BEFORE

THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

SURREBUTTAL TESTIMONY

OF

AARON L. ROTHSCHILD

COST OF CAPITAL

ON BEHALF OF

THE NORTH DAKOTA PUBLIC SERVICE COMMISSION ADVOCACY STAFF

MONTANA-DAKOTA UTILITIES CO.

2020 NATURAL GAS RATE INCREASE APPLICATION

CASE NO. PU-20-379

JANUARY 15, 2021

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Aaron L. Rothschild. My title is President, and my business address is 15 Lake Road, Ridgefield, CT.

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. The North Dakota Public Service Commission Advocacy Staff ("PSC Staff").

Q. ARE YOU THE SAME AARON ROTHSCHILD WHO FILED DIRECT TESTIMONY IN THIS PROCEEDING?

A. Yes.

II. PURPOSE OF SURREBUTTAL TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY?

A. The purpose of my Surrebuttal Testimony is to respond to the criticisms raised by Company Witness Ann Bulkley in her Rebuttal Testimony in the following areas:

- Reasonableness of Cost of Equity Recommendation
- Application of DCF Model
- Application of CAPM
- Current Market Environment

In addition, this surrebuttal demonstrates that Ms. Bulkey's CAPM approach has a critical flaw that renders her results invalid, at least in part, if not entirely, and as a result they should be disregarded by the Commission.

As addressed below, Ms. Bulkley's criticisms are invalid and should be rejected.

III. REASONABLENESS OF COST OF EQUITY RECOMMENDATION

Q. ON PAGES 13-16 OF HER REBUTTAL TESTIMONY, MS. BULKLEY STATES THAT YOUR 8.09% COST OF EQUITY RECOMMENDATION IS NOT REASONABLE. PLEASE RESPOND.

A. Ms. Bulkley and I recommend a different cost of equity for Montana-Dakota because we have fundamentally different analytical approaches. I focus on using market data (e.g., stock prices, bond yields, stock option prices) to measure investors' expectations as much as possible. On the other hand, Ms. Bulkley relies almost exclusively on non-market data, including economists' interest rate forecasts even when market data is available. Ms. Bulkley claims that my 8.09% cost of equity recommendation does not "satisfy the comparable return standard of *Hope* and *Bluefield*" based primarily on comparing my recommendation to authorized ROEs around the country. However, basing Montana-Dakota's authorized return in this case on allowed returns for different companies in different states should be done with caution. The decisions referenced by Ms. Bulkley were made in an entirely different context, and Montana-Dakota's rates should be set based on investors' expectations as indicated by current market conditions. Utilizing past determinations in the current economic environment, given the COVID-19 pandemic,

places improper weight on allowed rates of returns set in other jurisdictions operating under different circumstances.

On page 13 of Ms. Bulkley's Rebuttal Testimony, Figure 2 provides all natural gas utility authorized ROEs from January 2018 to January 2021.[1] These ROEs range between about 8.75% and about 10.25%. Ms. Bulkley's recommended ROE of 10.20% is on the high end of this already elevated range, and it should be pointed out that the Company has reduced its requested ROE from Ms. Bulkley's recommendation to 9.80%.

For ease of comparison, the Table 1 below summarizes the ROE recommended and requested rates in this proceeding.

TABLE 1: ROE COMPARISON	
Bulkley Recommended ROE	10.20%
Company Requested ROE	9.80%
Rothschild Recommended ROE	8.09%
Current Market Return Expectations by Leading Financial Institutions [1]	5.5 - 8.5%

[1] Source: Rothschild Direct Testimony, Table 3

Q. MS. BULKLEY CLAIMS THAT THIS COMMISSION SHOULD NOT CONSIDER THE RECENT 7.46% ROE AUTHORIZED BY THE SOUTH CAROLINA PUBLIC SERVICE COMMISSION ("SCPSC"). PLEASE RESPOND.

A. I disagree. As discussed in my Direct Testimony, I strongly encourage considering the return expectations of leading financial institutions and the results of my financial models. However, if the Commission chooses to consider recent authorized ROEs as part of its decision process, it is reasonable for this Commission to consider the recent 7.46% ROE

1 Ms. Bulkley's Rebuttal Testimony, page 13, lines 4-5.

authored by the SCPSC. Ms. Bulkley claims that this 7.46% ROE is not appropriate to consider because she claims that the SCPSC "takes into consideration service quality issues." However, the record in this proceeding does not support Ms. Bulkley's claim. She claims that I confirmed her speculation that the SCPSC's was influenced by service quality issues because the SPSC considered "all the evidence" when determining the 7.46% ROE, but she leaves out the rest of my response to Montana-Dakota DR to Advocacy Staff 1.5 which clearly demonstrates that the SCPSC based its decision on my market-based cost of equity analysis. Below is my full response to Montana-Dakota DR to Advocacy Staff 1.5:

> In the referenced Order (No. 2020 306), the South Carolina Commission stated that it considered "all of the evidence" and "the whole record" in concluding that: "the analysis used by Consumer Affairs witness Rothschild is the most compelling, applies cost of equity models using water utility companies without the influence of non-utility companies, is objectively just and reasonable, and supported by ample evidence in the record. After review of all evidence and analysis provided by the witnesses of the parties, we conclude and find that the ROE of 7.46% provided by Consumer Affairs witness Rothschild is the appropriate ROE for Blue Granite based upon (a) the evidence on the whole record, (b) the rate of return methodology, and (c) a historical test year beginning July 1, 2018 and ending June 30, 2019. The Commission approves a ROE of 7.46% for Blue Granite."

I provided the SCPSC with the evidence they needed to determine that Blue Granite Water Company would be able to raise capital on reasonable terms with a 7.46% ROE. Ms. Bulkley was not part of the Blue Granite proceeding in South Carlina, but she is nevertheless is willing to speculate on how the South Carolina commissioners came to their decisions. I was at the hearings in person and I know that the commissioners were working hard for many days to make sure that their utility would have access to capital. If we step back from complexities of probability distributions, yield curves and option-implied volatility that I carefully used to calculate the cost of equity in South Carolina, as I do in

this proceeding, the SCPSC decision to authorize a 7.46% ROE makes sense. As shown in Table 1 above, the current market return expectations of leading financial institutions are between 5.5 – 8.5% for the overall market. Unless these banks, funds and brokerage houses are completely out of touch, the cost of equity for regulated utility companies are certainly no more than the 8.09% cost of equity I recommend for Montana-Dakota.

Q. PLEASE BRIEFLY SUMMARIZE MS. BULKLEY'S POSITION REGARDING THE RELATIONSHIP BETWEEN THE RESULTS OF YOUR CONSTANT GROWTH DCF METHOD (9.48% AND 9.54%) AND THE EXPECTED EARNED RETURN ON EQUITY (10.0%) OF YOUR PROXY GROUP.

A. Ms. Bulkley claims that my "retention growth rates require an estimate of the earned return on common equity and are therefore somewhat circular."[2] Because the allowed ROE for a company is equal to the expected return on book equity, she concludes "[a] natural gas utility could not earn a return on book equity of 10.00 percent if the ROE authorized was between 9.48 percent and 9.54 percent."[3] She claims "the use of retention growth rates ignores the academic research demonstrating that EPS growth rates are most relevant in stock price valuation."[4] Using analyst EPS growth rates, according to Ms. Bulkley, results in a cost of equity range between 10.25% and 10.46%.[5]

[2] Ms. Bulkley's Rebuttal Testimony, page 42, lines 9-10.

[3] Ibid. page 42, lines 21-22 and page 43, line 1..

[4] Ibid. page 43, lines 5-7.

[5] Ibid. page 81, Figure 10.

Q. DO CONSTANT GROWTH DCF RESULTS BELOW INVESTORS' EXPECTED RETURN ON BOOK EQUITY INDICATE THAT THE RESULT IS TOO LOW AS SUGGESTED BY MS. BULKLEY?

A. No. First, it is important to recognize that the Constant Growth DCF model indicates what return investors expect to earn on the market price of the stock, not its book value. Return on book value is an accounting figure, which regulators can use to measure performance and investors can use to make investment decisions. In contrast, the market return is the return investors receive for making an investment. The return on the market price of a stock will only equal the return on the book value of a stock when the Market-to-Book ("M/B") ratio is one. But the M/B ratios of natural gas utility stocks are currently almost 2.

Q. DO M/B RATIOS ABOVE ONE INDICATE THAT THE COST OF EQUITY FOR NATURAL GAS UTILITY STOCKS IS LOWER THAN THE EXPECTED RETURN ON BOOK EQUITY?

A. Yes. Calculating the cost of equity (investors' equity return expectations) is more complicated than calculating the return on a rental property, but the very same concept applies regarding the relationship between market returns and book returns. If an investor purchases an apartment for $100,000 and expects to receive $500 per month ($500 X 12 = $6,000 per year) in rent, he or she will expect an annual return of 6% ($6,000/$100,000) on their investment. When the investor purchases the apartment, he would record the book value as $100,000 and the market value as $100,000 unless he determined that the purchase price was higher or lower than the market value. If the value of the apartment increases to $350,000, for example, the M/B ratio would increase to 3.5, and therefore, his return on

book value would remain at about 6% while his return on the market value of the apartment would decrease to about 1.7%.

In this rental property example, an increasing market value results in a lower expected return on market value (1.7%) compared to expected return on book value (6%), assuming the rent price remains constant. In the case of a utility stock, an increasing market value results in a lower return on market for the same expected return on book. As this rental property example demonstrates, there is nothing inconsistent about investors expecting a lower return on the market price of an investment than on the book value of an investment. In fact, with M/B ratios of natural gas utility companies significantly above one it would be surprising if investors expected a return on market equal, or anywhere close, to return on book.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S CLAIM THAT THE RETENTION RATES YOU USE IN YOUR CONSTANT GROWTH DCF METHOD ARE "SOMEWHAT CIRCULAR" BECAUSE THEY REQUIRE AN ESTIMATE OF THE EARNED RETURN ON COMMON EQUITY?[6]

A. My Constant Growth DCF method is not circular because my conclusion (market-based cost of equity that I recommend be applied to Montana-Dakota's book value) is not an input. Circular reasoning arises when we start with what we are trying to end with. The following is a classic circular argument: the restaurant is popular because everyone goes there, and everyone goes to the restaurant because it is popular. I am not calculating the market-based cost of equity for Montana-Dakota with the market-based cost of equity for

[6] Ms. Bulkley's Rebuttal Testimony, page 74, lines 4-5.

Montana-Dakota as Ms. Bulkley implies. My input is the earned return on book equity (not market return), and I use data from other utility companies (not Montana-Dakota). Additionally, my cost of equity result is based on data from a point in time (December 31, 2020 and before), and therefore, my DCF cost of equity result could not have been influenced by Montana-Dakota's proposed authorized return in this proceeding. Therefore, my Constant Growth DCF method is not circular.

Ms. Bulkley's claim that my Constant Growth Method is circular contradicts her own definition of the cost of equity. In particular, she says "the cost of equity is market-based and, therefore, must be estimated based on observable market data."[7] If the cost of equity is market-based, it is not circular to utilize accounting returns. Additionally, applying a market-based cost of equity to book value is consistent with the regulatory principles of original cost ratemaking. Ms. Bulkley's comparison of my Constant Growth DCF results to the expected return on book equity is problematic not just because she is confusing market returns and accounting returns. Her claim that the results of my Constant Growth DCF model are 46 to 52 basis points below the expected ROE of 10.00 percent assumed in my proxy group[8] implies that there is a problem with original cost ratemaking. Applying a market-based cost of equity to anything other than the original cost of Montana-Dakota's investments as measured by book value would violate fundamental principles of original cost ratemaking and result in overcharging consumers.

[7] Ms. Bulkley's Direct Testimony, page 35, lines 14-15.

[8] Ibid. page 43, lines 1-4.

Q. MS. BULKLEY CLAIMS THAT YOUR ROE RECOMMENDATION FOR MONTANA-DAKOTA IS NOT FAIR AND REASONABLE. DO YOU AGREE?

A. No. I agree with Ms. Bulkley that an important reason we recommend different ROEs is that we "disagree as to what satisfies the standards established by the United States Supreme Court of Hope and Bluefield and what constitutes a 'just and reasonable' return that is consistent with the returns for other companies with similar or comparable risk."[9] Despite stating correctly in her Direct Testimony that cost of equity should be market-based (i.e., the return investors expect to earn on the market price of a stock) she attempts to claim that my 8.09% ROE recommendation is unjust because it is lower than authorized returns. As stated above, the average market-to-book ratio of natural gas companies is above one. In other words, investors are willing to pay a premium over book value for the authorized returns from the past, which strongly indicates they require a return on equity lower than authorized returns on book value. If the Commission is looking for an independent source to gauge Montana-Dakota's cost of equity, it should turn to the leading financial institutions that are advising individual and institutional investors around the world.

On page 5 of my Direct Testimony, I show that Ms. Bulkley's 10.20% cost of equity recommendation is above (1) return expectations indicated by market data (e.g., stocks, bonds, options) and (2) return expectations published by major financial institutions. Duff & Phelps, a source used by Ms. Bulkley, published an 8.0% cost of equity for the overall market in December 2020. A survey conducted by Horizon Actuarial Services in July 2020

[9] Ms. Bulkley's Rebuttal Testimony, page 9, lines 5-8.

indicates that major financial institutions are expecting equity returns between 5.5 and 8.5% over the next 20 years. I would also note that my cost of equity recommendation of 8.09% is higher than the return expectations published by major banks and brokerage houses for small and large capitalization stocks trading in U.S. markets (5.5-8.5%), which should give the Commission confidence that if my recommendation is used to set rates, it will still enable Montana-Dakota to raise the capital it requires.

Q. DO YOU HAVE ANY CONCERNS WITH MS. BULKLEY'S CLAIM THAT THE DCF MODEL CURRENTLY UNDERSTATES THE COST OF EQUITY?

A. Yes, I do. Ms. Bulkley asserts that "the results of the DCF model are being distorted by the high valuations and low dividend yields of utilities."[10] As discussed more below, Ms. Bulkley's claim that high valuations are leading to low DCF results is to state the obvious. When stock valuations increase, all else remaining equal, the cost of equity of that stock decreases. Her claim that the DCF model is understating the cost of equity has little to do with the DCF model and much more to do with her speculation that utility stock prices will decrease in the future. The cost of equity should be based on investors' expectations as indicated by market prices and not capital market speculation.

Regarding estimating the cost of equity in current market conditions, Ms. Bulkley states "it is important to consider using, where possible, projected market data in the models to estimate the return for the forward-looking period,"[11] but her CAPM relies on historical betas that measure market data as far back as 10 years, so it is difficult to imagine

[10] Ms. Bulkley's Rebuttal Testimony, page 32, lines 14-15.

[11] Ms. Bulkley's Direct Testimony, page 37, line 19 and page 38, lines 1-2.

how her CAPM says much about the future and certainly not any more than a DCF analysis that uses market data. As explained in my Direct Testimony, option-implied betas indicate that investors expect natural gas utility stocks to be less correlated with the overall market than before the pandemic indicating that the cost of equity for natural gas utility stocks has not increased during the pandemic. Ms. Bulkley's "forward" CAPM analysis does not reflect investors' forward expectations regarding natural gas utility betas because it relies on historical data.

Q. DO YOU HAVE OTHER CONCERNS REGARDING MS. BULKLEY'S CAPM APPROACH?

A. Yes, I see a very significant inconsistency in her approach that renders the results of her CAPM analysis invalid, at least in part, if not entirely. The inconsistency centers around the market index underlying her beta coefficients and her market risk premium. CAPM theory calls for the underlying market index to be consistent throughout all the inputs. Ms. Bulkley's beta coefficients come from Value Line and are based on the New York Stock Exchange Composite Index.[12] The methodology Ms. Bulkley uses to calculate the market risk premium is based on the S&P 500 Index.[13] As elaborated upon on page 42 of this Surrebuttal, when applying the CAPM, it is imperative to use betas and a market risk premium based on the same market index. This is a fundamental concept of the CAPM and using betas based on one index with a market risk premium based on a different index, as Ms. Bulkley has done, yields invalid results. The results of her CAPM analysis with

[12] Ms. Bulkley's Rebuttal Testimony, page 67, lines 13-15.

[13] Ms. Bulkley's Rebuttal Testimony, page 72, lines 16-19.

this inherent inconsistency should be disregarded entirely by the Commission.APPLICATION OF CONSTANT GROWTH DCF

Q. PLEASE SUMMARIZE MS. BULKLEY'S CRITICISMS OF YOUR APPLICATION OF THE DCF METHOD.

A. Ms. Bulkley makes the following criticisms of my constant growth DCF method:

1. Reliance on retention growth rates,
2. The reasonableness of the results provided by the constant growth DCF model;
3. Growth methodology is circular;
4. Growth rate component should be based on analyst EPS growth rates.

Q. MS. BULKLEY CLAIMS THE RESULTS OF THE DCF MODEL ARE NOT RELIABLE. PLEASE RESPOND.

A. As discussed in my Direct Testimony, Ms. Bulkley correctly states, "current market conditions affect the results of ROE estimation models."[14] A cost of equity model that is not impacted by market conditions could not provide a market-based cost of equity. However, she views this influence as a problem. She claims to know that utility stock valuations are unsustainably high and interest rates are low. To correct for the expectations of apparently misinformed investors (investors who are purchasing utility stocks even though they are overpriced)[15], Ms. Bulkley claims that non-market-based data should be

[14] Ms. Bulkley's Direct Testimony, page 11, lines 3-4.

[15] On pages 32-35 of her Rebuttal Testimony, Ms. Bulkly claims that my market-based approach is flawed because I assume markets are efficient when they are not. There is a large body of research in behavioral economics that explains what we all know – markets can be irrational, bubbles form for various reasons. However, just because we know there are bubbles (e.g. GameStop in 2021) and investors are irrational does not mean we know when and for how long markets will be irrational. Regardless of the degree to which markets are irrational, including the long

used, such as the interest rate forecasts of economists. She has been making similar claims regarding the sustainability of high utility stock valuations and low interest rates for years. In NSP's 2012 rate case, Ms. Bulkley claimed "high stock valuations (associated with unusually low long-term interest rates) will tend to reduce dividend yields and, therefore, the estimated ROE."[16] Interest rate only continued to decline in the six years since that case.

In other words, Ms. Bulkley is asking for a 10.20% cost of equity based on "projected" figures (e.g., interest rates) instead of current market data because she considers market conditions that have existed for over 10 years to be "anomalous." Her 10.20% cost of equity is analogous to asking consumers to pay above the market price for groceries today because, in her opinion, the market prices of milk and bread are unsustainably low despite remaining "anomalous" for over a decade. If utility valuations decline in the future leading to higher DCF results, as Ms. Bulkley suggests, Montana-Dakota should file a rate case at that time and request rate increases accordingly. However, charging consumers above market rates now is unfair to consumers even if we knew with certainty that the cost of equity was going to increase at some point in the future. The stock market is unpredictable. The cost of equity could increase, it could decrease, and it could remain the same. It is in the best interest of consumers and Montana-Dakota to set rates based on the cost of equity currently indicated by the markets.

run of high utility stock prices relative to book value, the solution is to not replace market data with the capital market speculations of Ms. Bulkley or any other individual for that matter.

[16] Ms. Bulkley's NSP Direct Testimony, page 33, lines 24-27. December 18, 2012, Case No. PU-12-813.

The cost of capital is market-based. The price investors are willing to pay for a stock in relation to what they expect to receive in return is the information that is used to determine the cost of equity. For example, if investors are willing to pay more than book value for a utility company that investors expect will earn a return on book equity of 9%, this means that investors require less than a 9% return to be convinced to buy shares of this company. Just as the market yield on a bond decreases when investors bid up the market price of a bond, the yield also decreases for a common stock investment when the stock price goes up in the markets. The DCF model is specifically designed to measure the return investors expect on the market price of a stock. High valuations do not distort the results of the DCF method, as Ms. Bulkley claims.

Q. ON PAGE 44 OF HER REBUTTAL TESTIMONY, MS. BULKLEY CLAIMS THAT YOU SHOULD HAVE RELIED ON EPS GROWTH RATES INSTEAD OF RETENTION GROWTH RATES. HOW DO YOU RESPOND?

A. I disagree. A study conducted by McKinsey & Company in 2010 found that "analysts have been persistently over optimistic for the past 25 years with estimates ranging from 10 to 12 percent a year, compared with actual earnings growth."[17]

On average, analysts' forecasts have been almost 100 percent too high.[18] Additionally, the further a projection predicts into the future, the lower the likelihood of the projection being correct.

[17] Marc H. Goedhart, Rishi Raj and Abhishek Saxena, *Equity Analysts: Still too bullish*, Spring 2010

[18] Ibid.

Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999-2001, actual price-to-earnings ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts.

Even if equity analysts' forecasts were not upwardly biased, as discussed in my Direct Testimony, adding earnings per share growth forecasts to a dividend yield without considering the retention rate produces a flawed result. Using an earnings per share growth forecast as the growth component in a DCF model is like measuring how much money you will have in your bank account by simply adding up your paychecks. If you do not consider what percentage of your paycheck you will retain in your account and what percentage you will spend, your calculations will not be accurate.

Q. DOES THE ACADEMIC RESEARCH CITED BY MS. BULKLEY INDICATE IT IS APPROPRIATE TO USE ANALYST EPS GROWTH ESTIMATES IN A DCF MODEL WITHOUT ADDRESSING SUSTAINABILITY?

A. No. The issues with using analyst EPS growth rates in a DCF model are addressed in the articles cited in Ms. Bulkley's testimony. Regarding the potential difficulties with using analyst EPS growth rates in a DCF model, Robert Harris explains the following in Using Analysts' Growth Forecasts to Estimate Shareholder Required Rates of Return:

> …some analysts fail to normalize growth projections or fail to continually review and revise their earnings estimates.[19]

Harris utilizes various measures to control for analysts' potential failure to normalize EPS growth projections. He applies his DCF approach to a portfolio of stocks

[19] Staff Response 2.3 - Attachment 31 - 51b_Harris_Using Analysts' Growth Forecasts Spring 1986, page 61.

because "future growth patterns may be expected to have drastic changes for some specific securities."[20] As Harris explains, it is critical to ensure that the growth rate component used in a DCF model is sustainable. Using analyst EPS growth forecasts in a DCF model as Ms. Bulkley has done, is inconsistent with the research cited in her testimony. On the other hand, my Constant Growth DCF method takes measurements (See "Constant Growth Form of the DCF Model" section of my testimony, pages 35-43), as Ms. Bulkley's cited research advises, to control for the noted shortfalls of analyst EPS growth forecasts.

Q. PLEASE COMMENT ON MS. BULKLEY'S CLAIM THAT YOUR DCF METHOD IS FLAWED BECAUSE IT IS CIRCULAR.

A. Ms. Bulkley claims that my DCF method is circular because "the projected earned return on common equity is the expected return on book value and is exactly what the regulatory commissions are determining when they set the allowed ROE for a company."[21] As explained earlier, her claim is false because, among other reasons, my DCF results are based on companies in other jurisdictions, and not on Montana-Dakota. If authorized, my DCF results would not be applied to the companies in my Gas Proxy Group. There is no circularity. Additionally, my DCF results are based on a point in time (December 31, 2020) and therefore, if allowed, my DCF results could not impact investor expectations back in July without a time machine.

[20] Ibid.

[21] Ms. Bulkley's Rebuttal Testimony, page 42, lines 11-13.

IV. CAPM ANALYSIS

Q. PLEASE SUMMARIZE MS. BULKLEY'S CRITICISMS OF YOUR CAPM ANALYSIS.

A. Ms. Bulkley raises an issue with almost every input into my CAPM analysis. Her most critical point, which leads her to "recommend the Commission place zero weight"[22] on my CAPM analysis, is based on an erroneous comparison of my current CAPM methodology with a different methodology I used in a prior case[23] and should be entirely disregarded.

I address each of Ms. Bulkley's concerns in ample detail and with relevant citations in the relevant sections that follow. However, the criticisms she brings up center around a set of three repeated themes which highlight why our CAPM approaches differ significantly and merit being summarized in broad terms:

1. As explained in my Direct Testimony, one of the most important principles behind my ROE approach overall is that it should be market-based. With one noted exception,[24] I rely on data from established and efficient markets, such as bond prices and yields and stock and stock option prices. Though Ms. Bulkley also claims to use a market-based approach, she repeatedly places more weight on analyst forecasts over available market data and repeatedly criticizes my use of market data.

[22] Ms. Bulkley's Rebuttal Testimony, page 72, lines 11-13.

[23] As elaborated upon on page 44 of this Surrebuttal.

[24] Addressed on page 28 of this Surrebuttal.

2. When dealing with historical market data, Ms. Bulkley categorically disapproves of the use of the most recent spot values, citing concerns over daily fluctuations, particularly in volatile markets. While I agree with the potential of daily fluctuations, when using historical data as a proxy for future data, I believe there is a place for using the most recent spot data when balanced by historical averages of the same data, which help reduce the noise of daily fluctuations.[25] Though Ms. Bulkley states that using averages of historical data is preferrable to using spot data, she still expresses concerns about the susceptibility of averages to market fluctuations and repeatedly raises concerns about the proper time period to use for such averages, a concept I believe creates unnecessary noise[26] and once again confirms her preference for analyst forecasts over available market data.

3. Ms. Bulkley questions the validity or relevance of my option-based approach to calculating beta coefficients and market risk premia, even though it is based on established and broadly accepted-methods used by the CBOE to calculate the VIX and SKEW indices, among other uses. Her first and primary criticism is based on the same issue related to the potential volatility of spot market data mentioned above, even though I have balanced my use of spot data with historical averages as always. Ms. Bulkley also

[25] As elaborated upon on page 22 of this Surrebuttal.

[26] As elaborated upon on page 25 of this Surrebuttal.

raises concerns over the use of options contracts with an expiration date of 180 days in the future when longer expirations are not available, another issue that has little relevance and simply creates unnecessary noise. There is no crystal ball when it comes to predicting market data. Using recent historical values is one of the best approaches at our disposal, but it is not perfect. Options can help measure investors' future expectations, and even when they are only looking six months into the future, that is six months further than the most recent historical data point or any other market-based tool that is available.

Understanding and forming an opinion on the broad topics above helps navigate through the more than 30 pages Ms. Bulkley dedicates in her Rebuttal Testimony to criticizing my CAPM approach and the similar number of pages I dedicate in this Surrebuttal to defending its merits.

Q. DO YOU SEE ANY PROBLEMS WITH THE WAY MS. BULKLEY HAS IMPLEMENTED HER VERSION OF THE CAPM?

A. Yes, I see a very significant inconsistency in her approach that renders the results of her CAPM analysis invalid, at least in part, if not entirely. The inconsistency centers around the market index underlying her beta coefficients and her market risk premium. CAPM theory calls for the underlying market index to be consistent throughout all the inputs. Ms. Bulkley's beta coefficients come from Value Line and are based on the New York Stock Exchange Composite Index.[27] The methodology Ms. Bulkley uses to calculate the market

[27] Ms. Bulkley's Rebuttal Testimony, page 67, lines 13-15.

risk premium is based on the S&P 500 Index.[28] As elaborated upon on page 42 of this Surrebuttal, when applying the CAPM, it is imperative to use betas and a market risk premium based on the same market index. This is a fundamental concept of the CAPM and using betas based on one index with a market risk premium based on a different index, as Ms. Bulkley has done, yields invalid results. The results of her CAPM analysis with this inherent inconsistency should be disregarded entirely by the Commission.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S ATTEMPT TO DISCREDIT YOUR STATEMENT THAT YOUR CAPM APPROACH HAS BEEN "RECOGNIZED BY OTHER COMMISSIONS?"[29]

A. My CAPM approach using stock options has been used in numerous high-profile utility rate case proceedings over the past four years. It has been used as an integral part of utility proceedings in California, Pennsylvania, and South Carolina, has been used in settlement negotiations in other jurisdictions, and is being used in ongoing cases in Connecticut, California, Pennsylvania and before the Federal Energy Regulatory Commission ("FERC"). In my Direct Testimony, I cite the decision by the South Carolina Public Service Commission ("SCPSC") in the Blue Granite Water Company ("Blue Granite") case[30] to give a specific example where my CAPM methodology was not only accepted, but highlighted and commended, with a very specific quote from the SCPSC's Order

[28] Ms. Bulkley's Rebuttal Testimony, page 72, lines 16-19.

[29] Ms. Bulkley's Rebuttal Testimony, page 51, lines 5-6.

[30] Rothschild Direct Testimony, page 11, line 21 to page 12, line 3.

Ruling. Ms. Bulkley claims it is "problematic"[31] to cite the Blue Granite case for three baseless arguments which I address below and leaves it to be inferred that this disproves the fact that my methodology has been "recognized by other commissions," which is an illogical conclusion given that my methodology has been used in numerous other cases.

As I have done in recent cases, my ROE recommendation in the Blue Granite case consisted of a range and a specific value within that range. Some commissions prefer to focus on the specific value and others on the range. The quote from the SCPSC Order Ruling includes the line "the Commission therefore adopts the recommended ROE of 7.46% proposed by witness Rothschild." This was written by the SCPSC, so for Ms. Bulkley to claim that "Mr. Rothschild did not recommend an ROE of 7.46 percent for Blue Granite"[32] is going directly against the SCPSC's statement and conclusion. Similarly, the SCPSC makes no specific mention in its decision of the "service quality issues" in that case that Ms. Bulkley alludes to, so for her to state "it is clear the SCPSC selected the low-end of Mr. Rothschild's range to account for the Blue Granite's service quality issues"[33] is once again a dangerous instance of Ms. Bulkley attempting to speak on behalf of the Commission. Finally, the fact that the decision has been appealed recently does not negate the SCPSC's acceptance and recognition of my CAPM approach, which was the main purpose in referencing this case, and not the specific ROE which was accepted.

[31] Ibid., line 11.

[32] Ms. Bulkley's Rebuttal Testimony, page 52, line 3.

[33] Ms. Bulkley's Rebuttal Testimony, page 52, lines 7-8.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S ASSERTION THAT "AN AVERAGE IS THE [SIC] PREFERRED TO A SPOT YIELD"[34] WHEN RELYING ON HISTORICAL DATA TO ESTIMATE THE RISK-FREE RATE, A CONCEPT SHE IMPLIES APPLIES TO ALL INPUTS USED IN ROE CALCULATIONS, SUCH AS BETAS, MARKET PREMIA, STOCK PRICES AND DIVIDEND YIELDS? WOULD YOU SAY THAT HISTORICAL AVERAGES ARE ALWAYS BETTER THAN SPOT VALUES FOR SUCH VARIABLES?

A. Not necessarily. Most people would readily agree with Ms. Bulkley's central point that "the use of spot market data subjects any analysis to over or understating the ROE based on the relative position of the market on the date that the underlying data was accessed,"[35] speaking to the value of using a historical average. When doing a forward-looking analysis based on historical market data, however, it is equally important to look at the most recent data as an indication of trends and where a given value is more likely to be in the future. This is a broad and generally accepted principle, as made clear in the following example.

As a simple example using historical stock prices to make the point clear, if Company A's stock price were to go up linearly over the course of one year from $50 to $100, its average stock price over that year would be $75. If Company B's stock price declined linearly from $100 to $50 over the same year, it would have the same exact average stock price of $75. But most people would agree that predicting both stock prices at $75 over the near future would be overly simplistic and leave readily accessible

[34] Ms. Bulkley's Rebuttal Testimony, page 53, line 4.

[35] Ms. Bulkley's Rebuttal Testimony, page 52, line 20 to page 53, line 1.

forecasting data unused. Without relying on any additional data, at the very least, it would stand to reason that in the near future Company A's stock price is more likely to be between $75 and $100 than Company B's stock price, and that Company B's stock price is more likely to be between $50 and $75 than Company A's stock price. These observations cannot be made by looking at the yearly averages alone and must take the most recent data into consideration.

The point above does not eliminate Ms. Bulkley's raised concern about the effect of daily fluctuations in market data, especially during periods of volatility. As a result, I believe it is important to consider both averages and recent spot values when using market data for forward-looking analyses. That is precisely my approach when using market data that is expected to continue to fluctuate, such as bond yields, stock prices, dividend yields, betas, and market risk premia.

Q. CAN A DIFFERENCE OF ONE DAY IN THE SELECTION OF SPOT DATA HAVE A SIGNIFICANT POSITIVE OR NEGATIVE EFFECT ON ROE RESULTS, AS STATED BY MS. BULKLEY?[36] IF SO, HOW DO YOU GO ABOUT CHOOSING WHICH DAY TO USE FOR MARKET-BASED SPOT DATA?

A. Yes, daily fluctuations in stock prices, resulting dividend yields, betas, etc. all have an effect on resulting ROE calculations, especially when using recent spot values for market data. Such is the nature of market data, which changes from day to day. This is rightfully noted as a potential risk of using spot data, but given the stated benefits of using recent spot data for forward-looking analyses, there are ways to work around such potential pitfalls.

[36] Ms. Bulkley's Rebuttal Testimony, page 68, lines 18-19 and page 60, lines 19-22.

For this reason, it is very important to establish consistent methodologies that eliminate the possibility of personal bias, especially when using spot market data. I consistently use the last trading day of the last full calendar month before my schedule preparations for all market-based spot data and as the last day for all historical market-data averages.

It is important to keep in mind that even averages fluctuate over time, and all responsible data analysts must find a consistent and reproducible way to "freeze time" to work with such fluctuations while eliminating bias.

It is also important to point out once again that I use recent spot market-data to establish one benchmark for market-based inputs, which is balanced by the use of historical averages, as stated previously. Sometimes the results of a spot analysis are higher than those based on historical averages, and other times they are lower. In the current proceeding, it is worth pointing out that the COE results of my Spot CAPM (averaging 7.43%) are higher the results of my Weighted Average CAPM (averaging 7.03%), so eliminating the results of my Spot analysis, as Ms. Bulkley suggests, would actually bring my COE recommendation down by approximately 28 basis points.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S REPEATED ATTEMPTS TO CAST DOUBT OVER YOUR SELECTION OF A THREE-MONTH PERIOD WHEN USING A HISTORICAL AVERAGE OF VALUES FOR A GIVEN DATA INPUT FOR YOUR CAPM ANALYSIS?

A. The main goal of using a historical average to predict the future value of a data input (e.g., bond yields, betas, stock prices, etc.) is to use relatively recent data while eliminating the susceptibility of spot values to daily fluctuations. While there may be specific limitations

or considerations on the period that should be used for certain inputs, as elaborated below for six-month option-implied betas, changing the averaging period from three to four or five months will not have a significant impact on the results. As stated in my Direct Testimony,[37] for instance, any reasonable form of averaging or weighing approach applied to the last eight months of historical yield data would not have any significant effect on my CAPM results. Consistency is important to avoid bias, however small, which is why I have used a period of three months for my historical averages in all cases in recent years.

It is difficult to understand Ms. Bulkley's repeated criticism of historical averages when she directly states they are preferrable to spot historical data and she herself uses historical averages in her analyses. I could just as easily call into question or ask for academic support for Ms. Bulkley's selection of the 30- or 90-day periods she uses to calculate historical average stock prices in her DCF analysis.[38] I respond to each of Ms. Bulkley's specific questions on the matter in each relevant section below, but focusing on these insignificant aspects detracts from more meaningful topics.

A. Risk-Free Rate

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S CLAIM THAT INCREASED VOLATILITY SINCE THE ONSET OF THE COVID 19 PANDEMIC "COULD ALSO AFFECT THE 3-MONTH AVERAGE TREASURY BILL AND BOND

[37] Rothschild Direct, page 52, lines 4-6.

[38] Ms. Bulkley's Rebuttal Testimony, page 43, Figure 10.

YIELDS THAT MR. ROTHSCHILD HAS INCLUDED IN HIS CAPM ANALYSIS?"[39]

A. As stated in my Direct Testimony,[40] any reasonable form of averaging or weighing approach applied to the last eight months of historical yield data would not have any significant effect on my CAPM results.

Q. DOES MS. BULKLEY USE HISTORICAL AVERAGES IN DETERMINING HER CAPM RISK-FREE RATE?

A. No, she does not. She uses projected Treasury Bond yields published by Blue Chip Financial Forecast. As I have stated in my Direct Testimony, current market prices of stocks and bonds already reflect investors' forecasts for long-term interest rates and capital markets in general. If, indeed, investors in the aggregate should be expecting an increase in interest rates, adding a separate factor for this on top of what is already indicated in market prices would amount to a double count.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S STATEMENT THAT "THE BLUE CHIP FINANCIAL FORECAST IS A WELL-RESPECTED SOURCE OF PROJECTIONS THAT CAN AND SHOULD BE RELIED UPON IN THE DEVELOPMENT OF A FORWARD-LOOKING COST OF EQUITY?"[41]

A. As pointed out in my Direct Testimony, it is important to recognize that current long-term Treasury Bond yields represent a direct observation of investor expectations and there is

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[39] Ms. Bulkley's Rebuttal Testimony, page 53, lines 6-7.

[40] Rothschild Direct, page 52, lines 4-6.

[41] Ms. Bulkley's Rebuttal Testimony, page 57, lines 1-3.

no need to use "expert" forecasts such as Blue Chip to determine the appropriate risk-free rate to use in a CAPM analysis or any other cost of equity calculations.

Pages 53 and 54 of my Direct Testimony explain the flaws in attempting to predict data that is truly unpredictable. Chart 10 of my Direct Testimony shows how Blue Chip forecasts have been grossly incorrect in the past. Ms. Bulkley herself has been relying on such predictions to support rising interest rates for many years, as rates have only continued to decrease overall.

Montana-Dakota's actual cost of capital is based on the current capital markets. More fundamental to economic regulation, a market-based cost of equity is consistent with ratemaking principles.[42]

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S DEFENSE OF HER USE OF FORECASTED MARKET DATA BY POINTING TO YOUR ALLEGED USE OF FORECASTED MARKET DATA?[43]

A. First and foremost, I disagree with Ms. Bulkley's characterization of my use of options data as forecasted market data.[44] As investors buy and sell options with different maturities, money changes hands and a market is established. As with the stock market, investors' all-encompassing outlook for the future plays a significant role in how much they are willing to pay or receive for a security, be it a share or an option. However, it is

[42] The U.S. Supreme Court in the *Hope* and *Bluefield* cases, established that the cost of equity should support a utility's credit, enable raising money, assure financial soundness and "be commensurate with returns on investments in other enterprises having corresponding risks."

[43] Ms. Bulkley's Rebuttal Testimony, page 57, lines 4-7.

[44] Ms. Bulkley's Rebuttal Testimony, page 57, lines 7-10.

the independence, self-interest, and number of investors that creates a true and efficient market. This makes it drastically different from and more relevant (Montana-Dakota's cost of equity should be market-based) than forecasts made by equity analysts who are paid for their opinions and projections.

I rely on direct market data over analyst projections whenever and wherever possible. There are limited instances where market data does not provide access to inputs required for certain calculations, as is the case in my Constant Growth DCF analysis. In these cases, I do resort to forecasted data, though with extreme caution. Please refer to page 39, line 17 to page 42, line 8 in the DCF section of my Direct Testimony for more detail on my approach in the limited instances where I find no market-based alternative to using forecasts.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S SUGGESTION THAT THE YIELD ON THE 30-YEAR TREASURY BOND IS UNEQUIVOCALLY BETTER THAN THE YIELD ON THE 3-MONTH TREASURY BILL AS AN ESTIMATE OF THE RISK-FREE RATE COMPONENT OF THE CAPM WHEN APPLIED TO UTILITIES SUCH AS MONTANA-DAKOTA AND ITS RELATED PROXY GROUP?

A. When looking for a security to calculate an estimate of the risk-free rate, it is ideal, as Ms. Bulkley points out, to find one with a "term (or maturity) that best matches the life of the underlying investment."[45] In that sense, the 30-year Treasury Bond yield can be argued to be ideal for this specific application. However, as explained in my Direct Testimony, it is

[45] Ms. Bulkley's Rebuttal Testimony, page 58, lines 1-2.

equally important to find a security that has a beta coefficient with the overall market as close to zero as possible, because by the very definition of the risk-free rate in the CAPM model, its movements should have no correlation to the movements of the market.[46] And this is where the problem with the 30-year Treasury Bond yield arises, as it has an established non-zero beta. The 3-month Treasury Bill yield has a considerably lower beta, and therefore, is superior in that respect to the 30-year Treasury Bond yield. Neither one is a perfect fit on both fronts, which is precisely why I have chosen to consider both as proxies for the risk-free rate to establish a range for my CAPM results.

Q. CAN YOU PROVIDE SUPPORT FOR YOUR CLAIM THAT THE 30-YEAR TREASURY BOND HAS AN ESTABLISHED NON-ZERO BETA?

A. Yes. iShares Trust - iShares 20+ Year Treasury Bond ETF (Ticker: TLT) is an exchange traded fund that invests exclusively in U.S. Dollar denominated fixed rate U.S. treasury securities with remaining maturity of greater than or equal to twenty years (i.e., 30-year Treasury Bonds). As of the close of trading on February 23, 2021, the fund had a 24-month beta of -0.32 and a 60-month beta of -0.30.[47]

[46] See Section V.F. Capital Asset Pricing Model in my Direct Testimony for more details behind CAPM theory.

[47] https://seekingalpha.com/symbol/TLT/overview

B. Beta

Q. PLEASE SUMMARIZE MS. BULKLEY'S CRITICISMS OF YOUR USE OF OPTION-IMPLIED ("FORWARD") BETAS.

A. The first and principal criticism Ms. Bulkley has with the calculation of my option-implied, or "forward" betas, is that I have "relied on options data for a single trading day."[48] She also raises concerns over the fact that I "only considered options contracts with an expiration date of 180 days in the future,"[49]

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S PRIMARY CRITICISM THAT YOUR OPTION-IMPLIED BETAS "RELIED ON OPTIONS DATA FOR A SINGLE TRADING DAY?"[48]

A. The criticism that "in the calculation of the option-implied betas, Mr. Rothschild has relied on options data for a single trading day" [48] when speaking broadly about my CAPM analysis is categorically incorrect. I can only assume that Ms. Bulkley made a mistake in making such a broad criticism, as she herself acknowledges several pages later[50] that I also use a three-month historical average of the same option-implied betas. To be clear, when Ms. Bulkley refers to "weekly implied Betas" on line 7 of page 91 of her Rebuttal, she is referring to the same option-implied betas.

As addressed previously in this Surrebuttal (pages 24 through 26), Ms. Bulkley raises some general concerns over the use and selection of spot market-data, which is why,

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[48] Ms. Bulkley's Rebuttal Testimony, page 59, lines 11-12.

[49] Ms. Bulkley's Rebuttal Testimony, page 59, lines 12-13.

[50] Ms. Bulkley's Rebuttal Testimony, page 61, line 21 to page 62, line 2.

as with other market data, I use historical averages along with recent spot calculations of option-implied betas for use in my CAPM analysis.

Q. IS THERE ACADEMIC SUPPORT FOR YOUR USE OF AN AVERAGE OF WEEKLY OPTION-IMPLIED BETAS OVER A THREE-MONTH PERIOD? IF NOT, WHY DID YOU DECIDE TO CALCULATE IT IN THIS WAY?

A. No, I am not aware of any academic arguments for or against a specific approach to such a straightforward historical average and I think there is room for educated judgment in such matters. It is important to keep in mind that the goal is to calculate an average of relatively recent data that eliminates the susceptibility of spot values to daily fluctuations, as repeatedly brought up by Ms. Bulkley and suggested by Chang, Christoffersen, Jacobs and Vainberg in the quote she selected on page 61 of her Rebuttal. As such, and considering I am calculating six-month *forward-looking* betas, it is reasonable to use the most recent three months of options data to calculate an average.

I chose to use weekly beta calculations to be as consistent as possible with Value Line historical beta calculation methodology. It is a little-known fact that betas calculated based on historical returns can be significantly susceptible to the choice of day of the week they are calculated on, especially when based on weekly returns.[51] Value Line calculates their historical betas based on five years of weekly returns. They only update them quarterly, but for the reason stated above, they always calculate them on a Tuesday. For

[51] This can be easily corroborated in Excel by running a simple regression on weekly returns of any historical stock price data for any company versus any index (E.g., the S&P 500). Even without running calculation, one can understand this conclusion by realizing that it is a direct result of the fact that weekly returns for any company or any index will be different if calculated from Monday to Monday, Tuesday to Tuesday, etc.

the sake of compatibility, I have consistently calculated my historical and option-implied betas weekly on Tuesdays.

Q. PLEASE RESPOND TO MS. BULKLEY'S CLAIM THAT YOU "SHOULD HAVE USED OPTIONS CONTRACTS WITH AN EXPIRATION DATE OF ONE YEAR OR LONGER AND NOT SIX MONTHS"[52] AND THAT IF "CONTRACTS OF THIS LENGTH ARE NOT AVAILABLE FOR UTILITIES THEN AN ALTERNATIVE APPROACH SUCH AS THE USE OF HISTORICAL BETAS SHOULD BE USED TO ESTIMATE THE COST OF EQUITY FOR UTILITIES."[53]

A. The question starting on line 16 of page 61 of my Direct Testimony clearly lays out my reasoning for calculating option-implied betas based on a six-month horizon. I hereby note a correction of my Direct Testimony that page 62, lines 5 through 9 should read as follows: "As evidenced by the exhaustive option data in my working papers, the maximum expiration period for the options of the companies in my Gas Proxy Group is between 5.6 and 7.7 months. Only 1 of the 10 companies trade options with expiration periods of seven months or more, so for consistency across companies in my proxy group, I chose to use six months for the time horizon of my option-implied betas."

Simply because it may be better to use longer time horizons in place or in addition to a six-month horizon, it does not mean that a six-month option-implied beta is of no relevance or cannot be used. To repeat a strong argument in support of using six-month option-implied betas in a cost of capital calculation looking years into the future, as

[52] Ms. Bulkley's Rebuttal Testimony, page 63, lines 14-16.

[53] Ms. Bulkley's Rebuttal Testimony, page 64, lines 2-4.

expanded upon on page 64 of my Direct Testimony, the authors of the paper on which I based my option-implied betas concluded that the predictive powers are not limited to six months into the future. In fact, they conclude that six-month option-implied betas have stronger predictive power than six-month, one-year, or five-year historical betas when attempting to forecast betas one or two years into the future.

Q. DO THE BETAS MS. BULKLEY USES IN HER CAPM ANALYSIS "COVER THE PERIOD THAT MONTANA-DAKOTA'S RATES WILL BE IN EFFECT,"[54] AS SHE POINTS OUT IS NOT THE CASE FOR YOUR SIX-MONTH OPTION-IMPLIED BETAS?

A. No. They do not as they are based on historical data.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S STATEMENT THAT "CHRISTOFFERSEN, JACOBS AND VAINBERG SUGGEST THAT SIX MONTHS MAY NOT BE THE APPROPRIATE TIME-PERIOD TO USE WHEN ESTIMATING THE COST OF CAPITAL?"[55]

A. Contrary to Ms. Bulkley's implications, the authors of the paper do not state that a six-month option-implied beta may not or should not be used for cost of capital purposes, and ultimately, it is not their role to determine so. Throughout the paper, they give various ideas of how option-implied betas could be used in diverse applications, but ultimately, it is up to each field to refine the best way to use them.

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[54] Ms. Bulkley's Rebuttal Testimony, page 62, lines 17-18.

[55] Ms. Bulkley's Rebuttal Testimony, page 62, line 19 to page 63, line 1.

I did not choose to calculate six-month betas because the authors focused their paper on six-month betas. As stated previously, the limitation on the forecasting horizon is always set by the longest expiration period of the options currently traded in the market. Six months is the longest consistent time horizon that can be calculated using currently available option data for gas companies in my proxy group.

Furthermore, as pointed out previously and expanded upon on page 64 of my Direct Testimony, the authors of the paper conclude that six-month option-implied betas have a stronger predictive power than six-month, one-year, or five-year historical betas when attempting to forecast betas one or two years into the future.

Q. DO YOU THINK OPTION-IMPLIED BETAS SHOULD BE USED IN COST OF CAPITAL CALCULATIONS?

A. Yes. I think option-implied betas are one of the best tools currently available to measure the overall risk expected by investors at any given moment in time, and that is fundamentally what cost of capital determinations should be based on. As with other tools and methodologies we use regularly, option-implied betas are not a silver bullet and should be used in conjunction with other valid approaches to determine ranges of reasonableness for the cost of capital. The more valid tools we use, the more we can narrow down or confirm these ranges of reasonableness to ensure a more accurate result.

Q. PLEASE SUMMARIZE MS. BULKLEY'S CRITICISMS OF YOUR USE OF SIX-MONTH HISTORICAL BETAS.

A. Ms. Bulkley claims that six-month historical betas calculated on weekly returns "only contain 26 data points" and "can result in regression results that are not statistically

significant."[56] She also states that "market dislocations will have a larger effect on Beta coefficients that are calculated using shorter time periods,"[57] and therefore, more relevance or weight should be placed on historical betas calculated using two and five years of market data.

Q. HOW MANY DATA POINT PAIRS ARE USED IN THE CALCULATION OF YOUR SIX-MONTH HISTORICAL BETA COEFFICIENTS?

A. Ms. Bulkley is correct that a six-month historical beta based on weekly returns is calculated using 26 closing price points for a company and for its corresponding index, in this case the S&P 500. This actually translates into 25 pairs of return data.

Q. HOW MANY DATA POINT PAIRS ARE NECESSARY TO ESTABLISH A STATISTICALLY SIGNIFICANT CORRELATION BETWEEN TWO VARIABLES IN A REGRESSION ANALYSIS, SUCH AS THE ONE USED TO ESTABLISH BETA COEFFICIENTS?

A. Establishing a minimum number is somewhat subjective, though various authorities on statistics argue the number is between three and eight data pairs. While the generalization is correct that the more data point pairs one uses, the more certain one can be about the significance of the results of any correlation analysis, this is very different from stating that one cannot achieve statistical significance with a relatively low number of data pairs. In fact, it is important to realize that one can achieve statistical significance with less than 10 data pairs, and that even hundreds of data pairs do not guarantee statistical significance.

[56] Ms. Bulkley's Rebuttal Testimony, page 60, lines 2-4.

[57] Ms. Bulkley's Rebuttal Testimony, page 60, lines 7-8 and page 64, lines 10-11.

For precisely this reason, statisticians have developed a tool that helps determine statistical significance based on the number of data pairs in a regression analysis.

A "table of critical values" of Pearson's correlation, which can be readily found online[58] or in most statistics books, tells a statistician that for 25 data point pairs (implying N-2=23 "degrees of freedom"), a correlation, or beta, coefficient of 0.505 or higher will occur *by chance* with a probability of only 0.01.[59] As is explained in more detail in the text explaining how to use the table,[60] any beta coefficient above this level, and certainly above 0.54 or 0.57, as are the recent six-month betas in my gas proxy group, by definition are considered statistically significant.

Ms. Bulkley's implications regarding the possible statistical insignificance of my six-month historical betas should be disregarded.

Q. DO YOU AGREE WITH MS. BULKLEY THAT CHANGES IN MARKET DYNAMICS WILL HAVE A LARGER EFFECT ON SIX-MONTH HISTORICAL BETAS THAN THEY WILL ON TWO-YEAR OR FIVE-YEAR HISTORICAL BETAS?

A. Yes. As with other historical metrics based on a given time period, say, average stock prices, the longer the time horizon under consideration, the more data points are considered, and the smaller the effect of any one given change in the data set.

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[58] E.g., https://researchbasics.education.uconn.edu/r_critical_value_table/#

[59] In fact, many researchers use a more lenient "alpha level" of 0.05 for determinations of statistical significance.

[60] https://researchbasics.education.uconn.edu/statistical_significance/

Q. IS THIS LARGER EFFECT ON SIX-MONTH HISTORICAL BETAS FROM CHANGES IN MARKET DYNAMICS A GOOD OR A BAD THING?

A. The answer depends on what the beta will be used for. I would argue that in any attempt to forecast the beta coefficient of a company or any forward-looking analysis such as these cost of capital calculations, more recent historical data should be given more relevance than data from five or ten years ago. The weight of ten years of data makes a beta coefficient react extremely slowly to market developments. Even permanent market changes can take more than six months to have a detectable effect on a ten-year beta.

As with using spot values and averages of historical market data, I believe the right answer is not to use *either* six-month historical betas or historical betas with longer horizons, but to consider *both*. For this reason, I have created my hybrid betas, which take into consideration six-month, two-year, and five-year historical betas along with forward-looking, option-implied betas.

Q. DO YOU THINK IT IS A GOOD IDEA TO RELY ON SIX-MONTH HISTORICAL BETAS DESPITE THE RECENT "MARKET DISLOCATIONS" REFERENCED BY MS. BULKLEY?[61]

A. Financial markets are constantly in flux due to the influence of countless factors. What Ms. Bulkley refers to as "market dislocations,"[61] though arguably more significant, I would say are just some of the numerous factors affecting current markets. To attempt to separate any one specific factor from "real" underlying market dynamics would be an exercise in futility.

[61] Ms. Bulkley's Rebuttal Testimony, page 64, lines 9-10.

Furthermore, it is very difficult if not impossible for anyone to predict how long any one influencing factor will be present or how long its effects will be felt by financial markets. When interest rates came down to historical lows in 2008, many analysts referred to it as an aberration that would be short-lived. 12 years later, rates have not only remained low, but have come down even further due to yet another unexpected event. COVID-19 affected markets tumultuously, and though the initial wall of the tsunami has passed, no one can say for sure if its direct fallout and the effects of its reverberations or a resurgence will affect financial markets for months or years to come.

So in response, yes, I think it is a good idea to use six-month historical betas to measure recent and current market dynamics regardless of recent developments. I use them as part of my hybrid betas in conjunction with longer-term historical betas and forward-looking, option-implied betas to achieve the most reasonable result.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S CRITICISM OF YOUR SELECTION OF THE RELATIVE WEIGHTS YOU ALLOCATE TO EACH COMPONENT OF YOUR HYBRID BETAS?

A. My rationale for the selection of the relative weights of each component of my hybrid betas is clearly laid out in my Direct Testimony.[62] Ms. Bulkley seeks to discredit the findings of Christoffersen, Jacobs and Vainberg by pointing out their own questioning of their calculation of the estimated or *ex post* beta.[63] Calculating realized betas as back-testing inherently requires using "future" data that is already available, but this hardly disproves

[62] Rothschild Direct, page 63, line 16 to pg. 65, line 8.

[63] Ms. Bulkley's Rebuttal Testimony, page 65, line 9 to pg. 66, line 5.

the benefit of using a mix of historical and forward-looking option-based betas. As stated in my Direct Testimony, I am not aware of any academic study specifically focused on the optimal relative weight of historical betas to predict future betas and looked to the authors of the paper only for guidance. Even in the absence of an academic study, I think there is room for educated judgment in such matters.

Q. DO YOU AGREE WITH MS. BULKLEY'S RESPONSE[64] REGARDING YOUR POINT THAT USING BETA COEFFICIENTS BASED ON FIVE AND TEN YEARS OF HISTORICAL DATA RESULT IN AN OVERSTATED COST OF EQUITY FOR MONTANA-DAKOTA?

A. No, I do not. Her response is primarily based on the concept that spot values of my market-based option-implied betas can fluctuate from week to week. I have discussed the benefits and shortfalls of using such market spot data in detail above. However, my conclusion was based on a three-month average of option-implied betas (not three weeks, as stated by Ms. Bulkley[65]), which establishes a level for comparison that is considerably less prone to fluctuations in market data.

Furthermore, as pointed out in the conclusions of the authors of the option-implied beta research paper cited above, historical betas calculated based on longer periods such as five-years, have lower predictive powers than shorter-term historical betas and option-implied betas.

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[64] Ms. Bulkley's Rebuttal Testimony, page 66, line 13 to page 67, line 5.

[65] Ms. Bulkley's Rebuttal Testimony, page 67, line 2.

Q. WHICH BETA COEFFICIENT DOES MS. BULKLEY RECOMMEND USING AND USE IN HER OWN CAPM ANALYSIS?

A. She used beta coefficients for the proxy group companies provided by Value Line and Bloomberg.

Q. DO YOU SEE ANY PROBLEM WITH MS. BULKLEY'S USE OF VALUE LINE BETA COEFFICIENTS?

A. Yes, I do. A critical factor in the calculation of a beta coefficient is the choice of index to represent the overall market. Using the same beta calculation methodology with a different market index will result in different values of beta for a given company or portfolio - sometimes drastically different values. It is easy to jump to the conclusion that this points to a flaw in the CAPM methodology, as different values of beta would result in a different implied cost of equity. However, another key component of the CAPM, the market risk premium, also depends on the choice of market index and in theory would have an offsetting effect on the cost of equity calculation. This points to the most important aspect of selecting a market index for a CAPM analysis, which is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium.

Ms. Bulkley is not consistent in this critical point. Her market risk premium is not based on the same market index used to calculate her betas provided by Value Line. As acknowledged by Ms. Bulkley, Value Line calculates its published betas based on the New York Stock Exchange Composite Index.[66] The methodology Ms. Bulkley uses to calculate

[66] Ms. Bulkley's Rebuttal Testimony, page 67, lines 13-15.

the market risk premium is based on the S&P 500 Index.[67] When applying the CAPM, it is imperative to use betas and a market risk premium based on the same market index. This is a fundamental concept of the CAPM and using betas based on one index with a market risk premium based on a different index, as Ms. Bulkley has done, yields invalid results.

C. Market Risk Premium

Q. PLEASE SUMMARIZE MS. BULKLEY'S CRITICISMS OF YOUR MARKET RISK PREMIUM ESTIMATES.

A. Ms. Bulkley states that my "spot risk premium still relies on options contracts for a signal [sic] trading day, which can change considerably depending on the trading day that is used."[68] She also points out that I do not "provide any academic support or supporting analyses to show that a three-month average produces more accurate estimates of the market return."[69]

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S CONCERN REGARDING YOUR USE OF OPTIONS DATA TO CALCULATE A SPOT VALUE FOR THE MARKET RISK PREMIUM?

A. As with my option-implied betas, Ms. Bulkley's primary concern with my use of options to estimate the market risk premium is based on the more general theme of the common pitfalls of using spot market data.

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[67] Ms. Bulkley's Rebuttal Testimony, page 72, lines 16-19.

[68] Ms. Bulkley's Rebuttal Testimony, page 68, lines 17-19.

[69] Ms. Bulkley's Rebuttal Testimony, page 69, lines 11-13.

As addressed previously on pages 24 through 26, Ms. Bulkley's general concerns over the use and selection of spot market-data are well-based and properly addressed. As with other market data, I use historical averages along with recent spot calculations of market risk premia for use in my CAPM analysis.

Q. IS THERE ACADEMIC SUPPORT FOR YOUR USE OF A THREE-MONTH AVERAGE OF OPTION-IMPLIED MARKET RISK PREMIUM? IF NOT, WHY DID YOU DECIDE TO CALCULATE IT IN THIS WAY?

A. No, once again, I am not aware of any academic arguments for or against a specific approach to such a straightforward historical average and I think there is room for educated judgment in such matters. As with my average of option-implied betas, it is important to keep in mind that the goal is to calculate an average of relatively recent data that eliminates the susceptibility of spot values to daily fluctuations, as repeatedly brought up by Ms. Bulkley, and averaging three months of data does achieve that goal. I chose to focus on a three-month historical average for the sake of consistency with my calculation of option-implied betas.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S ASSERTION THAT "IT APPEARS THAT MR. ROTHSCHILD HAS CHANGED HOW HE PERFORMS THE CALCULATION FROM PREVIOUS CASES WHERE HE HAS TESTIFIED RECENTLY?"

A. Ms. Bulkley is correct in pointing out that my methodology for calculating the Market Risk Premium has improved considerably since the PAWC case she cites in her Rebuttal

Testimony.[70] In the cited case, I was using a normal function to approximate the probability distribution representing the possible trajectories for the S&P 500 implied by the options market. Even though normal functions are often used to approximate such probability distributions, including by the famous Black-Scholes option valuation formula, it is well accepted that this is an over-simplification. A better, though more mathematically challenging approach is to use a log-normal function to approximate the probability distribution, which is what I am now able to do. As explained in detail in my Direct Testimony,[71] this improved approach allows for the consideration of the skewness of the probability distribution, as measured by the CBOE SKEW Index, which is critical for being able to determine the median or market-consensus of the distribution.

However, Ms. Bulkley is incorrect in concluding that the difference in the Market Risk Premium I calculated in that case and in the current proceeding "highlights why options contract data should not be used in the estimation of the cost of equity for utilities."[72] The difference in the results is due in part to the improvement of the methodology and in part to the fact that the market risk premium has in fact come down in the five months since the calculations in that case were performed. Neither reason points to a flaw with the use of options contract data in the current proceeding.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S CLAIM THAT YOU ARE "ABLE TO ARBITRARILY SELECT THE PROBABILITY USED TO ESTIMATE THE

[70] Docket No. R-2020-3019369 for Pennsylvania-American Water Company ("PAWC")

[71] Rothschild Direct, page 65, line 10 to page 68, line 18.

[72] Ms. Bulkley's Rebuttal Testimony, page 70, lines 11-12.

MARKET RETURN"[73] LEADING HER TO RECOMMEND "THE COMMISSION PLACE ZERO WEIGHT"[74] ON YOUR CAPM ANALYSIS?

A. The quote Ms. Bulkley cites in her Rebuttal Testimony from the Dominion Energy South Carolina ("DESC") case[75] as well as her comparisons with this case have no relevance in this proceeding because that case used a different methodology for estimating the market return and market risk premium than that which I used in the current proceeding. Ms. Bulkley is incorrectly equating two approaches that even though may seem similar at first pass, have significant and important differences.

As with the PAWC case mentioned earlier, in the cited DESC case, I was using a normal function to approximate the probability distribution representing the possible trajectories for the S&P 500 implied by the options market. Even though normal functions are often used to approximate such probability distributions, including by the famous Black-Scholes option valuation formula, it is well accepted that this is an over-simplification. One of the most significant shortfalls of using a normal function to approximate the probability distribution is that the mean and the median of the distribution are both equal to the last closing price of the S&P 500 Index, implying a median growth of 0%. For this reason, one needs to resort to the concept of the "confidence intervals" referred to in the quote from the DESC case.

In contrast, the improved methodology of using a log-normal function to approximate the probability distribution, which I used in the current proceeding and is

[73] Ms. Bulkley's Rebuttal Testimony, page 72, lines 7-8.

[74] Ms. Bulkley's Rebuttal Testimony, page 72, lines 10-13.

[75] Ms. Bulkley's Rebuttal Testimony, page 71, lines 8-14, from Docket No. 2020-125-E.

explained in detail in my Direct Testimony,[76] takes into account the skewness of the distribution, as measured by the CBOE SKEW Index, and thus allows one to calculate the median or market-consensus of the distribution. In this improved approach, the median or market-consensus always occurs at 50% cumulative probability and thus eliminates the need for guessing at the proper "confidence interval" used in the other approach. In fact, the concept of "confidence intervals" was not even introduced in my Direct Testimony and I only refer to it here in response to Ms. Bulkley's reference to another case.

The ability to always rely on the 50% cumulative probability is one of the main reasons I revised my approach to calculating the market risk premium to the more complicated approach using log-normal functions. However, it is critical to understand that both approaches use different probability functions and that the cumulative probabilities of one cannot be compared to those of the other, as Ms. Bulkley has attempted to do, rendering the entire criticism in Q78 on page 71 and 72 of her Rebuttal completely baseless.

Q. HOW DO YOU RESPOND TO MS. BULKLEY'S DEFENSE OF HER USE OF FORECASTED MARKET DATA?[77]

A. Analyst estimates, including S&P's five-year projected growth rate for the entire S&P 500 Index, which is used by Ms. Bulkley in her forward-looking market risk premium,[78] is not independent market-based data.

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[76] Rothschild Direct, page 65, line 10 to page 68, line 18.

[77] Ms. Bulkley's Rebuttal Testimony, page 73, lines 8-17.

[78] Ms. Bulkley's Rebuttal Testimony, page 73, lines 11-13.

Direct market data is superior and less biased than analyst projections and that is why I rely on direct market data whenever and wherever possible. As stated previously, there are instances where market data does not provide access to inputs required for certain calculations, as is the case in my Constant Growth DCF analysis. In these cases, I do resort to forecasted data, though with extreme caution. Please refer to page 39, line 17 to page 42, line 8 in the DCF section of my Direct Testimony for more detail on my approach when I find no market-based alternative to using forecasts.

Q. DO YOU SEE ANY PROBLEM WITH MS. BULKLEY'S APPROACH TO CALCULATING THE MARKET RISK PREMIUM?

A. Yes, I do. As pointed out in page 42, the most important aspect of selecting a market index for a CAPM analysis is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium.

Ms. Bulkley is not consistent in this critical point. Her market risk premium is not based on the same market index used to calculate her betas provided by Value Line. As acknowledged by Ms. Bulkley, Value Line calculates its published betas based on the New York Stock Exchange Composite Index.[79] The methodology Ms. Bulkley uses to calculate the market risk premium is based on the S&P 500 Index.[80] When applying the CAPM, it is imperative to use betas and a market risk premium based on the same market index. This is a fundamental concept of the CAPM and using betas based on one index with a market risk premium based on a different index, as Ms. Bulkley has done, yields invalid results.

[79] Ms. Bulkley's Rebuttal Testimony, page 67, lines 13-15.

[80] Ms. Bulkley's Rebuttal Testimony, page 72, lines 16-19.

For this reason, the results of Ms. Bulkley's CAPM analysis should be disregarded by the Commission.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING MS. BULKLEY'S CRITICISMS OF YOUR CAPM ANALYSIS.

A. As detailed in this section, each of Ms. Bulkley's criticisms of the components of my CAPM analysis is either inaccurate, incomplete, or overly generalized. None of them can be considered a basis for invalidating my approach. Her general concern for the pitfalls of using spot market data are valid, but these issues have been well-considered and are addressed by using consistent dates for spot data and by using historical averages in addition to spot data.

Her criticisms and the results of her selected adjustments to my CAPM results should be disregarded.

V. CURRENT MARKET ENVIRONMENT

Q. DO YOU AGREE WITH MS. BULKLEY THAT BOND YIELDS ARE ONLY ONE OF MANY FACTORS THAT EQUITY INVESTORS CONSIDER IN DETERMINING THEIR RETURN REQUIREMENTS?

A. Yes. On pages 17-30 of my Direct Testimony, I explain that it is important to consider the results of my cost of equity models (DCF and CAPM) in the context of current financial market conditions as follows. I explain in-depth how COVID-19 has fundamentally changed capital markets, including stock price crashes, increased volatility expectations, lower interest rates, and higher credit spreads. I utilize a 3-dimensional surface to show

how the term-structure of volatility for the S&P 500 has evolved since before the COVID-19 outbreak and in the months since. I also show that investors' volatility expectations for natural gas utility companies increased less than the overall market in the initial outbreak of the pandemic, but has not declined as quickly as the overall market as of December 2020. And I explain what all this financial data indicates regarding the cost of equity for natural gas utility companies. I explain that volatility expectations are important, but investors' expectations regarding the co-variance between natural gas utility stocks and the overall market are more relevant to cost of equity than volatility expectations alone. Option-implied betas indicate that investors expect natural gas utility stock price movements to be less correlated with the overall market than before the pandemic. Before the COVID-19 pandemic, the average option-implied beta for my Gas Proxy Group ranged between approximately 0.74 and 0.89. In December 2020, the average option-implied beta of these gas companies has ranged between 0.57 and 0.72. In other words, investors expect natural gas utility stocks to move a little more than half for every percent the market moves. Before the pandemic, investors expected that natural gas utility stocks would move about 0.75% for every 1.0% move.

VI. CONCLUSION

Q. PLEASE SUMMARIZE YOUR REACTION TO MS. BULKLEY'S REBUTTAL TESTIMONY.

A. Ms. Bulkley's criticisms of my Direct Testimony are unsupported and should be rejected. In addition, Ms. Bulkey's CAPM approach has a critical flaw that renders her results

invalid, at least in part, if not entirely, and as a result they should be disregarded by the Commission.

If adopted, my cost recommendations would allow Montana-Dakota to raise the capital it needs to provide safe and reliable service because my recommendations are consistent with investors' return expectations.

Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?

A. Yes.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Montana-Dakota Utilities Co.
2020 Natural Gas Rate Increase
Application

Case No. PU-20-379

VERIFICATION

STATE OF ___Connecticut_____)
) ss.
COUNTY OF _Fairfield_____)

Aaron L. Rothschild, being first duly sworn on oath, deposes and states that he has read the testimony and exhibits submitted in the above captioned matters under his name, that they were prepared by him or under his direction, that he knows the contents thereof, and that the same are true and correct to the best of his knowledge and belief.

Aaron L. Rothschild

Subscribed and sworn to before me this 24 day of February 2021.

Notary Public
My Commission Expires: 12-31-21

Geralyn M Hatcher
NOTARY PUBLIC
State of Connecticut
My Commission Expires
December 31, 2021