

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

KRISTIN K. MAYES, Chairman
SANDRA D. KENNEDY
PAUL NEWMAN
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BOB STUMP

IN THE MATTER OF THE APPLICATION OF ARIZONA -AMERICAN WATER COMPANY, AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS AGUA FRIA WATER DISTRICT, ANTHEM WATER DISTRICT, HAVASU WATER DISTRICT, MOHAVE WATER DISTRICT, PARADISE VALLEY WATER DISTRICT, SUN CITY WEST WATER DISTRICT, AND TUBAC WATER DISTRICT

DOCKET NO. W-01303A-08-0227

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN COMPANY, AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS AGUA FRIA WASTEWATER DISTRICT, ANTHEM WASTEWATER DISTRICT, AND MOHAVE WASTEWATER DISTRICT

DOCKET NO. SW-01303A-08-0227

**REBUTTAL TESTIMONY
OF
BENTE VILLADSEN
ON BEHALF OF
ARIZONA-AMERICAN COMPANY
FEBRUARY 10, 2009**

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1 **I. EXECUTIVE SUMMARY**

2 Dr. Bente Villadsen, a Principal at *The Brattle Group*, filed direct testimony on the cost
3 of capital for Arizona-American districts (collectively, “Arizona-American”) in April
4 2008, and is now filing rebuttal testimony in response to the testimony submitted by Mr.
5 David C. Parcell on behalf of Arizona Corporation Commission Staff and by Mr. William
6 A. Rigsby on behalf of the Residential Utility Consumer Office. Dr. Villadsen continues
7 to believe that 11¾% is an appropriate return for Arizona-American on equity at 46.75%
8 equity.

9 Mr. Parcell relied on three different samples of water companies, and used versions of the
10 Discounted Cash Flow (“DCF”) method, the Capital Asset Pricing Model (“CAPM”),
11 and the Comparable Earnings method to arrive at his recommended 10% return on equity
12 for Arizona-American. The recommendation of Mr. Parcell is too low, because (i) it is at
13 or near the rate at which an affiliate recently raised debt, (ii) unlike prior Staff testimony,
14 it failed to consider that Arizona-American’s debt ratio is higher than that of the
15 comparable companies, and (iii) it relied on downward biased data such as a geometric
16 market risk premium for the CAPM, historical growth rates in its DCF, and regulated
17 entities only in the comparable earnings methodology. In sum, the recommended 10%
18 return on equity is too low, and does not reflect the Company’s cost of equity.

19 Mr. Rigsby’s recommended 8.88% return on equity on 44.8% equity is so low that it is
20 below the cost at which an affiliate recently issued debt and only slightly above the
21 current yield on investment-grade public utility bonds. This recommendation violates
22 basic principles of finance, and would not afford the Company the opportunity to
23 successfully raise equity capital, especially in a period of increased uncertainty due to the
24 current financial and economic crisis. Further, Mr. Rigsby fails to take into account that
25 the Company has higher financial risk than the comparable companies and also makes a
26 number of inappropriate assumptions in implementing both the DCF method and the
27 Capital Asset Pricing Model, which make his estimated 8.88% cost of equity completely
28 unreliable.

1 **II. INTRODUCTION AND SUMMARY**

2 **Q1. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.**

3 A1. My name is Bente Villadsen. My business address is *The Brattle Group*, 44 Brattle Street,
4 Cambridge, MA 02138.

5 **Q2. DID YOU PREVIOUSLY FILE TESTIMONY IN THIS PROCEEDING?**

6 A2. Yes, I filed direct testimony (“Villadsen Direct”) on behalf of Arizona-American Water
7 Company (“Arizona-American” or the “Company”) in April 2008 regarding the estimate
8 of the cost of equity for Arizona-American’s districts. The cost of equity is the return
9 that the Arizona Corporation Commission (the “Commission”) should provide the
10 Company an opportunity to earn on the equity portion of its rate base.

11 **Q3. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?**

12 A3. Arizona-American has asked me to review and respond to the testimony of Mr. David C.
13 Parcell (“Parcell Direct”), who filed testimony on behalf of the Arizona Corporation
14 Commission Staff (the “Staff”), and to the testimony of Mr. William A. Rigsby (“Rigsby
15 Direct”), who filed testimony on behalf of the Residential Utility Consumer Office.
16 Specifically, I will address their recommendations for the cost of equity capital (“CoE”)
17 for Arizona-American in this matter.

18 **Q4. PLEASE SUMMARIZE THE RECOMMENDATIONS OF THE PARCELL
19 DIRECT AND THE RIGSBY DIRECT.**

20 A4. The Parcell Direct recommends a cost of equity of 10%, on a capital structure consisting
21 of 41.62% common equity, 47.70% long-term debt, and 10.98% short-term debt.¹ The
22 recommendation is based on estimates obtained by employing three methods: the
23 Discounted Cash Flow (“DCF”) model, the Capital Asset Pricing Model (“CAPM”), and
24 the Comparable Earnings method. The Parcell Direct estimates the cost of equity to be in

¹ Parcell Direct, p. 2.

1 the range of 9.5% to 10.5%.² The Parcell Direct relies on three proxy groups of water
2 utilities: the four companies covered by *Value Line Standard Edition*, the nine companies
3 covered by the AUS Utility Reports, and the eight companies comprising the water
4 sample in the Villadsen Direct.³ Although Commission Staff in prior testimony made an
5 adjustment to account for the differences in financial risk between the sample companies
6 and Arizona-American and the Commission approved hereof,⁴ the Parcell Direct does not
7 take the Company's more leveraged capital structure into account.

8 The Rigsby Direct recommends a cost of equity of 8.88%, on a capital structure with
9 44.8% common equity and 55.2% long-term debt.⁵ The recommendation is based on
10 CAPM and single-stage DCF estimates for a water sample comprised of the four water
11 utilities covered by *Value Line Standard Edition* ("Value Line") and ten gas local
12 distribution companies ("gas LDCs") covered by *Value Line*.⁶ Although Mr. Rigsby has
13 in the past made an adjustment for financial risk, he has not done so in this proceeding,
14 although his testimony acknowledges that Arizona-American has more financial risk than
15 the sample companies used in the estimation.⁷

16 Both the Parcell Direct and the Rigsby Direct discuss the ongoing financial crisis in their
17 testimonies, but neither provides an explicit analysis of the impact on the market risk
18 premium equity investors require to provide capital.

19 **Q5. DO YOU BELIEVE THAT THE RECOMMENDATIONS OF THE PARCELL**
20 **DIRECT AND THE RIGSBY DIRECT REFLECT THE COST OF EQUITY FOR**
21 **ARIZONA-AMERICAN?**

² Parcell Direct, p. 3.

³ Parcell Direct, p. 17 (The Parcell Direct lists the AUS Utility Report companies as eight, but the correct number is nine, as reflected in the schedules to Parcell Direct, e.g. Schedule 5).

⁴ See, for example, the Direct Testimony of Pedro M. Chaves in Docket No. WS-01303A-06-0491 and Arizona Corporation Commission Decision 69440 pp. 18-19.

⁵ Rigsby Direct, pp. 4-5.

⁶ Rigsby Direct, p. 16.

⁷ Rigsby Direct, p. 54.

1 A5. No. The recommended cost-of-equity figures are simply too low. Arizona-American's
2 financing affiliate, American Water Capital Corporation, has recently issued debt at an
3 interest rate of 10%, so that the Company's cost of debt is higher than the Rigsby Direct's
4 recommended cost of equity and near the Parcell Direct's recommended cost of equity.
5 Because equity is riskier than debt, investors require a premium to provide equity capital
6 and the ongoing financial crisis has increased the premium investors require to provide
7 equity capital. Additionally, the recommendations are below the return allowed to other
8 utilities prior to the financial crisis which has now increased the cost of capital. Further,
9 if I make simple and conservative adjustments to the Parcell Direct and the Rigsby Direct
10 cost-of-equity estimates that (i) discard cost-of-equity estimates below the cost of
11 investment grade debt, (ii) take Arizona-American's higher financial risk into account in
12 the manner that Staff and Mr. Rigsby have in past testimony, (iii) rely on forward-looking
13 growth rates only, and (iv) ignore Capital Asset Pricing Model estimates that rely on the
14 geometric Market Risk Premium or other unusual features, the result is cost of equity
15 estimates in the range of no less than 11.2 to 11.4%. This range is only slightly below the
16 Company's requested return on equity of 11.75%, and it is based on making conservative
17 adjustments that do not attempt to reflect the impact of the current financial crisis on the
18 cost of equity. For these reasons, the evidence continues to support Arizona-American's
19 requested return on equity of 11.75%. It is reasonable and conservative given the current
20 financial crisis.

21 **Q6. HOW IS THE REMAINDER OF YOUR REBUTTAL TESTIMONY**
22 **ORGANIZED?**

23 A6. Section III discusses the reasonableness of the recommendations of the Parcell Direct and
24 the Rigsby Direct. This section addresses the Company's access to capital markets, the
25 need to raise capital for infrastructure investments, and the cost of capital. Section IV
26 addresses the higher financial risk of the Company relative to the comparable companies.
27 Section V addresses specific issues in the Parcell Direct and Section VI addresses
28 specific issues in the Rigsby Direct. Finally, Section VII concludes.

1 **III. REASONABLENESS OF THE RECOMMENDED COST OF EQUITY**

2 **Q7. PLEASE SUMMARIZE THE RETURN ON EQUITY RECOMMENDATIONS OF**
3 **THE COST OF CAPITAL WITNESSES IN THIS PROCEEDING.**

4 A7. Table R 1 below summarizes the return on equity and capital structure recommendations
5 in this matter.⁸

6 **Table R 1. Recommended RoE, RoR, and Capital Structure**

	Parcell Direct	Rigsby Direct	Company Request
Cost of Equity	10.0%	8.88%	11.75%
Percentage Equity	41.62%	44.8%	46.75%
Rate of Return*	7.34%	7.0%	8.40%

7
8 * Rate of Return is the weighted cost of debt and equity.
9

10 **Q8. IS A RETURN ON EQUITY AS LOW AS 8.88% REASONABLE?**

11 A8. No. There are three main reasons why the returns on equity recommended in the Rigsby
12 Direct and the Parcell Direct are unreasonable. First, a return on equity of 8.88% is
13 below the cost of debt that Arizona-American's financing affiliate, American Water
14 Capital Corporation, recently faced. As the equity is riskier than debt, this
15 recommendation makes no sense economically or practically. Second, the
16 recommendations of Mr. Parcell and Mr. Rigsby result in rates of return that are
17 substantially below those allowed for gas and electric utilities in the recent past. For
18 example, during the first three quarters of 2008, the weighted average allowed rate of
19 return for electric and gas utilities were 8.30 and 8.51%, respectively, so the Company's
20 requested 8.40% weighted average rate of return is in the same range.⁹ Third, the

⁸ See Parcell Direct p. 2, Rigsby Direct p. 4-5, Villadsen Direct p. 3, and Direct Testimony of Mr. Thomas M. Broderick ("Broderick Direct") p. 5.

⁹ Regulatory Research Associates, "Regulatory Focus, Major Rate Case Decisions - January-September 2008," October 3, 2008 ("RRA October 2008"); Exhibit 60 in Missouri Public Service Commission Case No. ER-2008-0318. Direct Testimony of Mr. Thomas M. Broderick ("Broderick Direct") p. 5.

1 financial crisis has impacted the cost of capital broadly and has without question
2 increased the cost of capital for water utilities. This section addresses these issues.

3 **Q9. DOES AMERICAN WATER'S RECENT DEBT ISSUANCE TELL YOU**
4 **ANYTHING ABOUT ARIZONA-AMERICAN'S COST OF EQUITY?**

5 A9. Yes. Arizona-American's financing affiliate, American Water Capital Corporation has
6 recently issued debt at an interest rate of 10%,¹⁰ and those bonds currently trade at a price
7 of 103.5, implying a current market cost of debt of approximately 9.7%.¹¹ This implies
8 that the Company is currently facing a cost of debt of at least 75 basis points higher than
9 the recommended cost of equity in the Rigsby Direct and about 30 basis points below the
10 recommendation of the Parcell Direct. Since equity for a company is always riskier than
11 its debt, equity must offer an expected return that is higher than the cost of debt to attract
12 rational investors. Simply put, equity investors require a risk premium, and American
13 Water cannot attract equity capital unless investors expect to earn a return that is higher
14 than what they can expect to earn by buying less risky bonds. Therefore, the
15 recommendation of the Rigsby Direct violates the very basic principles of risk and
16 expected return and should be disregarded by the Commission. This is further evidenced
17 when reviewing the Rigsby Direct's underlying estimates. Using the CAPM, the Rigsby
18 Direct estimates a cost of equity for its water utility sample of 6.66 - 8.39% and for its
19 gas LDC sample of 5.07 - 6.26%. Only the highest of the estimated figures is above the
20 current yield on Baa-rated utility debt,¹² and all four are below American Water's current
21 cost of debt as indicated by its recent bond issuance. As equity investors would not
22 consider investing for a return below what they could earn on investment grade utility
23 bonds, so any figure below the cost of investment grade utility debt should be ignored.
24 The recommendation of the Parcell Direct is also too low because it allows equity

¹⁰ On November 26, 2008, American Water Capital Corporation, the financing arm of American Waterworks, Arizona-American's parent, issued \$75 million worth of bonds maturing on 12/1/2038, and paying an interest rate of 10% (Bloomberg).

¹¹ Bloomberg, as of 1/28/2009.

¹² The 15-day average yield on Moody's Baa-rated public utility index for the period ending February 3, 2009 was 7.86% (Bloomberg).

1 investors a return that is only 30 basis points higher than that of debt investors. As Debra
2 C. Coy of Janney Montgomery Scott LLC said in recent testimony filed with California
3 Public Utilities Commission at the request of Staff

4 Last week, a large institutional investor asked us the following
5 question: “If I can buy American Water Works bonds with a 10%
6 coupon, why would I buy the stock, which carries a higher risk,
7 when the company is trading at book value and currently earning
8 less than a 10% return on equity?” This is a fair question and one
9 that sophisticated investors will be asking during American
10 Water’s upcoming equity offering roadshow.¹³

11
12 I agree. The expected return on equity must carry a premium over bonds to attract
13 investors and 30 basis points over the parent company’s cost of debt is too little.

14
15 **Q10. WHAT HAVE RECENTLY ALLOWED RATES OF RETURN BEEN?**

16 A10. According to Regulatory Research Associates, the average allowed overall return for gas
17 LDCs was 10.39% on an average of 51.4% equity during the first three quarters of 2008.
18 The figures do not include decisions made after the onset of the financial crisis, and are
19 based on utilities with, on average, substantially more equity in their regulatory capital
20 structure than Arizona-American. The average allowed overall rate of return for gas and
21 electric utilities during the first three quarters of 2008 were 8.30 and 8.51%, respectively.
22 Hence, the requested overall rate of return of 8.40% is very comparable.¹⁴ Specific
23 statistics on water utilities are not readily available, but a range of 9 to 12% has been
24 mentioned.¹⁵ It is also noteworthy that historically the average allowed return on equity
25 for electric utilities has been about 360 basis points above Moody’s Baa bond yield.
26 Using today’s bond yields, the addition of 360 basis points to Moody’s bond yield results
27 in a cost of equity of about 11.5%. While these figures are not exact, they indicate that

¹³ Debra G. Coy, “A Capital Markets View of Water Utilities,” submitted to the California Public Utilities Commission at the request of the CPUC Staff, January 30, 2009 (“Coy Testimony”), p. 3.

¹⁴ RRA October 2008. According to this source, electric utilities on average were allowed a return of 10.5% on an average of 48.7% equity.

¹⁵ Coy Testimony p. 6.

1 the magnitude of Mr. Parcell's and Mr. Rigsby's RoE recommendations is low by
2 historical standards.¹⁶

3 **Q11. PLEASE COMMENT ON THE IMPACT OF THE CURRENT FINANCIAL**
4 **CRISIS ON THE COST OF CAPITAL AND SPECIFICALLY ON THE**
5 **DISCUSSION IN THE TESTIMONIES OF MR. PARCELL AND MR.**
6 **RIGSBY.^{17,18}**

7 A11. First, the Rigsby Direct states that "8.88% cost of equity will provide Arizona-American
8 with a reasonable rate of return on the Company's invested capital when economic data
9 on interest rates (that are low by historical standards), ... are all taken into
10 consideration."¹⁹ There is ample evidence that the cost of both debt and equity capital
11 has increased, and it is dangerous and incorrect to focus on the risk-free rates which are
12 "low by historical standards." As a matter of fact, corporate and utility borrowing rates
13 are high, and *the spread between utility borrowing rates and risk-free rates is historically*
14 *high*. Figure R 1 below shows the development in the utility bond yields over the last
15 two years and clearly illustrate the substantial increase in utility borrowing costs. For
16 illustrative purposes, Figure R 1 also includes the yield on 20-year Treasury bonds.

¹⁶ See Table BV-R1 attached to this testimony. I look at electric utilities because I do not have access to the same long history of allowed rates of return on equity for water or gas utilities.

¹⁷ Parcell Direct pp. 9-12.

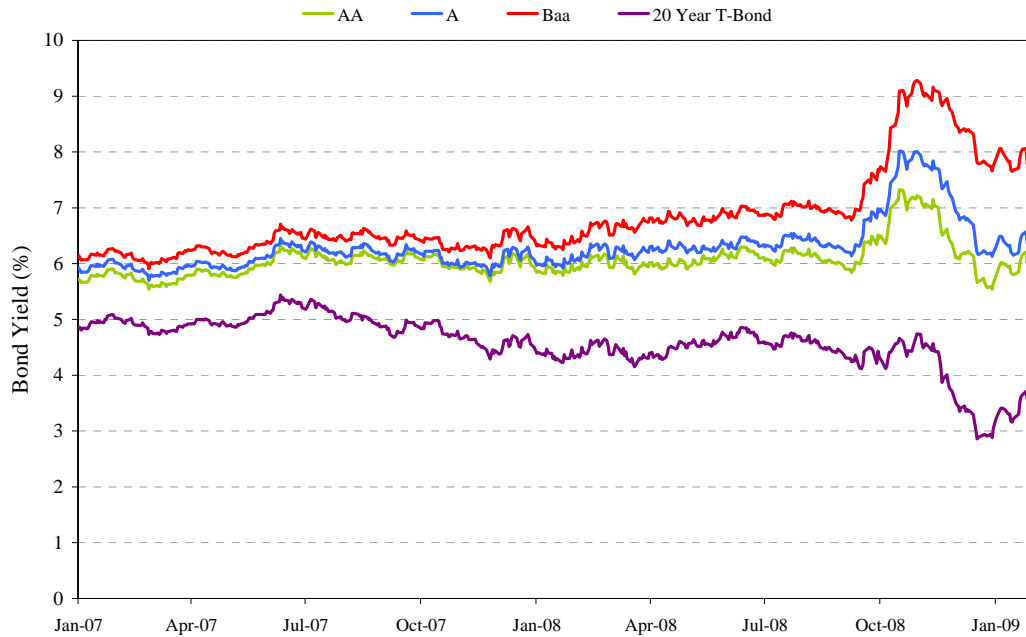
¹⁸ Rigsby Direct pp. 34-52.

¹⁹ Rigsby Direct p. 52.

1

Figure R 1

Moody's Utility Bond Yields by Credit Rating



Source: Bloomberg LP, last accessed February 3, 2009.

2

3 For the purpose of evaluating the cost of capital for a utility, it is the borrowing rate for
4 utilities (*e.g.*, yield on utility bonds) that is the relevant benchmark.

5

6 Second, the Parcell Direct states that the crisis will result in “declining capital costs,” and
7 that the crisis “do[es] not imply that the cost of equity for water utilities such as AAWC
8 have [sic] increased.”²⁰ Certainly, financial sector professionals disagree. For example,
9 Janney, Montgomery, Scott LLP expects that the cost of debt will be “at least 100 to 200
10 basis points higher than previous rates, despite efforts by the federal government to lower
interest rates and bring liquidity back into the capital markets.”²¹ Similarly, FitchRatings

²⁰ Parcell Direct p. 10 and p. 30, respectively.

²¹ Coy Testimony p. 3.

1 and Reuters in recent publications on electric utility issues noted the raising cost of
2 capital as a key theme.²²

3 **Q12. MORE BROADLY WHAT HAPPENS TO INVESTOR EXPECTATIONS**
4 **DURING TIMES OF FINANCIAL TURMOIL?**

5 A12. The facts that financial markets are in turmoil and stock market volatility has increased
6 dramatically mean that equity investors face increased uncertainty. Increased uncertainty
7 leads them to seek lower risk investments or to demand a higher expected rate of return
8 before they are willing to invest their money. In part, this is an explanation of why
9 market prices have fallen. The financial market distress means that the current market
10 risk premium (“MRP”) is *higher* than it would otherwise be. Dimson, Marsh, and
11 Staunton (2008) appear to agree as they note

12 Although credit spreads widened, credit fundamentals as measured
13 by low default rates remained at historically strong levels. This
14 may indicate higher defaults to come, an increase in risk aversion,
15 a bigger premium for liquidity, or all three.²³

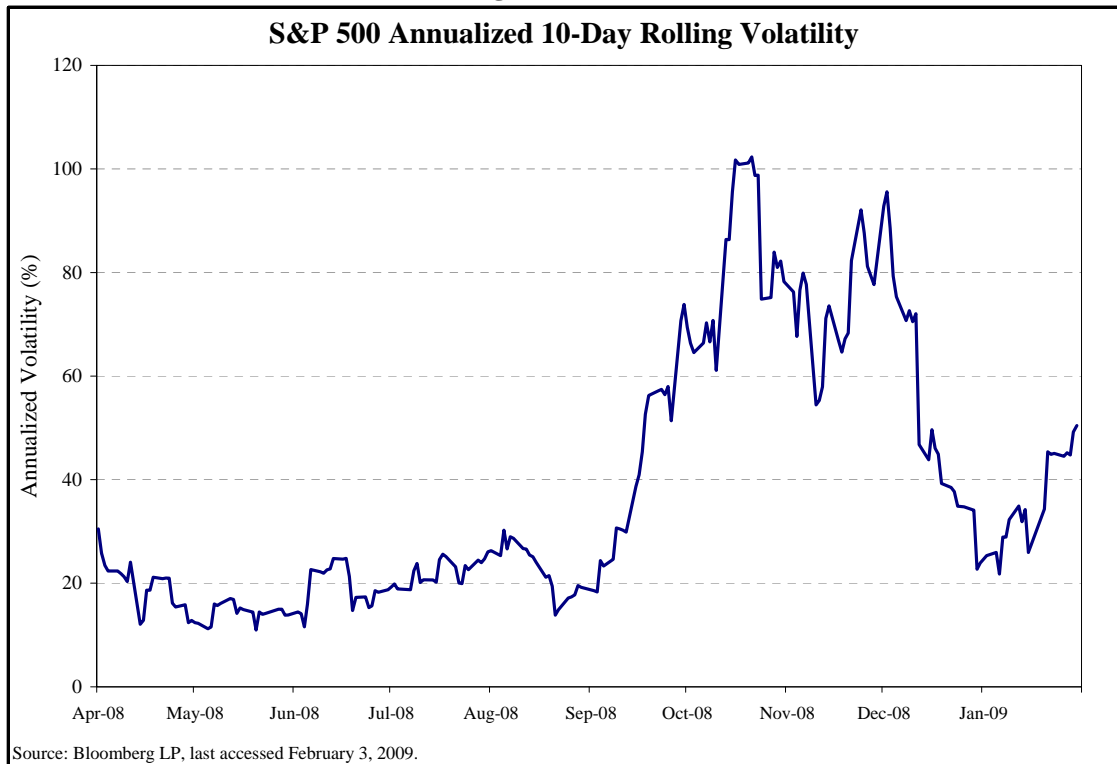
16 As shown in Figure R 2 below, the volatility in the U.S. stock market spiked to 3 to 4
17 times the normal level of about 20% in September-October and remains at more than
18 twice its normal level.

²² FitchRatings, “EEI 2008 Wrap-Up: Cost of Capital Rising,” November 17, 2008 and Reuters, “Credit Crisis Drives Buying in US Utilities’ Bonds,” December 16, 2008.

²³ Elroy Dimson, Paul Marsh, and Mike Staunton, 2008, *Global Investment Returns Yearbook 2008*, p. 25.

1

Figure R 2



2

3 As investors' risk aversion also increases during times of financial distress, there can be
4 little doubt that the MRP is currently higher than in the recent past.

3

4

5

**Q13. ARE THERE ACADEMIC STUDIES THAT PROVIDE INSIGHTS INTO THE
6 MRP IN TIMES OF FINANCIAL RECESSION OR ECONOMIC DOWNTURN?**

6

7

A13. Yes. The academic literature contains studies of the impact of recessions on investors'
8 attitude towards risk. The typical investor is risk averse and risk averse investors would
9 prefer a certain payoff to an uncertain gamble with the same expected payoff. Risk
10 averse individuals or investors require compensation to engage in uncertain investments
11 such as providing equity capital. These studies referenced above find that risk aversion,
12 and hence the risk premium required to hold equity rather than debt, increases in
13 economic downturns. Several articles suggest that the market risk premium is higher
14 during times of recession. Constantinides (2008) studies a classical utility model where
15 consumers are risk averse and summarizes some of the empirical literature.

15

16

Constantinides draws from empirical evidence that shows that consumers become risk

1 averse in times of economic recession or downturn, and equity investments accentuate
2 this risk.²⁴ (Increased risk aversion leads to a higher expected return for investors before
3 they will invest.) Specifically, equities are pro-cyclical and decline in value when the
4 probability of a job loss increases; thus, they fail to hedge against income shocks that are
5 more likely to occur during recessions.²⁵ Consequently, investors require an added risk
6 premium to hold equities during economic downturns:

7 In economic recessions, investors are exposed to the double hazard of
8 stock market losses and job loss. Investment in equities not only fails to
9 hedge the risk of job loss but also accentuates its implications. Investors
10 require a hefty equity premium in order to be induced to hold equities.
11 This is the argument that I formalize below and address the predictability
12 of asset returns and their unconditional moments.²⁶

13 And

14 The first implication of the theory is an explanation of the counter-cyclical
15 behavior of the equity risk premium: the risk premium is highest in a
16 recession because the stock is a poor hedge against the uninsurable income
17 shocks, such as job loss, that are more likely to arrive during a recession.

18 The second implication is an explanation of the unconditional equity
19 premium puzzle: even though per capita consumption growth is poorly
20 correlated with stocks returns, investors require a hefty premium to hold
21 stocks over short-term bonds because stocks perform poorly in recessions,
22 when the investor is most likely to be laid off.²⁷

23
24 Empirically, several authors have found that market volatility and the market risk
25 premium are positively related. For example, Kim, Morley and Nelson (2004)²⁸ find that

²⁴ Constantinides, G. M., "Understanding the equity risk premium puzzle". In R. Mehra, ed., *Handbook of the Equity Risk Premium*, 2008, Elsevier, Amsterdam.

²⁵ Constantinides, G.M., and D. Duffie, 1996, "Asset Pricing with Heterogeneous Consumers", *Journal of Political Economy*.

²⁶ G.M. Constantinides (2008), *op. cit.*

²⁷ *Ibid*, p. 353.

²⁸ C-J. Kim, J.C. Morley and C.R Nelson (2004), "Is There a Positive Relationship Between Stock Market Volatility and the Equity Premium," *Journal of Money, Credit and Banking*, Vol. 36.

1 When the effects of volatility feedback are fully taken into account, the
2 empirical evidence supports a significant positive relationship between
3 stock market volatility and the equity premium.²⁹

4 **Q14. WHAT BEARING DOES THIS HAVE ON WATER UTILITIES, WHICH**
5 **HISTORICALLY HAVE BEEN VIEWED AS RELATIVELY LOW RISK?**

6 A14. As noted by Debra G. Coy in testimony before the California PUC,

7 Water utilities have historically been viewed as low-risk,
8 predictable, regulated monopolies, and they have attracted equity
9 investors who appreciated those characteristics. Now, investors are
10 more wary

11 and

12 [i]nvestors have come to understand that ‘low risk’ water utilities in
13 fact carry a variety of potential risks, the largest of which is their
14 raising need to repair and replace aging infrastructure, resulting in
15 high capex requirements, low depreciation rates, and negative free
16 cash flow, along with the negative effects of regulatory lag on
17 earnings.³⁰

18 *Value Line* documents this increase in systematic risk as the betas *Value Line* estimates
19 for the utility companies in the water sample have increased over time. Figure R 3 below
20 shows the average estimated betas for the water sample. Based upon the end-of-year
21 reports,³¹ *Value Line*’s estimated betas for the water utility companies have increased
22 from an average of about 0.54 in 1998 to an average of about 0.87 in January 2009.

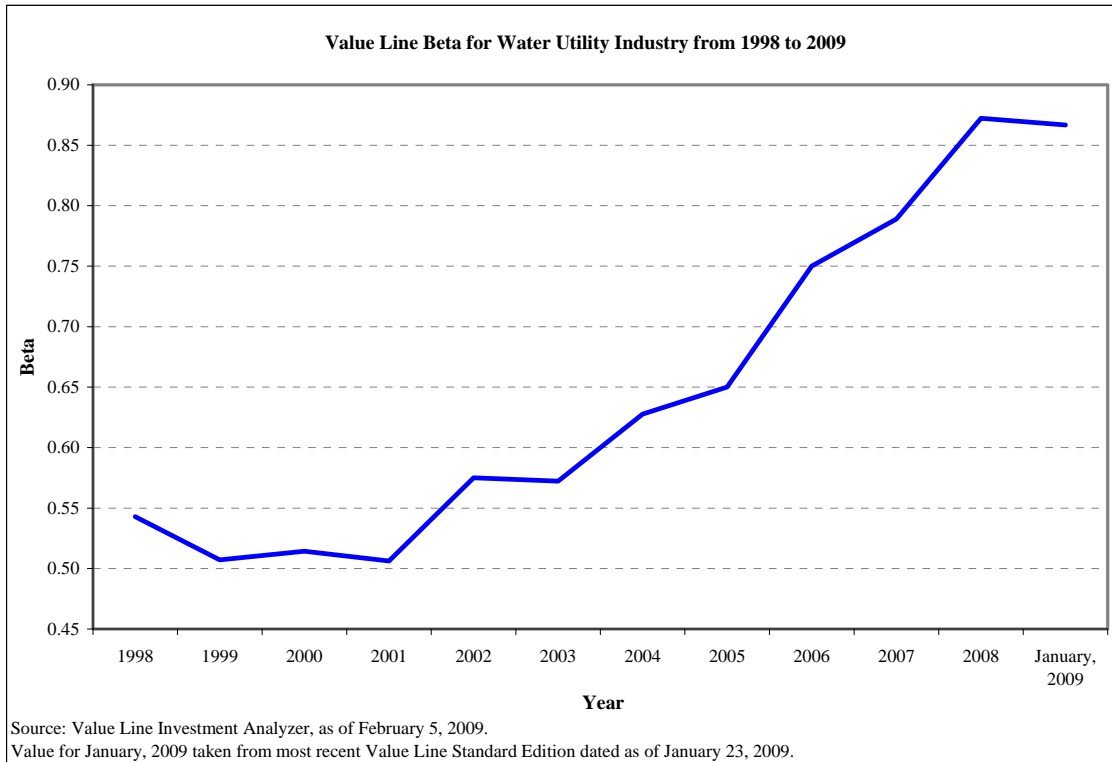
²⁹ *Ibid.* p. 357. The authors rely on a statistical (Markov-switching) model of the ARCH type and data for the period 1926 to 2000 for their analysis.

³⁰ Coy Testimony p. 7.

³¹ The 2009 beta estimates are taken from January 23, 2009 *Value Line Summary & Index*. The January estimate of .865 is very close to the October 2008 estimate of .87.

1

Figure R 3



2

3 **Q15. ARE VALUE LINE BETAS A RELIABLE MEASURE OF THE WATER**
4 **INDUSTRY'S SYSTEMATIC RISK?**

5 A15. Yes. While the stocks of publicly traded water companies, as discussed in the Villadsen
6 Direct, trade relatively infrequently,³² the impact hereof on estimated betas do not change
7 significantly over time, so the trend illustrated in Figure R 3 reflects an increase in the
8 water industry's systematic risk. At the same time, there are other indications that the
9 overall risk of the industry is increasing. Moody's Investors Service ("Moody's") and
10 Standard & Poor's ("S&P") both note the need for significant capital expenditures and
11 the costs of complying with environmental and security regulations as sources of risk.³³
12 Fitch notes that the debt ratios are increasing.³⁴ At the same time, the regulatory

³² Villadsen Direct, p. 36.

³³ *Moody's*, Credit Risks Are Increasing for U.S. Investor Owned Water Utilities, Special Comment, January 2004 and *Standard & Poor's*, Key Rating Factors for Water Companies Around the World, July 17, 2006.

³⁴ *Fitch Ratings*, 2007 Median Ratios for Water and Sewer Revenue Bonds – Retail Systems.

1 requirements imposed on the water industry are evolving.³⁵ Hence the water industry is
2 experiencing a transition period which adds to the risk of the industry.

3 **Q16. WHAT EVIDENCE DO YOU HAVE THAT THE WATER INDUSTRY WILL**
4 **REQUIRE SUBSTANTIAL CAPITAL EXPENDITURES GOING FORWARD?**

5 A16. As noted in the Villadsen Direct pp. 34-35, the water industry is expected to undertake
6 substantial capital investments in coming years. For example, the Environmental
7 Protection Agency (“EPA”) has indicated that the water industry needs to invest capital
8 of about \$224 billion over the next two decades to meet the nation’s need for clean
9 drinking water and for wastewater disposal.³⁶ Similarly, *Value Line* notes the need for
10 investment totaling “hundreds of millions of dollars in the coming decade” by the water
11 utilities it follows as the EPA enacts more stringent requirements; portions of many
12 current water systems are approaching 100 years in age and require significant
13 maintenance, in some cases complete rebuilding.³⁷ The requirement for additional
14 capital investment is a substantial hurdle for a group of companies that *Value Line*
15 estimates to have an annual profit of about \$450 million in 2009.³⁸ According to the
16 American Society of Civil Engineers (“ASCE”), Arizona’s drinking water infrastructure
17 “needs \$1.62 billion over the next 20 years” and there if “almost \$6.2 billion in
18 wastewater infrastructure needs.”³⁹ Arizona-American also faces substantial capital
19 expenditures.⁴⁰

20 **Q17. PLEASE SUMMARIZE WHAT EFFECT, IF ANY, THE CURRENT STATE OF**
21 **THE ECONOMY IS LIKELY TO HAVE ON THE COST OF CAPITAL.**

³⁵ For example, the Ground Water Rule, a set of water quality standards mandated by the EPA, was published in the Federal Register November 8, 2006.

³⁶ www.epa.gov/waterinfrastructure/infrastructuregap.html

³⁷ *Value Line Investment Survey*, Water Utility Industry, July 25, 2008, p. 1415.

³⁸ *Ibid*, p. 1415.

³⁹ *American Society of Civil Engineers*, 2005 Report Card for America’s Infrastructure, Arizona.

⁴⁰ See, for example, Broderick Direct’s discussion pp. 13-26.

1 A17. I agree with the credit rating agencies, EEI, and financial professionals that the current
2 state of the economy is likely to increase the cost of capital for all companies due to
3 heightened investor uncertainty. Utilities face higher cost of debt and an increased equity
4 premium. Investors are simply unwilling to commit capital to new investment without a
5 much higher expected return relative to the risk of the investment than in the relatively
6 recent past. This coupled with the requirement for substantial infrastructure investment
7 in the water industry in general, and for the Company's continued efforts to maintain the
8 water supply and wastewater infrastructure in Arizona, makes it imperative that the
9 Commission not underestimate the required return on equity.

10 **IV. LACK OF ADJUSTMENT FOR FINANCIAL RISK**

11 **Q18. HAS THE COMMISSION TRADITIONALLY PROVIDED AN ADJUSTMENT**
12 **TO THE ALLOWED RETURN ON EQUITY TO ADJUST FOR FINANCIAL**
13 **RISK?**

14 A18. Yes. The Commission has approved Staff's use of its version of the Hamada
15 methodology to increase the allowed return on equity to compensate for risk in all recent
16 Arizona-American rate cases. Although I do not believe that the Hamada methodology
17 as implemented by Staff in prior Arizona-American rate cases adequately compensates
18 investors for risk, there has been no dispute that some methodology must be used.

19 **Q19. HAS THE COMMISSION RECENTLY PROVIDED AN ADJUSTMENT TO THE**
20 **ALLOWED RETURN ON EQUITY TO ADJUST FOR FINANCIAL RISK?**

21 A19. Yes, very recently. On November 19, 2008, in Decision No. 70624, the Commission
22 again approved adjusting the return on equity to account for financial (leverage) risk.
23 Interestingly, Gold Canyon Sewer Company's capital structure was comprised of 100%
24 equity, so the return on equity was reduced in recognition that investors faced less risk in

1 a company with no debt. The Commission did this by using RUCO's methodology of a
2 hypothetical capital structure of 40% debt and 60% equity.⁴¹

3 **Q20. DO THE RECOMMENDATIONS OF THE PARCELL DIRECT AND THE**
4 **RIGSBY DIRECT ACCURATELY REFLECT THE FINANCIAL RISK**
5 **INHERENT IN ARIZONA-AMERICAN'S REGULATORY CAPITAL**
6 **STRUCTURE?**

7 A20. No, neither the Parcell Direct nor the Rigsby Direct makes an adjustment to take into
8 account the differences in financial risk between the Company and the sample companies.
9 This violates the basic principles of financial economics, since there is no debate in the
10 finance profession as to whether capital structure affects the risks borne by equity holders.
11 I explained in great detail in my direct testimony how higher levels of debt increase the
12 risk faced by shareholders, since debt has a priority claim in any cash flows, while
13 shareholders are residual claimants – they only receive a return after all debt holders are
14 paid off.⁴²

15 **Q21. HAS THE STAFF OR MR. RIGSBY IN THE PAST ADJUSTED SAMPLE**
16 **ESTIMATES TO TAKE INTO ACCOUNT THE COMPANY'S HIGHER DEBT**
17 **LEVEL?**

18 A21. Yes. In past testimony by Staff and Mr. Rigsby, an adjustment was made to account for
19 the fact that Arizona-American had more debt in its capital structure than the comparable
20 companies.⁴³ In past testimony, Mr. Rigsby has recommended the reliance on a

⁴¹ Staff recommended using the Hamada methodology to reduce the allowed return on equity. See Decision No. 70624 pp. 11 and 14.

⁴² Villadsen Direct, pp. 8-16.

⁴³ See, for example, Direct Testimony of Pedro M. Chaves in Dockets No. WS-01303A-06-0491 (Executive Summary) WS-01303A-06-0403 (Executive Summary) and Direct Testimony of William A. Rigsby in Dockets No. WS-01303A-06-0491 p. 6 and No. WS-01303A-06-0403. See also Arizona Corporation Commission Decision 69449 p. 19.

1 hypothetical capital structure for Arizona-American and an upward adjustment for the
2 Company's higher financial risk.⁴⁴

3 **Q22. IF THE METHOD RELIED UPON BY STAFF IN PAST ARIZONA-AMERICAN**
4 **CASES WAS APPLIED TO THE PARCELL DIRECT'S AND THE RIGSBY**
5 **DIRECT'S ESTIMATES, WHAT WOULD BE THE RESULTING ESTIMATED**
6 **RETURN ON EQUITY?**

7 A22. Using the capital structure employed by the Parcell Direct, including short-term debt, I
8 started with the 10% recommended cost of equity, and computed the financial risk
9 adjustment used in previous Staff testimony. This resulted in an upward adjustment of 70
10 basis points, which applied to the Parcell recommended cost of equity would result in a
11 recommendation of 10.7%. Table BV-R1 and associated workpapers detail the
12 assumptions and the steps involved in this calculation. Similarly, Mr. Rigsby has in past
13 testimony before this Commission in Arizona-American cases made an upward
14 adjustment of 50 basis points to account for the Company's higher financial risk. Hence,
15 I added 50 basis points to the recommended return on equity in the Rigsby Direct. The
16 results are shown in Table R 2 below.⁴⁵

17 **Table R 2. RoE Recommendations Using Prior Adjustments for Financial Risk**

	Parcell Direct	Rigsby Direct
Recommended RoE	10.00%	8.88%
Adjustment for financial risk	0.6 - 0.7%	0.50%
RoE adjusted for financial risk	10.6 - 10.7%	9.38%

18
19 **Q23. DOES THE PARCELL DIRECT OR THE RIGSBY DIRECT DISCUSS THE**
20 **LACK OF FINANCIAL RISK ADJUSTMENT?**

21 A23. The Parcell Direct does not discuss the financial risk component of the cost of equity.
22 Instead, Mr. Parcell criticizes the ATWACC model that I used to account for financial

⁴⁴ See, for example, Direct Testimony of William A. Rigsby in Docket No. WS-01303A-06-0491 p. 36.

⁴⁵ Parcell Direct p. 2, Rigsby Direct p. 4-5, Testimony of William A. Rigsby in Docket No. WS-0130A-06-0491 p. 6, and Table No. BV-R1.

1 risk, but he does not discuss, nor implement, an alternative method. However, Mr.
2 Rigsby explicitly states that he departs from his usual method by not including a financial
3 risk adjustment, although he acknowledges that Arizona-American has a higher level of
4 financial risk than the sample companies he used to derive the cost-of-equity estimate.⁴⁶

5 **Q24. PLEASE COMMENT ON MR. PARCELL’S CRITIQUE OF THE ATWACC**
6 **METHODOLOGY.**

7 A24. The Parcell Direct does not explain why the ATWACC “is an unnecessary step in the
8 cost of capital development,”⁴⁷ which is puzzling statement because the only purpose of
9 using the ATWACC model is to properly account for financial risk differences among
10 sample companies, as well as between sample companies and Arizona-American. To say
11 that it is unnecessary appears to imply that accounting for financial risk is unnecessary,
12 which is clearly at odds with established finance theory and practice. The Parcell Direct
13 also objects to using the sample companies’ market value capital structure in order to
14 compute the sample ATWACC. However, this objection only speaks to *how* the
15 financial risk adjustment should be done, not *whether* it should be done at all.

16 **Q25. NEVERTHELESS, IS MR. PARCELL CORRECT THAT THE USE OF MARKET**
17 **VALUES CAPITAL STRUCTURE FOR THE SAMPLE COMPANIES IS**
18 **INAPPROPRIATE?**

19 A25. No. As discussed in the Villadsen Direct,⁴⁸ the risk of the capital structure’s equity
20 depends on the market-value, not on the book-value, and cost of equity is determined in
21 the market place. Hence, investors are concerned about market values not book values.
22 Going through an example, the leading financial text of Brealey, Myers and Allen (2006)
23 states:

24 The market-value balance sheet shows assets worth \$1,250 million. Of
25 course we can’t observe this value directly, because the assets themselves

⁴⁶ Rigsby Direct, p. 54.

⁴⁷ Parcell Direct, p. 34.

⁴⁸ Villadsen Direct, pp. 11-14.

1 are not traded. But we know what they are worth to debt and equity
2 investors ... This value is entered on the left of the market-value balance
3 sheet.
4

5 Why did we show the book balance sheet? Only so you could draw a big
6 X through it. Do so now.
7

8 *When estimating the weighted-average cost of capital, you are not*
9 *interested in past investments but in current values and expectations for*
10 *the future.*⁴⁹
11

12 In other words, the cost of equity is determined in the market place and is based upon
13 market values. Thus, the cost-of-equity estimates obtained in the market place pertain to
14 companies with a market-value capital structure, whereas a regulated utility such as
15 Arizona-American is afforded an allowed cost of equity on a much lower equity
16 percentage. Investors require compensation for the difference.

17 **Q26. PLEASE COMMENT ON MR. RIGSBY'S DEPARTURE FROM HIS**
18 **PRECEDENCE OF ADJUSTING FOR FINANCIAL RISK.**

19 A26. The Rigsby Direct states that the lack of a financial risk adjustment is intended as an
20 incentive for the Company to increase its equity ratio in the future. He does not however
21 provide an argument as to why such a change in capital structure would benefit
22 ratepayers or the Company. In fact, as the development of the ATWACC method makes
23 clear,⁵⁰ the overall rate of return the Company needs to provide its investors in order to
24 attract them is independent of capital structure. The capital structure affects how the
25 overall risk and expected return are divided between debt and equity holders, but not the
26 underlying business risk of the Company. As illustrated in Table 2 on p. 15 of the
27 Villadsen Direct, the cost of financing is the same regardless of its capital structure.
28 Additionally, it is difficult to see how the Company would attract equity capital at the

⁴⁹ Richard A. Brealey, Stewart C. Myers, and Franklin Allen (2006), *Principles of Corporate Finance*, 8th Edition, McGraw-Hill, pp. 504-505 (emphasis added).

⁵⁰ See Villadsen Direct, pp. E-18 to E-21.

1 8.88% return on equity the Rigsby Direct recommends when the Company's bonds
2 provide a higher return. It is also puzzling that the Rigsby Direct recommends a cost of
3 equity below the cost of debt for the Company, and at the same time suggests the
4 Company "start making a concerted effort to increase its level of common equity..."⁵¹ Mr.
5 Rigsby does not explain how a company would attract equity investors if the expected
6 return on equity is, as the Rigsby Direct recommends, lower than the company's return
7 on debt.

8 **V. COMMENTS ON THE ESTIMATION METHODS OF THE PARCELL DIRECT**

9 **A. ISSUES WITH THE DCF APPROACH**

10 **Q27. WHAT ARE YOUR MAIN CONCERNS REGARDING THE DCF MODEL USED** 11 **BY THE PARCELL DIRECT?**

12 A27. I have two main concerns with the Parcell Direct's DCF implementation. First, the
13 Parcell Direct relies on the single-stage version of the model, which assumes that the
14 growth rate for each sample company is constant forever. This is an oversimplification
15 of reality that makes the model less reliable, and can be corrected by using more
16 sophisticated models such as the multi-stage DCF on which I rely in my direct testimony.
17 Second, the Parcell Direct uses a biased estimate of growth rates for its DCF
18 implementation, by relying on both forecasted and historical growth rates instead of using
19 only analysts' forecasts, which are more reliable because they already incorporate any
20 relevant historical information. I expand on these two main issues below, and then
21 address several other problems with the Parcell Direct DCF approach.

22 **Q28. WHY IS THE MULTI-STAGE DCF MODEL MORE RELIABLE THAN THE** 23 **SIMPLE DCF MODEL?**

24 A28. The simple DCF model uses a single value for the future growth rate of cash flows, even
25 if the estimated growth rate is much higher or lower than the forecasted GDP growth.

⁵¹ Rigsby Direct p. 55.

1 However, if a company were to grow significantly faster (slower) than the economy as a
2 whole for a very long time, it would become an increasingly larger (smaller) portion of
3 the economy which appears illogical as water companies and utilities in general serve the
4 public. While such an illogical situation is unlikely to happen in stable industries, which
5 have reached a steady-state equilibrium in which all companies grow at approximately
6 the same rate. In such circumstances, the industry as a whole is not expanding relative to
7 the economy. It is much more likely to be a problem in industries undergoing significant
8 changes and restructuring, such as the water industry today. This is reflected in the
9 growth rates relied upon by Parcell Direct: for example, the forecasted earnings per share
10 (“EPS”) growth rates among the companies considered in the three samples range from
11 4% to 15%.⁵² Even the overall average growth rates used by Parcell Direct, which are
12 the result of averaging five different measures of growth, both historical and projected,
13 vary widely between 3.8% and 7.5%.⁵³

14 The multi-stage DCF model only relies on the estimated growth rates for several years,
15 which is consistent with analysts’ forecast horizon, and then assumes that all companies
16 in the sample will gradually converge toward a growth rate equal the projected growth
17 rate of the economy as a whole. This feature eliminates the illogical outcome described
18 above, and has the additional benefit that it limits the effect of an unusually large forecast
19 error, should one exist for some sample companies.

20 **Q29. HOW DOES THE PARCELL DIRECT ESTIMATE THE GROWTH RATE USED**
21 **TO IMPLEMENT THE DCF APPROACH?**

22 A29. The Parcell Direct uses an average of historically observed and forecasted measures of
23 growth rates. In particular, Mr. Parcell averages the historical growth rates of earnings
24 per share, dividends per share, book values per share, and earnings retention rates, and

⁵² Parcell Direct, Schedule 5, p. 4.

⁵³ *Ibid.*

1 forecasts of the same variables, in order to arrive at a final estimate of the growth rate
2 forecast.⁵⁴

3 **Q30. IS SUCH AN AVERAGE AN ACCURATE FORECAST?**

4 A30. No. Taking an average of historical and forecast growth rates biases the resulting
5 estimate toward the historical values, which have already been reflected in the analysts'
6 forecasted growth rates. In other words, analysts have access to historical growth rates
7 when making their forecasts, and they take them into account to the extent they deem
8 them relevant. Therefore, the Parcell Direct effectively counts twice the importance of
9 historically observed growth rates. Moreover, using outdated information invalidates the
10 main argument in favor of using the DCF model in the first place: namely, that it is a
11 forward-looking model capable of reflecting the most recent changes in investors'
12 information about the company. There is a large academic literature that indicates that
13 analysts' forecasts are statistically more accurate than growth forecasts solely based on
14 historical earnings, dividends, book value and equity growth rates.⁵⁵ For example, a
15 paper by Gordon, Gordon and Gould (1989)⁵⁶ demonstrates that for utilities, forecasted
16 earnings growth outperform past growth in earnings, past growth in dividends, and past
17 growth in earnings retention in explaining utilities expected return. (Note that one of the
18 authors, Myron J. Gordon, developed the Gordon Growth Model, or DCF model, relied
19 upon in the Parcell Direct).

20 **Q31. WHAT IS THE EFFECT OF THIS DOUBLE COUNTING ON THE ESTIMATED
21 GROWTH RATES AND COST OF EQUITY?**

22 A31. Because the historical growth rates used by Parcell Direct are lower than the forecasts of
23 the same growth rates, the erroneous inclusion of historical observations results in growth
24 rate estimates that are biased downward. The bias that results from using historical

⁵⁴ Parcell Direct, Schedule 5, pp. 3-4.

⁵⁵ This literature is summarized in the Villadsen Direct, Appendix C pp. 5-8.

⁵⁶ David A. Gordon, Myron J. Gordon, and Lawrence I. Gould (1989), Choice Among Methods of Estimating Share Yield, *The Journal of Portfolio Management*, 50-55.

1 growth rates is particularly troubling in times of industry changes, large infrastructure
 2 investments, and/or a changing financial environment. Table R 3 below shows the
 3 impact on the estimated cost of equity of incorrectly relying on historical estimates, using
 4 the input values provided in Schedule 5 of the Parcell Direct. Thus, including historic-
 5 based estimates biases the average growth rate estimate downward by 60 to 240 basis
 6 points (depending on the sample considered), which results in a downward bias in the
 7 DCF estimate for the cost of equity of at least 60 basis points.

8 **Table R 3. Impact on the Parcell Direct DCF Estimates of Relying on Historical Growth Rates**

	Value Line Water Group	AUS Utility Reports Group	Villadsen Water Sample
[1] Overall average growth rate (as used by Parcell Direct)	4.6%	5.2%	5.3%
[2] Parcell Direct DCF cost of equity	7.8%	8.8%	8.8%
[3] Average growth rate based on prospective figures	5.2%	7.4%	7.7%
[4] DCF cost of equity based on prospective growth rate estimates	8.4%	11.1%	11.3%
[5] Difference between estimated growth rates	0.6%	2.2%	2.4%
[6] Difference between cost-of-equity estimates	0.6%	2.3%	2.5%

Sources and Notes:

[1]: Parcell Direct, Schedule 5, Page 4.

[2]: Parcell Direct, Schedule 5, Page 4.

[3]: Table No. BV R-2, Column [13].

[4]: Table No. BV R-2, Column [15].

[5]: = [3] - [1].

[6]: = [4] - [2].

9
 10 **Q32. HAVE YOU IDENTIFIED OTHER PROBLEMS WITH THE DCF METHOD**
 11 **USED BY THE PARCELL DIRECT?**

12 A32. Yes. The Parcell Direct uses an annual version of the DCF model, which requires an
 13 adjustment for the quarterly timing of dividends, instead of formulating the model in
 14 quarterly terms, which would not require an inexact adjustment to the growth rate. In
 15 addition, the stock price used to compute the dividend yield is an average of stock prices
 16 over a three-month period, which constitute out-of-date information and runs counter to

1 the forward-looking nature of the model. This is especially problematic when stock
2 prices changes dramatically.

3 **Q33. DOES THE PARCELL DIRECT USE AN APPROPRIATE FORMULA TO**
4 **IMPLEMENT THE DCF METHOD?**

5 A33. No, the Parcell Direct inappropriately adjusts the formula in an attempt to reconcile the
6 quarterly payment of dividends with the annual model being employed. In particular, the
7 Parcell Direct uses the following formula to calculate the dividend yield component of
8 the DCF formula:⁵⁷

$$9 \quad \text{Yield} = \frac{D_0(1 + 0.5g)}{P_0}$$

10 The Parcell Direct states that “[t]his dividend yield component recognizes the timing of
11 dividend payments and dividend increases.”⁵⁸ In particular, the 0.5 factor is the
12 adjustment used to account for the timing of dividends, since the usual, textbook, formula
13 does not contain such a factor. However, such an adjustment is unnecessary if the DCF
14 model is implemented using quarterly cash values, since in that case the timing of cash
15 flows assumed by the model actually matches the timing of dividend payments.

16 **B. ISSUES WITH THE CAPM APPROACH**

17 **Q34. WHAT ARE THE MAIN PROBLEMS YOU IDENTIFIED IN THE PARCELL**
18 **DIRECT’S CAPM IMPLEMENTATION?**

19 A34. The main flaw in the Parcell Direct’s approach is the reliance on the geometric estimate
20 of the market risk premium, as opposed to the arithmetic estimate.

21 **Q35. PLEASE ADDRESS THIS ISSUE.**

⁵⁷ Parcell Direct, p. 19.

⁵⁸ Parcell Direct, p. 19.

1 A35. While the magnitude of the market risk premium currently is the subject of scrutiny in the
2 academic literature,⁵⁹ there is little doubt among academics that the geometric market
3 risk premium does not apply to cost-of-capital estimation. For example, Ibbotson
4 Associates state

5 The equity risk premium data presented in this book are arithmetic
6 average risk premia as opposed to geometric average risk premia. The
7 arithmetic average equity risk premium can be demonstrated to be most
8 appropriate when discounting future cash flows. For use as the expected
9 equity risk premium in either the CAPM or the building block approach,
10 the arithmetic mean or the simple difference of the arithmetic means of
11 stock market returns and riskless rates is the relevant number. This is
12 because both the CAPM and the building block approach are additive
13 models, in which the cost of capital is the sum of its parts. The geometric
14 average is more appropriate for the reporting past performance, since it
15 represents the compound average return.⁶⁰

16 Similarly, the *New Regulatory Finance* text by Roger A. Morin (2006) argues that

17 Only arithmetic means are correct for forecasting purposes and for
18 estimating the cost of capital. There is no theoretical or empirical
19 justification for the use of geometric mean rates of returns as a measure of
20 the appropriate discount rate in computing the cost of capital or in
21 computing present values. There is no dispute in academic circles as to
22 whether the arithmetic or geometric average should be used for purposes
23 of computing the cost of capital.⁶¹
24

25 Finally, the text by Bode, Kane, and Marcus (2005) states:

26 [I]f our focus is on future performance, then the arithmetic average is the
27 statistic of interest because it is an unbiased estimate of the portfolio's
28 expected return (assuming, of course, that the expected return does not
29 change over time). In contrast, because the geometric return over a
30 sample period is always less than the arithmetic mean, it constitutes a

⁵⁹ See Villadsen Direct p. 25 and Appendix C for a detailed discussion.

⁶⁰ Morningstar Ibbotson SBBI 2008 Valuation Yearbook, p. 77.

⁶¹ Roger A. Morin (2006), *New Regulatory Finance*, Public Utilities Reports, Inc., ("Morin (2006)"), pp. 116-117.

1 downward-biased estimator of the stock's expected return in any future
2 year.^{62,63}

3 Based on the academic and other literature, the MRP estimate based on the geometric
4 average is invalid.⁶⁴ It leads to downward biased cost of capital estimates and should be
5 ignored. Table R 4 below shows the difference between the Parcell Direct's cost-of-
6 equity estimates including and excluding the geometric MRP.

7 **Table R 4. Impact of Relying on Geometric MRP Estimates in Parcell Direct**

	Value Line Water Group	AUS Utility Reports Group	Villadsen Water Sample
[1] Risk-free rate	4.35%	4.35%	4.35%
[2] Average beta	1.03	0.93	0.93
Arithmetic MRP (Average of Ibbotson and value derived by Parcell Direct based on S&P 500 [3] returns)	6.48%	6.48%	6.48%
[4] Estimate based on arithmetic MRP	10.99%	10.38%	10.38%
Average of arithmetic and geometric MRP used by [5] Parcell Direct	5.90%	5.90%	5.90%
[6] Estimate based on both arithmetic and geometric MRP	10.40%	9.84%	9.84%
[7] Difference	0.59%	0.54%	0.54%

Sources and Notes:

[1] and [2]: Parcell Direct, Schedule 7.

[3] and [5]: Parcell Direct, p. 24.

[4] = [1] + [2] x [3].

[6] = [1] + [2] x [5].

[7] = [4] - [6].

62 Zvi Bode, Alex Kane, and Alan J. Marcus (2005), *Investments*, 6'th Edition, McGraw-Hill, p. 865.

63 See also Richard A. Brealey, Stewart C. Myers, and Franklin Allen (2006), *Principles of Corporate Finance*, 8th Edition, McGraw-Hill, p. 150-151.

64 An exception to this could occur if returns were serially correlated, but the equity risk premium data series used by Morningstar / Ibbotson does not exhibit serial correlation and neither does the market return series. Morningstar's Ibbotson SBBI 2008 Valuation Yearbook notes that over the 1926-2007 period used to calculate the historical MRP, the equity risk premium shows no evidence of serial correlation (pp. 80-81). Additionally, I have performed the standard portmanteau (Ljung-Box) test for serial correlation on the series of annual stock market returns used by Morningstar to calculate the historical MRP, and found no evidence of serial correlation (for a description of the portmanteau test statistic, see John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, *The Econometrics of Financial Markets*, Princeton UP: New Jersey, 1997, p. 47).

1 As can be seen from the table, the Parcell Direct's CAPM cost-of-equity estimates are
2 between 54 and 59 basis points lower when relying on both the arithmetic and the
3 geometric MRPs than when relying on the arithmetic MRPs only. Using only the
4 arithmetic CAPM, the Parcell Direct method would estimate an average cost of equity of
5 10.59%.⁶⁵

6 **C. ISSUES WITH THE COMPARABLE EARNINGS APPROACH**

7 **Q36. WHAT ARE THE PROBLEMS WITH THE PARCELL DIRECT'S**
8 **COMPARABLE EARNINGS METHODOLOGY?**

9 A36. I find two key problems with the methodology as implemented in the Parcell Direct.
10 First, the comparable earnings methodology relies on accounting returns rather than on
11 market returns. Hence, it does not necessarily reflect the cost of capital that current and
12 prospective investors require. Second, the figures that the Parcell Direct relies upon to
13 estimated cost of equity relies on the historical return for regulated water utilities. Both
14 the use of historical returns and the use of regulated entities are problematic.

15 **Q37. WHY DO YOU THINK IT IS PROBLEMATIC TO USE ACCOUNTING**
16 **RETURNS AS A MEASURE FOR THE COST OF CAPITAL?**

17 A37. As noted in the Villadsen Direct, the cost of capital is the expected rate of return in
18 capital markets on alternative investments of equivalent risk. Clearly, an accounting
19 return is *not* a market measure.

20 **Q38. WHY DO YOU THINK THE USE OF HISTORICAL RETURNS EARNED BY**
21 **REGULATED UTILITIES IS PROBLEMATIC?**

22 A38. First, historical returns are not necessarily representative for the industry going forward
23 and hence do not measure the *expected rate of return*. Current and prospective investors
24 are interested in the going forward rate of return. Second, as noted by Professor Morin

⁶⁵ This is the average of the three estimates on line [4] of Table R 4.

1 The rationale of the method is that regulation is a duplicate for
2 competition. The profitability of unregulated firms is set by the
3 free forces of competition. ... [B]y averaging the book profitability
4 of a large number of unregulated companies over time, an
5 appropriate measure of the fair return on equity for a public utility
6 is obtained.⁶⁶
7

8 Thus, for the method to work properly, it needs to be applied to unregulated entities. The
9 Parcell Direct does apply the methodology to unregulated entities (S&P 500), and finds
10 that the earned return on equity over the past 16 years was 14.7 to 15%.⁶⁷ However, the
11 Parcell Direct ignores those figures based on a summary analysis of risk characteristics,
12 and makes no attempt to identify a group of unregulated, comparable risk companies that
13 could provide a useful insight into the magnitude of returns expected by investors in
14 similarly risky, but competitive, companies. Third, the Parcell Direct finds that the
15 prospective accounting return on equity is 9.5 to 11.5%.⁶⁸ However, the Parcell Direct
16 also ignores these returns and concludes that the comparable earnings method results in a
17 cost of equity estimate of 9.5 to 10.5%.⁶⁹

18 **Q39. WHAT DO YOU CONCLUDE REGARDING THE IMPLEMENTATION OF**
19 **THE COMPARABLE EARNINGS METHOD?**

20 A39. The methodology does not provide insights into the Company's current cost of capital
21 because it focuses on historical accounting returns for water utilities which says nothing
22 about the cost of capital that investors currently require. Therefore, this cost of equity
23 estimate should be ignored. As estimated in the Parcell Direct, it is also downward
24 biased as the Parcell Direct ignored the higher returns from non-regulated entities and
25 also prospective returns.

⁶⁶ Morin (2006) pp. 381-381.

⁶⁷ Parcell Direct p. 28.

⁶⁸ Parcell Direct, Schedule 8 (the range is based on the 2009 and 2011-2013 projections, since 2008 returns are not prospective at this time).

⁶⁹ Parcell Direct p. 30.

1 **VI. COMMENTS ON ESTIMATION METHODS IN THE RIGSBY DIRECT**

2 **A. THE RIGSBY DIRECT RECOMMENDATION**

3 **Q40. HOW DOES THE RIGSBY DIRECT ARRIVE AT A RECOMMENDATION OF**
4 **8.88%?**

5 A40. The Rigsby Direct's recommendation is driven by unrealistically low estimates.
6 Specifically, the Rigsby Direct relies on CAPM estimates that are below the Company's
7 current cost of debt. As summarized on page 33 of Rigsby Direct, the recommendation is
8 based on at least three estimates that are clearly below the cost of debt: 6.66%, 5.07%,
9 and 6.26%. Eliminating these estimates from the calculation of the average brings the
10 estimated cost of equity for the sample to 9.78%. If one adds to this value the adjustment
11 for financial risk that Mr. Rigsby has traditionally applied in the past,⁷⁰ the Rigsby
12 Direct's recommendation would be 10.28%. In addition, there are other flaws in the
13 methodology applied by the Rigsby Direct. The major flaws are failing to consider
14 financial risk, relying on an adjusted sustainable growth rate formula in estimating the
15 DCF growth rate, using an unrealistically low risk-free rate in the CAPM implementation,
16 and relying on a geometric measure of the market risk premium. As I have already
17 discussed the importance of adjusting for financial risk and the flaws of using a geometric
18 market risk premium, this section addresses only the DCF growth rates and the results of
19 the CAPM.

20 **B. ISSUES WITH THE DCF METHOD**

21 **Q41. HOW DOES THE RIGSBY DIRECT ARRIVE AT ITS DCF ESTIMATE%?**

22 A41. The Rigsby Direct relies on a constant growth DCF model with a sustainable growth rate
23 where the standard sustainable growth model states that

24
$$g = b \times r + s \times v \quad (1)$$

⁷⁰ Rigsby Direct pp. 54-55, and Direct Testimony of William A. Rigsby in Dockets No. WS-01303A-06-0491 p. 6 and No. WS-01303A-06-0403. See also Arizona Corporation Commission Decision 69440 p. 19.

1 where b is the earnings retention ratio
2 r is the return on common equity
3 s is the growth in shares
4 v = [(Market Value per Share) / (Book Value per Share) - 1] **(2-a)**

5 Rigsby calculates the five-year historical and forecasted retention ratio, book return on
6 equity, book value per share, and growth in shares. Based on five-year historical
7 averages and forecasted growth rates, Rigsby decides on an internal growth rate.⁷¹ He
8 also estimates the share growth. However, the Rigsby Direct relies on a model where v is
9 replaced by⁷²

10 v* = {[(Market Value per Share) / (Book Value per Share) + 1] / 2 - 1 } **(2-b)**

11 As v* is less than v whenever the stock price per share is higher than the book value per
12 share, the formula in (2-b) results in a lower growth rate than the standard formula for
13 companies with a market-to-book (or price to book value per share) above one.

14 **Q42. WHAT ARE THE CONSEQUENCES OF THE RIGSBY DIRECT'S**
15 **MODIFICATION OF THE SUSTAINABLE GROWTH METHOD?**

16 A42. In essence, the adjustment lowers (increases) the sustainable growth rate when the
17 market-to-book ratio is higher (lower) than one. Table R 5 below reports the results from
18 using the data in the Rigsby Direct's Schedules WAR-2 and WAR-4 page 2 but removing
19 the adjustment factor. For the water companies the cost-of-equity estimate increases by
20 about 79 basis points while the cost-of-equity estimate for the gas LDC sample increases
21 by about 41 basis points for an average increase of about 60 basis points in the DCF cost-
22 of-equity estimate.

⁷¹ See Rigsby Direct p. 27 and Schedules WAR-4, WAR-5, and WAR-6.

⁷² Rigsby Direct, Schedule WAR-4, page 2.

Table R 5. The Impact on the DCF Cost of Equity of Rigsby Direct's Adjustment to the Sustainable Growth Model

	Water Utility Sample	Natural Gas LDC Sample
[1] Rigsby DCF estimate	11.19%	11.16%
[2] Rigsby DCF with adjustment	11.97%	11.57%
[3] Difference	0.79%	0.41%

Sources and Notes:

[1], [2]: Table BV-R3, columns [7] and [7a].

[3] = [2] - [1].

As can be seen from Table R 5 above, the impact of this one adjustment is significant and biases the DCF estimates obtained in the Rigsby Direct downward.

Q43. WHY DID YOU MODIFY THE CALCULATION OF THE EXTERNAL GROWTH RATE?

A43. The adjustment made in the Rigsby Direct is founded on the notion that “[t]he market price of a utility’s common stock will tend to move toward book value, or a market-to-book ratio of 1.0, if regulators allow a rate of return that is equal to the cost of capital.”⁷³ Thus, it appears that the Rigsby Direct relies on the so-called market-to-book test, which is based on the assumption that the value of a utility’s stock equals the present value of the returns of and on a rate base equal to the net book value of the utility’s equity. To illustrate the consequences of a strict belief in the market-to-book test,⁷⁴ I will discuss a hypothetical example.

Assume the market-to-book test worked, and that all parties agreed that at a cost of equity of 11% is appropriate for Utility A.⁷⁵ For simplicity; assume that Utility A has an actual and ratemaking capital structure consisting of 40% equity. Assume that Utility A’s market-to-book ratio is 2, which if the market-to-book test were valid would signal that 11% is above the cost of equity at the regulatory equity ratio. Suppose also that the book

⁷³ Rigsby Direct p. 15.

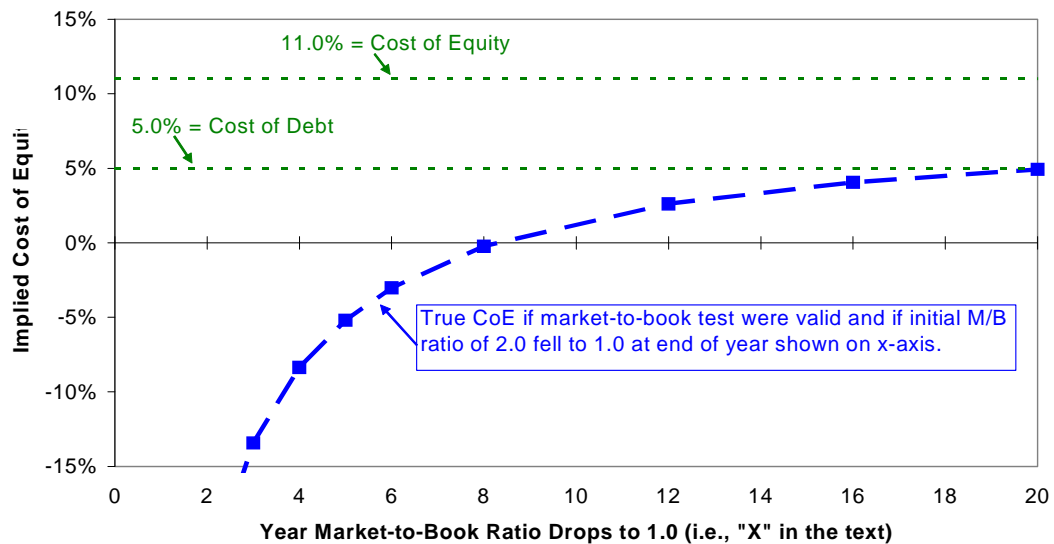
⁷⁴ The Rigsby Direct does not argue that regulators should seek a market-to-book ratio of one.

⁷⁵ The 11% is used for illustrative purposes only.

1 value of the utility is expected to grow at a long-term annual rate of 5%. Lastly, suppose
2 that investors expected an extreme form of regulatory lag: regulators will leave allowed
3 rates of return at the current 11% level for X years. On the last day of the Xth year,
4 regulators will readjust the allowed rate of return down to the cost of equity, so that the
5 market-to-book ratio falls to 1.0 on that day. In short, the assumptions are that (1)
6 investors put up \$2 now for every \$1 of book equity rate base, (2) earn an allowed rate of
7 return of 11% (which by hypothesis is above the cost of capital) on the book value of the
8 equity rate base (which grows at 5% per year) for X years, and (3) then end up with a
9 stock value equal to only the book-value rate base, i.e., they lose 50% of their original
10 investment after X years. If the market-to-book test were valid, the discount rate that
11 makes the present value of these hypothesized returns equal to twice the book value of
12 the stock is the utility's true cost of equity. Figure R 4 plots the implied true cost of
13 equity associated with values of "X" running out to 20 years. As benchmarks, it adds the
14 assumed 11% allowed rate of return on equity and the associated long-term bond rate, 5%.

15 **Figure R 4**

Market-to-Book Test Implies an Unrealistic True Cost of Equity (CoE)
(Allowed RoR on Book Equity = Estimated Cost of Equity = 11%. M/B
Ratio Falls from 2.0 to 1.0 at the End of the Year Indicated on the X-Axis.)



1 The curved line (blue in color copies) depicts the true cost of capital as the length of the
2 regulatory lag (X) grows from three years to 20 years. With a loss of 50% of the original
3 investment due at the end of the regulatory lag, X must exceed 8 years for the true cost of
4 equity to become positive, and during the 20-year period considered it never exceeds the
5 cost of debt (or risk-free rate). As investors clearly expect a return in excess of the risk-
6 free rate, trying to regulate to obtain a market-to-book ratio of one is not viable. The
7 example illustrates that it is unlikely that the simple market-to-book test works. Because
8 the test does not work, I firmly believe the regulators should not attempt to maintain,
9 increase, or decrease a utility's market-to-book ratio.⁷⁶

10 **Q44. DO YOU HAVE ANY GENERAL COMMENTS REGARDING CHOICE OF**
11 **GROWTH RATES IN THE RIGSBY DIRECT?**

12 A44. Yes, the Rigsby Direct relies on a mixture of historical growth rates and projected growth
13 rates. Because, as discussed above, the water industry currently is in transition, historical
14 growth rates are likely not representative of future growth. As noted above, the water
15 utility industry is expected to make significant infrastructure investments, the industry is
16 facing a number of mergers and acquisitions, and the water utility companies' risk
17 appears to be increasing as evidenced by the increasing betas shown in Figure R 3.⁷⁷
18 There is a large academic literature that indicates that analysts' forecasts are statistically
19 more accurate than growth forecasts solely based on historical earnings, dividends, book
20 value and equity growth rates.⁷⁸ For example, a paper by Gordon, Gordon and Gould
21 (1989)⁷⁹ demonstrates that for utilities, forecasted earnings growth outperform past
22 growth in earnings, past growth in dividends, and past growth in earnings retention in

⁷⁶ There may be circumstances where an extremely low market-to-book ratio indicates a fundamental problem in which case the regulator may need to address the underlying problem - - not the market-to-book ratio.

⁷⁷ *Section III* discusses this issue further.

⁷⁸ This literature is summarized in the Villadsen Direct, Appendix D pp. D-6-D-9.

⁷⁹ David A. Gordon, Myron J. Gordon, and Lawrence I. Gould (1989), "Choice Among Methods of Estimating Share Yield," *The Journal of Portfolio Management*, 50-55. See also R. Charles Moyer, Robert E. Chatfield, and Gary D. Kelley (1985), "The Accuracy of Long-Term Earnings Forecast in the Electric Utility Industry," *International Journal of Forecasting* 1, 241-252.

1 explaining utilities expected return. Therefore, the Rigsby Direct's use of historical
2 growth rates biases the cost of equity. However, because the Rigsby Direct performs an
3 assessment of the applicable growth rates⁸⁰ rather than a numerical calculation, I cannot
4 determine the magnitude of this bias..

5 **C. ISSUES WITH THE CAPM METHOD**

6 **Q45. DOES THE RIGSBY DIRECT RELY ON THE GEOMETRIC CALCULATION**
7 **OF THE MARKET RISK PREMIUM?**

8 A45. Yes, the Rigsby Direct considers estimates based on both the geometric and the
9 arithmetic MRP.⁸¹ As I explained in Section V.B above, the geometric MRP is not a
10 valid measure of the market risk premium. Eliminating the estimated based on it would
11 drop two of the Rigsby's Direct CAPM estimates that fall below estimates of the cost of
12 debt, and are therefore unreliable: 6.66% and 5.07%.⁸²

13 **Q46. ARE THE OTHER CAPM ESTIMATES REASONABLE?**

14 A46. The CAPM estimate based on the arithmetic MRP and the gas LDC sample is certainly
15 not reasonable, since 6.26% is much lower than current yields on utility bonds.⁸³
16 Estimates below the current yield on investment grade utility bonds should be ignored
17 and if the Rigsby Direct were to rely only on cost of equity estimates above the cost of
18 investment grade utility debt, his CAPM estimate would be at least 8.39%. Additionally,
19 the Rigsby Direct relies on a risk-free rate of 1.50% in his CAPM analysis.⁸⁴ If the
20 Rigsby Direct is to use the unusually low risk-free rate that currently prevails, he would
21 need to make an adjustment to the MRP which currently is unusually high. Alternatively,
22 the Rigsby Direct needs to look to prospective estimates of the risk-free rate. For

⁸⁰ Rigsby Direct p. 23.

⁸¹ Rigsby Direct, p. 32, and Schedule WAR-7.

⁸² See Page 1 of Schedule WAR-7 of Rigsby Direct.

⁸³ As of February 3, the 15-day average yield on Moody's Baa rated utility bonds was 7.86% (Bloomberg).

⁸⁴ Rigsby Direct, Schedule WAR-7, page 2.

1 example, a month into the financial crisis, Blue Chip Economic Indicators estimated the
2 3-month Treasury Bill rate at 3.6% and the 10-Year Treasury Notes rate at 4.9% for 2010.
3 Had the Rigsby Direct used these more reasonable figures, say the midpoint of 4.25%,⁸⁵
4 the arithmetic CAPM would become 11.14% and 9.01% for the water utility and gas
5 LDC samples, respectively. Using the average of these figures, the CAPM cost of equity
6 would be about 10.08%.

7 **VII. CONCLUSION**

8 **Q47. WHAT IS YOUR CONCLUSION REGARDING THE PARCELL DIRECT AND**
9 **THE RIGSBY DIRECT RECOMMENDATIONS?**

10 A47. The recommended return on equity and hence the rate of return is too low for several
11 reasons. It is below or near the Company's current cost of debt and below the pre-crisis
12 allowed rates of return in the utility industry. As the financial crisis have increased the
13 cost of capital, it is imperative that Arizona-American be afforded an opportunity to earn
14 a reasonable return on the equity invested. Further, the Parcell Direct deviates from the
15 Staff's practice of recognizing the added financial risk of Arizona-American, and the
16 Rigsby Direct deviates from Mr. Rigsby's previous recommendation to recognize the
17 Company's higher financial risk. In addition, there are modeling or data issues in both
18 the Parcell Direct and the Rigsby Direct which downward bias the recommended cost of
19 equity. The overall impact of the implementation choices made by the Parcell Direct and
20 the Rigsby Direct is that the recommended cost of equity is too low.

21 **Q48. CAN YOU ILLUSTRATE THE CONSEQUENCES OF THE**
22 **IMPLEMENTATION CHOICES MADE IN THE PARCELL DIRECT AND THE**
23 **RIGSBY DIRECT?**

24 A48. Yes, Table R 6 below summarizes the impact the cost of equity. The modifications are
25 discussed in Section III to VI above.

⁸⁵ The Rigsby Direct, Schedule WAR-7 uses the 5-year Treasury Bond yield which logically would be

Table R 6. Summary of the Impact of Modifications

	Parcell Direct [a]	Rigsby Direct [b]
Original recommendation	10.00%	8.88%
Revised DCF estimate	at least 10.6%	11.77%
Revised CAPM estimate	at least 10.5%	10.08%
Using Staff/Rigsby prior financial risk adjustment	+ 0.6% to 0.7%	+ 0.5%
Revised Cost of Equity	at least 11.2%	11.4%

As can be seen from Table R 6 and Section VI, if the Rigsby Direct used only cost of equity estimates above the current cost of Baa-rated utility debt and relied on Mr. Rigsby's previous adjustment for financial risk, the cost of equity would increase to about 10.3%. Further, if the Rigsby Direct had not made its unique adjustment to the sustainable growth model and used a reasonable risk-free rate, the recommended cost of equity would increase to about 11.4%. This figure does not take into account the reliance on historical growth rates. Similarly, if the Parcell Direct had used the same methodology as Staff in the past has used to adjust for financial risk, its recommendation would be in the range of 10.6 to 10.7%. If the Parcell Direct further had relied only on forecasted growth rates and the version of the CAPM that uses the arithmetic MRP, the midpoint of its range would increase to at least 11.2%. Thus, with adjustment based on past testimony from Staff and Mr. Rigsby and standard financial economics, the cost of equity estimated in the Parcell Direct and the Rigsby Direct is no less than 11.2 to 11.4%. As the adjustments are conservative, so are the ranges indicated above.

Q49. DO YOU HAVE ANY OTHER CONCLUDING REMARKS ON ARIZONA-AMERICAN'S COST OF EQUITY CAPITAL?

A49. Yes. As discussed in Section III above, Arizona-American's financing affiliate, American Water Capital Corporation, has recently issued debt at or near 10% and equity investors require a premium to provide capital. Additionally, the current turmoil in financial markets has caused the cost of debt and equity to increase. For a utility that

higher than the 3-month Treasury Bill rate but lower than the 10-year Treasury Note rate. The Parcell Direct uses a risk-free rate of 4.35%.

1 needs to undertake investments in infrastructure, it is therefore imperative that the
2 allowed return on equity and overall return are such that it maintains its access to capital.

3 **Q50. YOU DO NOT ADDRESS ALL ISSUES OR FINDINGS DISCUSSED IN THE**
4 **PARCELL DIRECT OR RIGSBY DIRECT. DOES THAT IMPLY THAT YOU**
5 **ACCEPT THEIR POSITIONS OR FINDINGS?**

6 A50. A. No, not necessarily.

7 **Q51. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?**

8 A51. A. Yes.

Table No. BV R-1
Cost of Equity Adjustment Calculation

Company	Risk Free Rate [1]	Beta [2]	Risk Premium [3]	K [4]
Value Line Water Group				
Using Value Line Beta	4.35%	1.03	5.90%	10.4% [a]
Using Adjusted Relevered Beta	4.35%	1.15	5.90%	11.1% [b]
				0.7% [c]
AUS Utility Reports Group				
Using Value Line Beta	4.35%	0.93	5.90%	9.8% [a]
Using Adjusted Relevered Beta	4.35%	1.03	5.90%	10.4% [b]
				0.6% [c]
Villadsen Water Sample				
Using Value Line Beta	4.35%	0.93	5.90%	9.8% [a]
Using Adjusted Relevered Beta	4.35%	1.03	5.90%	10.4% [b]
				0.6% [c]

Sources and Notes:

[1], [3]: Parcell Direct, Schedule 7.

[2][a]: Workpaper #1 to Table No. BV R-1; column [1] average.

[2][b]: Workpaper #3 to Table No. BV R-1; column [6].

[4][a] - [b]: = [1] + ([2] x [3]).

[4][c]: = [4][b] - [4][a].

Workpaper #1 to Table BV R-1
Value Line Raw Beta Calculation

Company	Value Line Beta	Raw Beta
	[1]	[2]
<u>Value Line Water Group</u>		
American States Water Co.	0.95	0.90
Aqua America, Inc	1.00	0.97
California Water Service Group	1.10	1.12
Southwest Water Co.	1.05	1.04
Average	1.03	1.01
<u>AUS Utility Reports Group</u>		
American States Water Co.	0.95	0.90
Aqua America, Inc	1.00	0.97
Artesian Resources Corp.	-	-
California Water Service Group	1.10	1.12
Connecticut Water Service, Inc.	0.80	0.67
Middlesex Water	0.90	0.82
SJW Corporation	1.15	1.19
Southwest Water Co.	1.05	1.04
York Water Company	0.50	0.22
Average	0.93	0.87
<u>Villadsen Water Sample</u>		
American States Water Co.	0.95	0.90
Aqua America, Inc	1.00	0.97
California Water Service Group	1.10	1.12
Connecticut Water Service, Inc.	0.80	0.67
Middlesex Water	0.90	0.82
SJW Corporation	1.15	1.19
Southwest Water Co.	1.05	1.04
York Water Company	0.50	0.22
Average	0.93	0.87

[1]: Value Line Betas from Schedule 7 of Parcell Testimony.

[2]: $(-0.35 + [1]) / 0.67$

Workpaper #2 to Table No. BV R-1

Calculation of Unlevered Raw Beta

Company	(Unadjusted Beta) Value Line Levered Raw Beta	Primary Location of Operations	State Corporate Income Tax Rate	Tax Rate	Book Debt	Equity Cap	Unlevered Raw Beta
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<u>Value Line Water Group</u>							
American States Water Co.	0.90	CA	8.84%	40.75%	50%	50%	0.56
Aqua America, Inc	0.97	PA	9.99%	41.49%	57%	43%	0.55
California Water Service Group	1.12	CA	8.84%	40.75%	43%	57%	0.77
Southwest Water Co.	1.04	CA	8.84%	40.75%	48%	52%	0.68
Average	1.01		9.13%	40.93%	50%	51%	0.64
<u>AUS Utility Reports Group</u>							
American States Water Co.	0.90	CA	8.84%	40.75%	50%	50%	0.56
Aqua America, Inc	0.97	PA	9.99%	41.49%	57%	43%	0.55
Artesian Resources Corp.*	-						
California Water Service Group	1.12	CA	8.84%	40.75%	43%	57%	0.77
Connecticut Water Service, Inc.	0.67	CT	7.50%	39.88%	50%	50%	0.42
Middlesex Water	0.82	NJ	9.00%	40.85%	52%	48%	0.50
SJW Corporation	1.19	CA	8.84%	40.75%	48%	52%	0.77
Southwest Water Co.	1.04	CA	8.84%	40.75%	48%	52%	0.68
York Water Company	0.22	PA	9.99%	41.49%	52%	48%	0.14
Average	0.87		8.98%	40.84%	50%	50%	0.55
<u>Villadsen Water Sample</u>							
American States Water Co.	0.90	CA	8.84%	40.75%	50%	50%	0.56
Aqua America, Inc	0.97	PA	9.99%	41.49%	57%	43%	0.55
California Water Service Group	1.12	CA	8.84%	40.75%	43%	57%	0.77
Connecticut Water Service, Inc.	0.67	CT	7.50%	39.88%	50%	50%	0.42
Middlesex Water	0.82	NJ	9.00%	40.85%	52%	48%	0.50
SJW Corporation	1.19	CA	8.84%	40.75%	48%	52%	0.77
Southwest Water Co.	1.04	CA	8.84%	40.75%	48%	52%	0.68
York Water Company	0.22	PA	9.99%	41.49%	52%	48%	0.14
Average	0.87		8.98%	40.84%	50%	50%	0.55

Sources and Notes:

[1]: See Workpaper #1 to Table BV R-1; column [2].

[2]: From company website.

[3]: From Federation of Tax Administration Website; http://www.taxadmin.org/fta/rate/corp_inc.html.

[4]: = [3] + (1 - [3]) x 35%.

[5]: = 1 - [6].

[6]: Parcell Direct, Schedule 4.

[7]: = [1] / (1 + ([5] / [6]) x (1 - [4])).

*Artesian Resources Corp. is excluded from calculations due to lack of a Value Line Beta.

Workpaper #3 to Table No. BV R-1
Calculation of Adjusted Relevered Beta

Company	Unlevered Raw Beta [1]	Book Debt (Long-term and short term) [2]	Equity Capital [3]	Tax Rate [4]	Relevered Raw Beta [5]	Adjusted Relevered Beta [6]
Value Line Water Group	0.64	0.58	0.42	38.6%	1.19	1.15
AUS Utility Reports Group	0.55	0.58	0.42	38.6%	1.02	1.03
Villadsen Water Sample	0.55	0.58	0.42	38.6%	1.02	1.03

Sources and Notes:

[1]: Workpaper #2 to Table No. BV R-1; Column [7] average.

[2] - [3]: Parcell Direct, page 2.

[4]: Provided by Arizona-American Water.

[5]: = [1] x (1 + (1 - [4]) x ([2] / [3])).

[6]: = 0.35 + (0.67 x [5]).

Table No. BV R-2
Parcell Direct DCF Estimates Based only on Prospective Growth Rates

Company	DPS [1]	Average Stock Price [2]	Dividend yield [3]	Retention Growth Rates (2008) [4]	Retention Growth Rates (2009) [5]	Retention Growth Rates (2011 - 2013) [6]	Prospective Retention Growth [7]	Est'd '05-'07 to '11-'13 Growth Rates				First Call EPS Growth [12]	Average Growth [13]	Adjusted dividend yield [14]	RoE estimate [15]
								EPS [8]	DPS [9]	BVPS [10]	Average [11]				
American States Water	\$1.00	\$34.10	2.9%	4.5%	5.5%	7.5%	5.8%	11.0%	5.0%	2.5%	6.2%	4.0%	5.3%	3.0%	8.3%
Aqua America, Inc.	\$0.54	\$15.67	3.4%	3.0%	3.5%	4.0%	3.5%	7.5%	5.5%	5.5%	6.2%	7.0%	5.6%	3.5%	9.1%
California Water Service Group	\$1.17	\$35.09	3.3%	2.5%	4.0%	5.5%	4.0%	10.0%	2.0%	4.0%	5.3%	8.0%	5.8%	3.4%	9.2%
Southwest Water Co.	\$0.24	\$8.61	2.8%	0.5%	1.5%	4.5%	2.2%	9.5%	6.0%	1.0%	5.5%	5.0%	4.2%	2.8%	7.1%
Average													5.2%		8.4%
American States Water	\$1.00	\$34.10	2.9%	4.5%	5.5%	7.5%	5.8%	11.0%	5.0%	2.5%	6.2%	4.0%	5.3%	3.0%	8.3%
Aqua America	\$0.54	\$15.67	3.4%	3.0%	3.5%	4.0%	3.5%	7.5%	5.5%	5.5%	6.2%	7.0%	5.6%	3.5%	9.1%
Artesian Resources Corp.	\$0.71	\$15.27	4.6%									5.0%	5.0%	4.8%	9.8%
California Water Service Group	\$1.17	\$35.09	3.3%	2.5%	4.0%	5.5%	4.0%	10.0%	2.0%	4.0%	5.3%	8.0%	5.8%	3.4%	9.2%
Connecticut Water Service, Inc.	\$0.89	\$24.11	3.7%									15.0%	15.0%	4.0%	19.0%
Middlesex Water	\$0.71	\$15.00	4.7%									8.0%	8.0%	4.9%	12.9%
SJW Corporation	\$0.64	\$25.24	2.5%									10.0%	10.0%	2.7%	12.7%
Southwest Water Co.	\$0.24	\$8.61	2.8%	0.5%	1.5%	4.5%	2.2%	9.5%	6.0%	1.0%	5.5%	5.0%	4.2%	2.8%	7.1%
York Water Company	\$0.48	\$12.46	3.9%									8.0%	8.0%	4.0%	12.0%
Average													7.4%		11.1%
American States Water	\$1.00	\$34.10	2.9%	4.5%	5.5%	7.5%	5.8%	11.0%	5.0%	2.5%	6.2%	4.0%	5.3%	3.0%	8.3%
Aqua America	\$0.54	\$15.67	3.4%	3.0%	3.5%	4.0%	3.5%	7.5%	5.5%	5.5%	6.2%	7.0%	5.6%	3.5%	9.1%
California Water Service Group	\$1.17	\$35.09	3.3%	2.5%	4.0%	5.5%	4.0%	10.0%	2.0%	4.0%	5.3%	8.0%	5.8%	3.4%	9.2%
Connecticut Water Service, Inc.	\$0.89	\$24.11	3.7%									15.0%	15.0%	4.0%	19.0%
Middlesex Water	\$0.71	\$15.00	4.7%									8.0%	8.0%	4.9%	12.9%
SJW Corporation	\$0.64	\$25.24	2.5%									10.0%	10.0%	2.7%	12.7%
Southwest Water Co.	\$0.24	\$8.61	2.8%	0.5%	1.5%	4.5%	2.2%	9.5%	6.0%	1.0%	5.5%	5.0%	4.2%	2.8%	7.1%
York Water Company	\$0.48	\$12.46	3.9%									8.0%	8.0%	4.0%	12.0%
Average													7.7%		11.3%

Sources and Notes:

Note that the replication of the Parcell Direct's numbers is subject to minor rounding errors due to not having access to the original spreadsheets.

[1] - [2]: Parcell Direct, Schedule 5, Page 1.

[8] - [10]: Parcell Direct, Schedule 5, Page 3.

[14] = [3] x (1 + (0.5 x [13])).

[3] = [1] / [2]. See also, Parcell Direct, Schedule 5, Page 1.

[11] = ([8] + [9] + [10]) / 3. See also, Parcell Direct, Schedule 5, Page 3. [15] = [13] + [14].

[4] - [6]: Parcell Direct, Schedule 5, Page 2.

[12]: Parcell Direct, Schedule 5, Page 4.

[7] = ([4] + [5] + [6]) / 3. See also, Parcell Direct, Schedule 5, Page 2 [13] = ([7] + [11] + [12]) / 3.

Table No. BV R-3
Rigsby Direct DCF Estimates Without Adjustment to Sustainable Growth Formula

	Share Growth	Market-to- Book Ratio	External Growth (Rigsby)	External Growth (Unadjusted)	Internal Growth	Dividend Growth (Rigsby)	Dividend Growth (Unadjusted)	Dividend Yield	DCF Cost of Equity (Rigsby)	DCF Cost of Equity (Unadjusted)	Impact of Adjustment
	[1]	[2]	[3]	[3a]	[4]	[5]	[5a]	[6]	[7]	[7a]	[8]
American States Water Co.	3.25%	1.76	1.24%	2.47%	6.75%	7.99%	9.22%	3.10%	11.09%	12.32%	
California Water Service Group	3.00%	2.11	1.67%	3.33%	5.00%	6.67%	8.33%	2.87%	9.54%	11.20%	
Southwest Water Co.	3.50%	0.68	6.44%	5.88%	3.75%	10.19%	9.63%	5.38%	15.57%	15.01%	
Aqua America, Inc.	1.00%	2.60	0.80%	1.60%	5.00%	5.80%	6.60%	2.75%	8.55%	9.35%	
Water Company Average			2.54%	3.32%		7.66%	8.45%		11.19%	11.97%	0.79%
AGL Resources, Inc.	1.00%	1.29	0.15%	0.29%	5.25%	5.40%	5.54%	5.77%	11.17%	11.31%	
Atmos Energy Group	5.00%	0.99	9.98%	9.95%	4.00%	13.98%	13.95%	5.62%	19.60%	19.57%	
Laclede Group, Inc.	3.00%	2.22	1.83%	3.66%	4.50%	6.33%	8.16%	3.14%	9.47%	11.30%	
New Jersey Resources Corp.	1.00%	2.15	0.58%	1.15%	6.25%	6.83%	7.40%	3.01%	9.84%	10.41%	
Nicor, Inc.	0.07%	1.83	0.03%	0.06%	6.00%	6.03%	6.06%	4.89%	10.92%	10.95%	
Northwest Natural Gas Co.	1.00%	1.98	0.49%	0.98%	4.75%	5.24%	5.73%	3.37%	8.61%	9.10%	
Piedmont Natural Gas Co.	0.01%	2.52	0.01%	0.02%	5.00%	5.01%	5.02%	3.27%	8.28%	8.29%	
South Jersey Industries	1.75%	2.07	0.94%	1.87%	9.00%	9.94%	10.87%	6.32%	16.26%	17.19%	
Southwest Gas Corp.	2.50%	1.06	0.08%	0.15%	5.25%	5.33%	5.40%	3.66%	8.99%	9.06%	
WGL Holdings, Inc.	0.20%	1.54	0.05%	0.11%	4.00%	4.05%	4.11%	4.43%	8.48%	8.54%	
Natural Gas LDC Average			1.41%	1.82%		6.81%	7.22%		11.16%	11.57%	0.41%

Sources and Notes:

Note that the replication of the Rigsby Direct's numbers is subject to minor rounding errors due to not having access to the original spreadsheets.

[1]: Rigsby Direct, Schedule WAR-4, Page 2, Column (A).

[2]: Rigsby Direct, Schedule WAR-4, Page 2, Column (B).

[3] = [1] x (([2] + 1) / 2 - 1) if [2] > 1, and [1] x (([2] + 1) / 2 + 1) if [2] < 1.

[3a] = [1] x ([2] - 1) if [2] > 1, and [1] x ([2] + 1) if [2] < 1.

[4]: Rigsby Direct, Schedule WAR-4, Page 1, Column (A).

[5] = [4] + [3].

[5a] = [4] + [3a].

[6]: Rigsby Direct, Schedule WAR-2, Column (A).

[7] = [6] + [5].

[7a] = [6] + [5a].

[8] = [7a] - [7] (averages only).

Table BV R-4
Result of Corrections to the Rigsby Direct Cost-of-Equity Estimate

Estimate Basis	Original [a]	No estimates below cost of debt [b]	Arithmetic MRP only [c]	No adjustment to DCF sustainable growth formula [d]	Adjustment to risk- free rate [e]	All corrections [f]
DCF - Water Sample	11.19%	11.19%	11.19%	11.97%	11.19%	11.97%
DCF - Natural Gas LDC Sample	11.16%	11.16%	11.16%	11.57%	11.16%	11.57%
DCF Average	11.17%	11.17%	11.17%	11.77%	11.17%	11.77%
CAPM Geometric MRP - Water Sample	6.66%			6.66%	9.41%	
CAPM Geometric MRP - Natural Gas LDC Sample	5.07%			5.07%	7.82%	
CAPM Arithmetic MRP - Water Sample	8.39%	8.39%	8.39%	8.39%	11.14%	11.14%
CAPM Arithmetic MRP - Natural Gas LDC Sample	6.26%		6.26%	6.26%	9.01%	9.01%
CAPM Average	6.59%	8.39%	7.33%	6.60%	9.35%	10.08%
Estimate	8.88%	9.78%	9.25%	9.18%	10.26%	10.92%
Difference from Rigsby Direct Estimate	-	0.90%	0.37%	0.30%	1.38%	2.04%
Financial Risk Adjustment	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Estimate Adjusted for Financial Risk	9.38%	10.28%	9.75%	9.68%	10.76%	11.42%

Sources and Notes:

[a]: Rigsby Direct, Schedule WAR-1, Page 3.

[b]: The 15-day average yield on Moody's Baa-rated public utility index for the period ending February 3, 2009 was 7.86 percent (Bloomberg).

[d]: Table BV R-3, Column [7a].

[e]: See discussion in Section VI.C of the rebuttal testimony.