April 2017.[36] To put that increase in context, the securities held by the Federal Reserve represented approximately 3.29 percent of Gross Domestic Product ("GDP") at the end of September 2008, and had risen to approximately 22.37 percent of GDP in April 2017.[37] As such, the Federal Reserve policy actions have represented a significant source of liquidity, and have had a substantial effect on capital markets.

Just as market intervention by the Federal Reserve has reduced interest rates, it also had the effect of reducing market volatility. As shown in Chart 2 (below), each time the

[34] *See*, Federal Reserve Press Release, dated June 19, 2013.
[35] Federal Reserve Bank of New York, *Domestic Open Market Operations During 2012*, April 2013, at 29.
[36] Source: Federal Reserve Board Exhibit H.4.1. "Securities held outright" include U.S. Treasury securities, Federal agency debt securities, and mortgage-backed securities
[37] Source: Federal Reserve Board Exhibit H.4.1; Bureau of Economic Analysis.

Federal Reserve began to purchase bonds (as evidenced by the increase in "Securities Held Outright" on its balance sheet), volatility subsequently declined. In fact, in September 2012, when the Federal Reserve began to purchase long-term securities at a pace of $85 billion per month, volatility (as measured by the CBOE Volatility Index, known as the "VIX") fell, and through October 2014 remained in a relatively narrow range. The reason is quite straight-forward: Investors became confident that the Federal Reserve would intervene if markets were to become unstable.

Chart 2: VIX and Federal Reserve Asset Purchases[38]



The important analytical issue is whether we can infer that risk aversion among investors is at a historically low level, implying a Cost of Equity that is well below recently authorized returns. Given the negative correlation between the expansion of the Federal Reserve's balance sheet and the VIX, it is difficult to conclude that fundamental risk aversion and investor return requirements have fallen. If it were the case that investors

[38] Source: Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis; Federal Reserve Statistical Release H.4.1, Factors Affecting Reserve Balances.

believe that volatility will remain at low levels (that is, that market risk and uncertainty will remain low), it is not clear why they would decrease their return requirements for defensive sectors such as utilities. In that respect, it appears that the Constant Growth DCF results are at odds with market conditions.

Q. Does your recommendation also consider the interest rate environment?

A. Yes, it does. From an analytical perspective, it is important that the inputs and assumptions used to arrive at an ROE recommendation, including assessments of capital market conditions, are consistent with the recommendation itself. Although I appreciate that all analyses require an element of judgment, the application of that judgment must be made in the context of the quantitative and qualitative information available to the analyst and the capital market environment in which the analyses were undertaken.

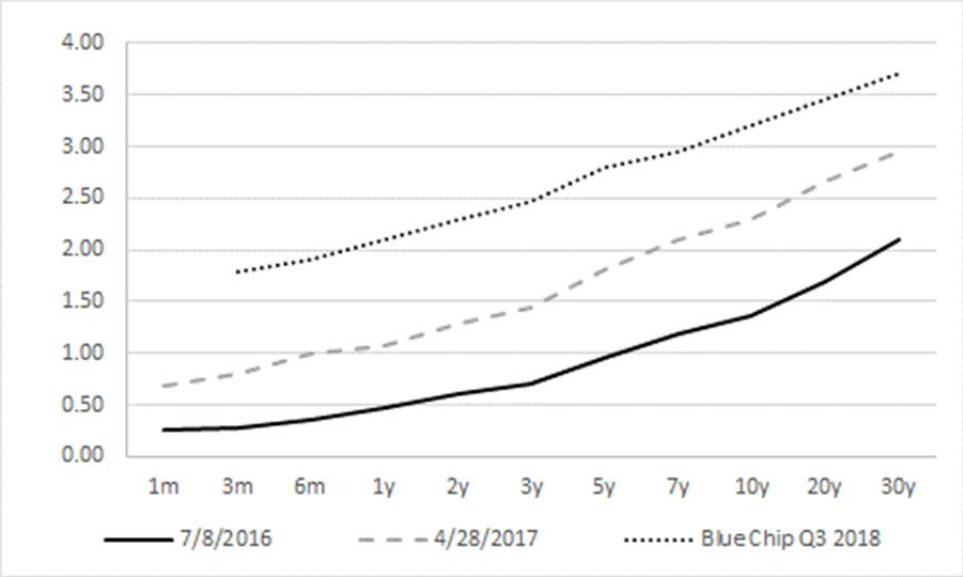
The low interest rate environment associated with central bank intervention may lead some analysts to conclude that current capital costs, including the Cost of Equity, are low and will remain as such. However, that conclusion only holds true under the hypothesis of Perfectly Competitive Capital Markets ("PCCM") and the classical valuation framework which, under normal economic and capital market conditions, underpin the traditional Cost of Equity models. Perfectly Competitive Capital Markets are those in which no single trader, or "market-mover", would have the power to change the prices of goods or services, including bond and common stock securities. In other words, under the PCCM hypothesis, no single trader would have a significant effect on market prices.

Classic valuation theory assumes that investors trade securities rationally, with prices reflecting their perceptions of value. Although central banks have the ability to set benchmark interest rates, they have been maintaining below normal rates to stimulate continued economic and capital market recovery. It therefore is reasonable to conclude that the Federal Reserve and other central banks have been acting as market-movers, thereby having a significant effect on the market prices of both bonds and stocks. The presence of market-movers, such as the Federal Reserve, runs counter to the PCCM hypothesis, which underlies traditional Cost of Equity models. Consequently, the results of those models should be considered in the context of both quantitative and qualitative information.

Although the Federal Reserve's market intervention policies have kept interest rates historically low, since July 8, 2016 (when the 30-year Treasury yield hit an all-time low of 2.11 percent), rates have risen. As the Federal Reserve increased the Federal Funds target rate by 25 basis points in December 2016 (from 0.25 percent - 0.50 percent to 0.50 percent - 0.75 percent) and again in March 2017 (to 0.75 percent - 1.00 percent), short-term interest rates increased by a corresponding amount.[39] Long-term yields increased by wider margins, with the 10-year and 30-year Treasury yields increasing by 92 basis points and 85 basis points, respectively, by April 28, 2017 (*see* Chart 3 below).

[39] Federal Reserve Board Exhibit H.15. 6-month and 1-year Treasury yields both increased by 63 and 59 basis points, respectively, from July 8, 2016 to April 28, 2017.

Chart 3: Treasury Yield Curve: 7/8/2016, 4/28/2017 and Projected Q3 2018[40]



The increase in the ten- and 30-year yields from July 2016 to April 2017 is among the highest increase in at least 25 years.[41] That increase in Treasury yields is highly related to increasing inflation. To that point, leading up to and following the November 2016 Presidential election expected inflation, as measured by the difference between nominal Treasury yields and Treasury Inflation Protected Securities (that difference often is referred to as the "TIPS spread") also increased, such that it stands somewhat above the Federal Reserve's 2.00 percent inflation target (*see* Chart 4, below).

[40] Sources: Federal Reserve Board Exhibit H.15.; Blue Chip Financial Forecasts, Vol. 36, No.3, March 1, 2017, at 2. 3-year, 7-year and 20-year projected Treasury yields interpolated.

[41] Source: Federal Reserve Exhibit H.15. The increases fall in the top 94th percentiles for both the 10 and 30-year Treasury yields, respectively.

Chart 4: Forward Inflation Estimates 7/8/2016 – 4/28/2017[42]

The increase in both long-term interest rates and inflation, particularly considering the magnitude of the changes over an abbreviated period, suggest higher investor return requirements.

Q. Does market-based data indicate that investors see a probability of increasing interest rates?

A. Yes. Forward Treasury yields implied by the slope of the yield curve and published projections by sources such as *Blue Chip Financial Forecasts* (which provides consensus estimates from approximately 50 professional economists) indicate investors expect long-term interest rates to increase. Similarly, investors' expectations for increased long-term Treasury yields are apparent in the prices investors are willing to pay today for the option to buy or sell long-term Government bonds, at today's price, in the future. Because the

[42] Source: Federal Reserve Exhibit H.15. Forward inflation estimates calculated as the difference between implied nominal and inflation protected 20-year Treasury yields in 10 years.

value of bonds falls as interest rates increase, the option to sell bonds at today's price becomes more valuable when interest rates are expected to increase.[43] Currently option prices show that investors are willing to pay about 50.00 percent more for the option to sell bonds in the future (at today's price) than they are willing to pay for the option to buy those bonds.[44] That market-based data tells us that investors consider an increase in interest rates as likely.

Looking to short-term interest rates, data compiled by CME Groups indicates that investors see a high likelihood of further Federal Funds rate increases, even after the December 14, 2016 and March 15, 2017 increases. As shown in Table 7, (below) the market is now anticipating at least one additional rate hike (94.50 percent probability) and possibly two or more (59.80 percent and 18.60 percent probability, respectively) by January 2018. In fact, the implied probability of no increase in the coming year is only 5.50 percent, whereas the likelihood of at least a 50-basis point increase is approximately 60.00 percent. Importantly, the potential for rising rates represents risk for utility investors.

[43] In other words, if there is a high probability that interest rates will increase and bond prices will fall, there is value in the option to sell those bonds in the future at today's price. Conversely, if there is a strong probability that interest rates will decrease (price of bonds will increase), there is value in the option to buy those bonds in the future at today's price.

[44] The option to sell the TLT index in January 2018 at today's price is approximately one and a half times the value of the option to buy the fund. Source: http://www.nasdaq.com/symbol/tlt/option-chain?dateindex=7.

Table 7: Probability of Federal Funds Rate Increases[45]

Target Rate (bps)	Federal Reserve Meeting Date					
	6/14/17	7/26/17	9/20/17	11/1/17	12/13/17	1/31/18
75-100	16.9%	15.7%	8.8%	8.5%	5.8%	5.5%
100-125	83.1%	78.2%	50.9%	49.2%	36.6%	34.7%
125-150		6.2%	37.6%	38.1%	41.6%	41.2%
150-175			2.7%	4.1%	14.6%	16.3%
175-200				0.1%	1.3%	2.2%
200-225						0.1%

Lastly, we can view the market's expectations of future interest rates based on the current yield curve. Those expected rates, often referred to as "forward yields" are derived from the "Expectations" theory, which states that (for example) the current 30-year Treasury yield equals the combination of the current three-year Treasury yield, and the 29-year Treasury yield expected in one year. That is, an investor would be indifferent to (1) holding a 30-year Treasury to maturity, or (2) holding a one-year Treasury to maturity, then a 29-year Treasury bond, also to maturity.[46] As Chart 5 (below) indicates, since 2006 the implied forward 29- and 28- year yields (one and two years hence, respectively) consistently exceeded the (interpolated) spot yields. That is, just as economists' projections implied increased interest rates, so did observable Treasury yields.

[45] Source: http://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html, accessed May 8, 2017.

[46] In addition to the Expectations theory, there are other theories regarding the term structure of interest rates including: the Liquidity Premium Theory, which asserts that investors require a premium for holding long term bonds; the Market Segmentation Theory, which states that securities of different terms are not substitutable and, as such, the supply of and demand for short-term and long-term instruments is developed independently; and the Preferred Habitat Theory, which states that in addition to interest rate expectations, certain investors have distinct investment horizons and will require a return premium for bonds with maturities outside of that preference.

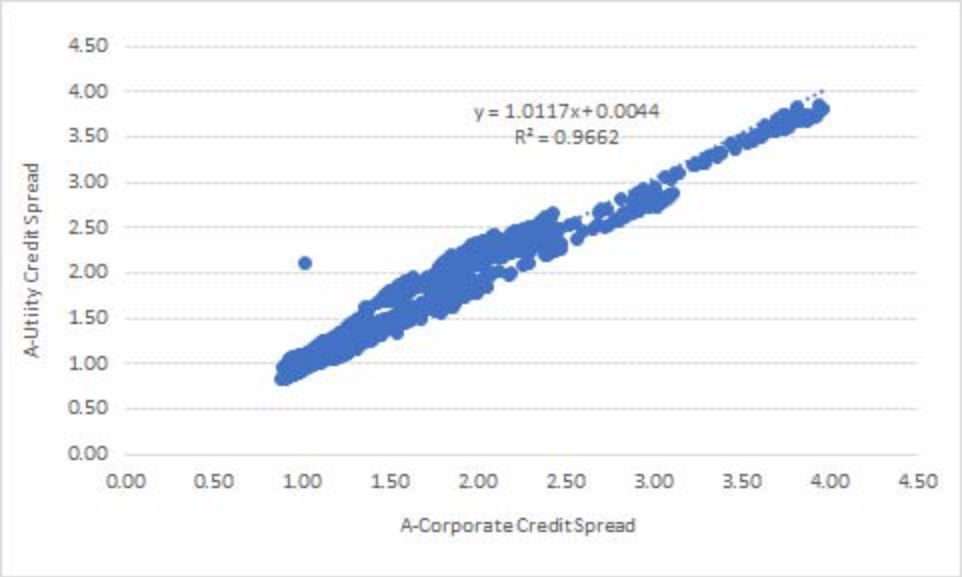
Chart 5: Forward vs. Interpolated Treasury Yields[47]

Q. Have you also reviewed the relationship between credit spreads for A-rated utility debt relative to A-rated corporate debt?

A. Yes, I have. Given the historical volatility in the spread between corporate and utility A-rated debt, there is no reason to conclude that utility yields are different than those of their corporate counterparts. That conclusion is consistent with the finding that over time, there has been a nearly one-to-one relationship between credit spreads on A-rated corporate and utility bonds. In fact, a regression analysis in which corporate credit spreads are the explanatory variable and utility credit spreads are the dependent variable shows that slope is approximately 1.00 and highly significant (*see* Chart 6, below). Because the intercept term is statistically insignificant, we can conclude that there has been no material difference between the two, and there certainly is no meaningful difference in the current market.

[47] Source: Federal Reserve Exhibit H.15. Spot yields are interpolated.

Chart 6: Corporate and Utility Credit Spreads (A-Rated)[48]



Q. What do you conclude from those analyses?

A. First, it is clear that interest rates have increased from the low levels experienced in early 2016. Second, it is clear that market-based data indicate investors' expectations of rising interest rates in the near- and longer-term. The observation that interest rates have increased, in combination with the optimism in the market discussed in Section II, indicates that the financial community sees the strong prospect of increased growth throughout the economy. As that occurs, and as interest rates continue to rise, it would be reasonable to expect lower utility valuations, higher dividend yields, and higher growth rates. In the context of the Discounted Cash Flow model, those variables would combine to indicate increases in the Cost of Equity.

[48] Source: Federal Reserve Exhibit H.15.

Although the market data discussed above indicate increasing costs of capital, it is important to keep in mind that estimating the Cost of Equity is an empirical exercise, but rote application of a specific form of an analysis, or the mechanical use of specific model inputs, may well produce misleading results. The methods used to estimate the Cost of Equity, or the weight given to any one method, may change from case to case; and that the returns authorized in other jurisdictions provide a relevant, observable, and verifiable benchmark for assessing the reasonableness of analytical assumptions, results, and conclusions.

Q. Have there been recent periods when utility valuation levels were high relative to both their long-term average and the market?

A. Yes. For example, between July and December 2016, the SNL Gas Utility Index lost approximately 9.00 percent of its value. At the same time, the S&P 500 increased approximately by 7.00 percent, indicating that the utility sector under-performed the market by about 16.00 percent. Also during that time, the 30-year Treasury yield increased by approximately 95 basis points (an increase of nearly 45.00 percent). The point simply is that as interest rates increased, utility valuations fell. Because (as noted above) investors see the strong likelihood of further interest rate increases, there is a continuing risk of losses in the utility sector.

Q. What conclusions do you draw from your analyses of the current capital market environment, and how do those conclusions affect your ROE recommendation?

A. In my view, we cannot conclude that the recent levels of utility valuations are due to a fundamental change in the risk perceptions of utility investors. There is no measurable

difference between credit spreads of A-rated utility debt, and A-rated corporate debt. That is, based on analyses of credit spreads, there is no reason to conclude that investors see utilities as less risky relative to either historical levels or to their corporate counterparts.

From an analytical perspective, it is important that the inputs and assumptions used to arrive at an ROE determination, including assessments of capital market conditions, are consistent with the conclusion itself. Although all analyses require an element of judgment, the application of that judgment must be made in the context of the quantitative and qualitative information available to the analyst and the capital market environment in which the analyses were undertaken. Because the application of financial models and interpretation of their results often is the subject of differences among analysts in regulatory proceedings, I believe that it is important to review and consider a variety of data points; doing so enables us to put in context both quantitative analyses and the associated recommendations.

Because not all models used to estimate the Cost of Equity adequately reflect those changing market dynamics, it is important to give appropriate weight to the methods and to their results. Moreover, because those models produce a range of results, it is important to consider the type of data discussed above in determining where the Company's ROE falls within that range. It is for that reason that I considered the Risk Premium-based methods to corroborate the DCF-based results, and to inform where the Cost of Equity likely falls within the range of those results. I believe that doing so supports my recommended range of 10.00 percent to 10.60 percent, and my ROE

recommendation of 10.30 percent.

IX. CAPITAL STRUCTURE

Q. What is the Company's proposed capital structure?

A. The Company has proposed a capital structure comprised of 51.70 percent common equity and 48.30 percent long-term debt.

Q. Is there a generally accepted approach to developing the appropriate capital structure for a regulated natural gas utility?

A. Yes, there are a number of generally accepted approaches to developing the appropriate capital structure. The reasonableness of the approach depends on the nature and circumstances of the subject company. In cases where the subject company does not issue its own securities, it may be reasonable to look to the parent's capital structure or to develop a "hypothetical" capital structure based on the proxy group companies or other industry data. Regardless of the approach taken, however, it is important to consider the resulting capital structure in light of industry norms and investor requirements. That is, the capital structure should enable the subject company to maintain its financial integrity, thereby enabling access to capital at competitive rates under a variety of economic and financial market conditions.

Q. How does the capital structure affect the Cost of Equity?

A. The capital structure relates to a company's financial risk, which represents the risk that a company may not have adequate cash flows to meet its financial obligations, and is a function of the percentage of debt (or financial leverage) in its capital structure. In that

regard, as the percentage of debt in the capital structure increases, so do the fixed obligations for the repayment of that debt. Consequently, as the degree of financial leverage increases, the risk of financial distress (*i.e.*, financial risk) also increases. Since the capital structure can affect the subject company's overall level of risk,[49] it is an important consideration in establishing a just and reasonable rate of return.

Q. Please discuss your analysis of the capital structures of the proxy group companies.

A. I calculated the average capital structure for each of the proxy group companies over the last eight quarters. As shown in Schedule RBH-11, the mean of the proxy group actual capital structures is 49.74 percent common equity and 50.26 percent long-term debt. The common equity ratios range from 29.95 percent to 70.13 percent. Based on that review, it is apparent that the Company's proposed capital structure is generally consistent with the capital structures of the proxy group companies.

Q. What is the basis for using average capital components rather than a point-in-time measurement?

A. Measuring the capital components at a particular point in time can skew the capital structure by the specific circumstances of a particular period. Therefore, it is more appropriate to normalize the relative relationship between the capital components over a period of time.

[49] *See*, Roger A. Morin, New Regulatory Finance, Public Utility Reports, Inc., 2006, at 45-46.

Q. What is your conclusion regarding an appropriate capital structure for Northern?

A. Considering the average actual equity ratio of 49.74 percent for the proxy group companies, I believe that Northern's proposed common equity ratio of 51.70 percent is appropriate as it is consistent with the proxy group companies.

X. COST OF DEBT

Q. What cost of debt has the company requested in this proceeding?

A. The Company has proposed a cost of debt of 6.16 percent, which is the Company's actual net cost rate, as shown in Schedule RevReq 6-4.

Q. Please discuss your analysis of the Company's cost of debt.

A. To test the reasonableness of the Company's proposed cost of debt I reviewed the prevailing yield on Bloomberg Fair Value Curves for A-rated and BBB-rated utility debt concurrent with the date of issuance of the Company's debt instruments. As shown in Schedule RBH-12, the Company's weighted average coupon rate is consistent with the prevailing yields at the times of issuance. Based on that analysis, I conclude that the Company's proposed 6.16 percent cost of long-term debt is reasonable.

XI. CONCLUSIONS AND RECOMMENDATION

Q. What is your conclusion regarding the Company's Cost of Equity?

A. As discussed throughout my testimony, it is important to consider a variety of empirical and qualitative information in reviewing analytical results and arriving at ROE recommendations. Here, we have a situation in which the proxy companies have traded at Price/Earnings ratios in excess of their historical average, and, for a time, in excess of

the market. Because that condition is unlikely to persist, it violates a principal assumption of the Constant Growth DCF model, *i.e.*, that the P/E ratio will not change, ever. A more balanced approach is to consider additional methods, including the CAPM approach, and the Bond Yield Plus Risk Premium model, to corroborate the DCF-based results, and to inform where the Cost of Equity likely falls within the range of those results.

Based on the analyses discussed throughout my Direct Testimony, I believe 10.00 percent to 10.60 percent represents the range of equity investors' required rate of return for investments in natural gas utilities similar to Northern. Within that range, it is my view that an ROE of 10.30 percent is reasonable and appropriate. A summary of the results of my analyses is shown in Table 8, below.

Table 8: Summary of Analytical Results

Discounted Cash Flow	***Mean Low***	***Mean***	***Mean High***
Constant Growth DCF			
30-Day Constant Growth DCF	7.47%	9.25%	11.59%
90-Day Constant Growth DCF	7.57%	9.36%	11.69%
180-Day Constant Growth DCF	7.68%	9.47%	11.81%
Multi-Stage DCF (Gordon Method)			
30-Day Multi-Stage DCF	8.21%	8.61%	9.20%
90-Day Multi-Stage DCF	8.31%	8.73%	9.34%
180-Day Multi-Stage DCF	8.42%	8.85%	9.48%
Multi-Stage DCF (Terminal P/E)			
30-Day Multi-Stage DCF	7.91%	9.05%	10.54%
90-Day Multi-Stage DCF	8.22%	9.37%	10.87%
180-Day Multi-Stage DCF	8.53%	9.69%	11.19%
CAPM Results		***Bloomberg Derived Market Risk Premium***	***Value Line Derived Market Risk Premium***
Average Bloomberg Beta Coefficient			
Current 30-Year Treasury (2.97%)		9.53%	9.99%
Near Term Projected 30-Year Treasury (3.43%)		9.99%	10.45%
Average Value Line Beta Coefficient			
Current 30-Year Treasury (2.97%)		10.77%	11.31%
Near Term Projected 30-Year Treasury (3.43%)		11.23%	11.77%
	Low	***Mid***	***High***
Bond Yield Risk Premium	9.93%	9.99%	10.24%
Flotation Costs		0.11%	

Based on the proposed capital structure of 51.70 percent common equity and 48.30 percent long-term debt, and my recommended 10.30 percent Return on Equity, the Company's proposed overall Rate of Return is 8.30 percent (*see* Table 9, below).

Table 9: Proposed Overall Rate of Return[50]

Component	Percent of Total	Cost Rate	Weighted Cost Rate
Common Equity	51.70%	10.30%	5.32%
Long-Term Debt	48.30%	6.16%	2.98%
Total			8.30%

Q. Does this conclude your testimony?

A. Yes, it does.

[50] *See,* Schedule RevReq-6.