BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

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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 INCRASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS ANTHEM WATER AND ANTHEM/AQUA FRIA WASTEWATER DISTRICTS	DOCKET NO. WS-01303A-06-0403

REBUTTAL TESTIMONY
OF
BENTE VILLADSEN
ON BEHALF OF
ARIZONA-AMERICAN WATER COMPANY

APRIL 26, 2007

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SCHEDULES BV-R1 THROUGH BV-R6

1   **I.   INTRODUCTION AND SUMMARY**

2   **A. INTRODUCTION**

3   **Q1.   Please state your name, address and position.**

4

5   A1.   My name is Bente Villadsen and I am a principal at *The Brattle Group*, 44 Brattle Street,

6   Cambridge, MA 02138.

7   **Q2.   Did you previously file testimony in this proceeding?**

8   A2.   Yes, I filed Direct Testimony ("Villadsen Direct") on behalf of Arizona-American Water

9   Company in June 2006 regarding the cost of equity that the Anthem Water and

10   Anthem/Aqua Fria Wastewater districts (jointly "Anthem") should be allowed an

11   opportunity to earn on the rate base. A detailed resume was attached to that testimony.

12 **Q3.   What is the purpose of your rebuttal testimony?**

13 A3.   I have been asked by Arizona-American Water to review and comment on the Direct

14   Testimony of Mr. Pedro M. Chaves ("Chaves Direct") for the Arizona Corporation

15   Commission Staff ("Staff") and on the Direct Testimony of Mr. William A. Rigsby

16   ("Rigsby Direct") for the Residential Utility Consumer Office ("RUCO").

17 **Q4.   Do you have any preliminary comments before you begin your rebuttal?**

18 A4.   Yes. While cost of capital experts may rely on different models or implement the relied

19   upon models differently, the methods used in the Chaves Direct and in the Rigsby Direct

20   are similar to those relied upon in the Villadsen Direct. Both testimonies recognize the

21   importance of financial risk as well as business risk and adjust the cost of equity

22   estimates obtained for proxy groups in recognition of Anthem's more leveraged capital

23   structure. The largest source of difference between the Villadsen Direct and the Chaves

24   Direct is that while the Villadsen Direct relies on market value capital structures, the

25   Chaves Direct relies on book value capital structures when comparing the sample

26   companies' capital structure to that of Anthem. In addition, the Chaves Direct includes a

1   cost of equity estimate below the current cost of debt in his average. I do not believe that

2   investors will provide equity capital at a return below the current yield on utility bonds

3   and therefore would exclude that estimate from consideration. There are two key

4   differences between the Rigsby Direct and the Villadsen Direct. First, the Villadsen

5   Direct explicitly calculates the impact of the difference between the proxy groups' market

6   value capital structure and the regulatory capital structure of Anthem, while the Rigsby

7   Direct adds 50 basis points to the cost of equity obtained by the testimony's preferred

8   method. Second, I disagree with two of the Rigsby Direct's implementation choices.

9   The Rigsby Direct relies on a non-standard adjustment to the sustainable growth model

10   and uses a geometric average market risk premium in its CAPM analysis. Neither of

11   these choices is consistent with financial theory. Finally, the Villadsen Direct estimated

12   Anthem's cost of equity using data that were available as of May 2006 whereas the

13   Chaves and Rigsby Direct rely on more current data. However, the cost of equity capital

14   has not changed materially since the Villadsen Direct was filed and a cost of equity of

15   11¾ percent remains a valid midpoint estimated.

16 **Q5.**   **What topics do you cover in this rebuttal testimony?**

17 A5.   I discuss the cost of capital recommendations and calculations in the Chaves Direct and

18   in the Rigsby Direct. I also discuss the Chaves Direct and the Rigsby Direct's comments

19   on and discussion of my Direct Testimony filed in June 2006. Specifically, I cover the

20   following topics:

21   • First, I summarize the impact on the cost of equity of key decisions made in the

22   Chaves Direct and the Rigsby Direct.

23   • Second, I discuss the impact of financial leverage and the after-tax weighted-

24   average cost of capital ("ATWACC").

25   • Third, I discuss the selection of sample companies and the implementation of

26   relied upon methods: the discounted cash flow method ("DCF") and the risk

27   positioning methods (including the capital asset pricing model ("CAPM")).

1   • Finally, I attach Schedules BV-R1 to BV-R6 which support my rebuttal
2   testimony.

3   **B. SUMMARY**

4   **Q6.   Please summarize the recommendations made by the cost of capital witnesses.**

5   A6.   Table R-1 below summarizes the cost of capital witnesses' recommendations regarding

6   the cost of equity that Anthem should be allowed to earn on the equity portion of its rate

7   base. In the table all figures take into consideration that Anthem is more leveraged than

8   the companies that were relied upon to estimate the cost of equity.[1]

Table R-1 Cost of Equity Recommendations			
	Chaves	Rigsby	Villadsen
Recommendation (Point Estimate)	10.4%	10.27%	11¼ -12¾ (11¾)

9   Sources: Chaves Direct Executive Summary, Rigsby Direct p. 6, Villadsen Direct
10   Executive Summary.
11
12   While Table R-1 shows variation in the recommendations, it is noteworthy that the

13   Chaves Direct obtains raw (before leverage consideration) cost of equity estimates in the

14   range of 8.4 to 10.8 percent[2] which when adding the Chaves Direct's recommended

15   leverage adjustment of 90 basis points provides a range of 9.3 to 11.7 percent with the

16   upper end being comparable to the Company's request. Similarly, the Rigsby Direct

17   obtains estimates ranging from 8.81 percent to 11.40 percent[3] which include the

18   Company's requested 11¾ percent when the 50 basis points leverage adjustment in the

19   Rigsby Direct is considered.

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[1]   The Chaves Direct recommends a capital structure with 35.8 percent equity (Schedule PMC-1) while the
       Rigsby Direct relies on Anthem's requested capital structure of 40 percent equity and 60 percent debt
       (Rigsby Direct p. 6).
[2]   Chaves Direct, Schedule PMC-2.
[3]   Rigsby Direct p. 8.

1   The estimate in the Chaves Direct relies on a DCF figure that results in a cost of
2   equity lower than the current yield on BBB-rated utility bonds. I do not believe investors
3   will commit equity capital to a company if they expect to a return below what they can
4   earn on utility bonds. Therefore, a cost of equity estimate below the current cost of debt
5   should be ignored. Using the methods and results in the Chaves Direct with that one
6   exception would raise the cost of equity estimate to 10.6 percent. In addition, the Chaves
7   Direct relies on the difference between the sample companies' book capital structure and
8   the regulatory capital structure recommended in the Chaves Direct[4] to determine the
9   adjustment for financial risk. Had the Chaves Direct instead used the sample companies'
10   market-value capital structure, the cost of equity recommendation would increase by
11   approximately 95 basis points, for a return on equity of about 11.35%.[5] Lastly, the
12   Chaves Direct relies on a capital structure that differs from the one filed by the Company.

13   The Rigsby Direct relies on a non-standard adjustment to the sustainable growth
14   model. Specifically, the Rigsby Direct adjusts the observed market-to-book ratio
15   downward in his sustainable growth model resulting in a downward adjustment to the
16   cost of equity estimates. Had the Rigsby Direct not used this downward adjustment in
17   the DCF method, the cost of equity estimates would have been over 110 basis points
18   higher. Thus, without this adjustment, the DCF model would result in a cost of equity
19   estimate of about 10.7 percent once the 50 basis points adjustment for financial risk has
20   been applied. Second, using two versions of the CAPM, the Rigsby Direct obtains a cost
21   of equity estimate of about 11% after the 50 basis point adjustment for financial risk. One
22   of the CAPM methodologies relied upon uses a market risk premium that was determined
23   using geometric averages, which standard financial texts disagree with for the purpose of
24   determining cost of capital. Eliminating the estimate that relies on a geometric market
25   risk premium from consideration results in a CAPM cost of equity estimate of above 11¾
26   percent, once the 50 basis points for financial risk has been added.

27   The discussion above shows that the Company's request for an allowed return on
28   equity of 11¾ percent is consistent with current estimates of the cost of equity. This is

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[4]   Chaves Direct, Schedule PMC-1.
[5]   The calculation is based on the capital structure used in Chaves Direct, Schedule PMC-1.

1   particularly true given the water industry's need for infrastructure investments and

2   increasing risks as illustrated by, for example, increasing beta estimates.

3

4   **II.   FINANCIAL LEVERAGE AND COST OF CAPITAL**

5   **Q7.   What topics do you cover in this section?**

6   A7.   I address two topics. First, I address the need for an explicit adjustment for financial

7   leverage and second, I discuss the testimonies' comments on the shape of the ATWACC

8   curve.

9   **Q8.   Do the Chaves Direct and the Rigsby Direct include an explicit adjustment for**

10   **financial leverage?**

11   A8.   Yes. Both the Chaves Direct and the Rigsby Direct explicitly adjust for financial

12   leverage. The Chaves Direct relies on Robert S. Hamada (1969)[6] for the adjustment, and

13   the Rigsby Direct uses a 50 basis points upward adjustment.

14   **Q9.   Do you agree with the adjustments made in the Chaves Direct and the Rigsby**

15   **Direct?**

16   A9.   I certainly agree that an adjustment is merited because Anthem is significantly more

17   leveraged than the sample companies used in the estimation process. However, I do not

18   agree with the Chaves Direct's or the Rigsby Direct's implementation methods. First, the

19   Chaves Direct relies on an adjustment based upon finance paper that relies on market-

20   value capital structures, but the Chaves Direct instead uses book values. If the Chaves

21   Direct had instead relied on the market-value capital structure, the leverage adjustment

22   would have increased to about 185 basis points rather than the recommended 90 basis

23   points.[7] If the Chaves Direct had relied on a leverage adjustment based on market values

24   as indicated in the Hamada article, the cost of equity estimate would, everything else

25   equal, have been about 11.35 percent. Second, the Rigsby Direct relies on an adjustment

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[6]   Robert S. Hamada (1969), Portfolio Analysis, Market Equilibrium and Corporate Finance, *Journal of Finance* 24, 13-31.

[7]   See Schedule No. BV-R2.

1   of 50 basis points, which corresponds to the adjustment made in some prior Arizona

2   cases

3   **Q10.   Why is it important to use market values when determining the sample companies**

4   **cost of equity?**

5   A10.   As discussed in the Villadsen Direct,[8] the risk of the capital structure's equity depends on

6   the market-value, not on the book-value, and cost of equity is determined in the market

7   place.   Hence, investors are concerned about market values not book values.   Going

8   through an example, the text of Brealey, Myers and Allen (2006) states[9]

9   The market-value balance sheet shows assets worth $1,250 million. Of
10   course we can't observe this value directly, because the assets themselves
11   are not traded.   But we know what they are worth to debt and equity
12   investors … This value is entered on the left of the market-value balance
13   sheet.
14   Why did we show the book balance sheet? Only so you could draw a big
15   X through it. Do so now.
16   *When estimating the weighted-average cost of capital, you are not*
17   *interested in past investments but in current values and expectations for*
18   *the future.*

19

20   In other words, the cost of equity is determined in the market place and is based upon

21   market values.   Thus, the cost of equity estimates obtained in the market place pertains to

22   companies with a market-value capital structure whereas a regulated utility such as

23   Anthem is afforded an allowed cost of equity on a much lower equity percentage.

24   Investors require compensation for the difference.

25   It is also noteworthy that in the 1969 paper where Professor Hamada developed the

26   leverage adjustment relied upon in the Chaves Direct, the author explicitly referred to the

27   "the market value of firm A's equity …" in the derivation for the formula.[10]

28   Lastly, the Chaves Direct states that

29

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[8]   Villadsen Direct pp. 9-18.
[9]   Richard A. Brealey, Stewart C. Myers, and Franklin Allen (2006), *Principles of Corporate Finance*, 8th
      Edition, McGraw-Hill, pp. 504-505 (emphasis added).
[10] Hamada (1969), *Op. Cit*., p. 22.

1 regulatory agencies in the United States utilize book values when
2 estimating the cost of capital of a public utility. The ATWACC
3 methodology uses ROE as a dependent variable that is derived by
4 inappropriately equating the sample companies' market value capital
5 structure ATWACC to the Applicant's book value capital structure
6 ATWACC.[11]

7

8   While it is true that regulatory agencies in the U.S. generally use book values when

9 estimating the cost of capital, there certainly are exceptions. For example, the

10 Pennsylvania Public Utility Commission has adopted a financial risk adjustment similar

11 to the adjustment I have recommended here to set the allowed rate of return on equity for

12 water companies.[12] Similarly, the Missouri Public Service Commission has in the past

13 accepted a method similar to the one presented here.[13] Also, the Surface Transportation

14 Board uses a market value capital structure to estimate the cost of capital for railroads.[14]

15

16 **Q11.** **Even if "the ATWACC methodology to estimate the cost of equity capital … is not**

17 **widely accepted in the regulatory environment," [15] would this be sufficient**

18 **justification for rejecting the reliance on market value capital structures to estimate**

19 **the Company's cost of capital?**

20 A11. No. From an economic perspective, the rate of return needs to be such that it gives

21   investors a fair opportunity to earn the cost of capital that compensates them for the risk

22   they bear.[16] My recognition of the added financial risk is consistent with financial and

23   economic theory and the Commission should judge the recommendation based on the

24   evidence presented.

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[11] Chaves Direct p. 40, lines 2-5.

[12] See, Pennsylvania-American Water, Docket R-00016339 (January 10, 2002); The financial leverage adjustment was appealed to the Commonwealth Court of Pennsylvania and upheld in Pennsylvania-American Water in March 2005 (No. 301 C.D. 2004).

[13] See the decision in Missouri Public Service Commission, Case No. ER-2004-0570, Tariff File No. YE-2004-1324, for Empire District Electric Company, issued March 10, 2005 ("Missouri Decision").

[14] Surface Transportation Board, Decision, STB Ex Parte No. 558 (Sub-No. 9). Railroad Cost of Capital – 2005. Decided December 19, 2005.

[15] Chaves Direct p. 39.

[16] This is consistent with the U.S. Supreme Court's opinions in *Bluefield Waterworks & Improvement Co. v. Public Service Commission*, 262 U.S. 679 (1923) and *Federal Power Commission v. Hope Natural Gas*, 320 U.S. 591 (1944).

1 **Q12. Do you have any other comments on the discussion of the after-tax weighted average**

2 **cost of capital in regulatory proceedings?**

3 A12. Yes. Mr. Rigsby comments

4   While I believe that the ATWACC may have weight in regard to business
5   entities that operate in a truly competitive environment, the higher rate of
6   return that she [Villadsen] advocates for the Anthem/Agua Fria Districts is
7   not warranted. While Arizona-American may have a higher degree of
8   financial risk, as a result of the Company's leveraged capital structure, it is
9   still a regulated entity that can apply for rate relief when the need arises.[17]

10

11   I agree that Anthem is a regulated entity and can apply for rate relief when the need

12 arises as can most, if not all, regulated utilities. However, this is not a reason to provide a

13 rate of return below what investors expect. The cost of capital for Anthem is determined

14 in the market as is the cost of capital for firms in competitive industries. There is no

15 difference in the applicability of the ATWACC in these two situations.

16

17 **III. COST OF CAPITAL ESTIMATION**

18   **A. THE SAMPLES: WATER UTILITIES AND GAS LDCS**

19 **Q13. Please summarize the sample selection in the Chaves and Rigsby Direct.**

20 A13. The Villadsen Direct and the Rigsby Direct utilize a sample of water utilities and a

21   sample of natural gas distribution companies while the Chaves Direct relies only on a

22   sample of water utilities. For the water sample, the Villadsen Direct included all water

23   utilities followed by *Value Line*[18] as of March 2006. The Chaves Direct included the six

24   water utilities followed by *Value Line* that earn most of their revenues from regulated

25   operations and have sufficient data for his analysis. The Rigsby Direct included the

26   water utilities included in *Value Line*'s Standard Edition. While both the Villadsen

27   Direct and the Rigsby Direct selected a group of natural gas distribution utilities from

28   *Value Line*, the proxy groups differ. The Villadsen Direct included seven gas distribution

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[17] Rigsby Direct p. 67.

1   companies which, prior to March 2006, had a five-year history of no major (and publicly

2   announced) merger or acquisition activities, no accounting restatements, investment

3   grade bond ratings, and whose revenue was primarily regulated. The Rigsby Direct also

4   selected its gas distribution sample from *Value Line*, but excluded two of the Villadsen

5   Direct's proxy companies: Cascade Natural Gas and Peoples Energy. These two

6   companies announced merger activities in July of 2006, after my Direct Testimony was

7   filed. If I undertook the analysis today, I would also exclude these companies from my

8   sample. The Rigsby Direct also included AGL Resources, Atmos Energy, New Jersey

9   Resources, NICOR Inc., and Piedmont Natural Gas in his sample for a sample of ten

10   companies.[19]

11 **Q14. Please comment on the Chaves Direct and the Rigsby Direct's proxy groups.**

12 A14. I will address the Rigsby Direct first. As noted in the Rigsby Direct, *Value Line*'s

13   Standard Edition currently follows only four water utilities: American States Water, Aqua

14   America, California Water, and Southwest Water. These are the four water utilities

15   include in the Rigsby Direct's water company sample. Of the four companies in *Value*

16   *Line*'s Standard Edition, Southwest Water does not earn the majority of its revenues from

17   water activities and Aqua America is actively pursuing acquisitions. I therefore agree

18   with the Rigsby Direct on the need of a second sample as a check. The Rigsby Direct

19   relies on three estimation methods applied to two comparable groups, water utilities and

20   gas LDCs. The testimony averages the results for the two proxy groups and then

21   averages the DCF result and the CAPM result which is based on two methodologies.

22   The Chaves Direct also relies on a Value Line water sample but does not include

23   Southwest Water whose revenue is not concentrated in the water industry. The testimony

24   adds Connecticut Water, Middlesex Water and SJW Water from Value Line's Small and

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[18] *Value Line Investment Survey*'s Standard and Small and Mid-cap Editions.

[19] AGL Resources, Atmos Energy and Piedmont Natural Gas were not part of the Villadsen Direct because of merger and acquisition activities within the past five years (as of the date the Direct was filed). New Jersey Resources and NICOR were excluded because of a low percentage of regulated revenues and accounting restatements, respectively.

1   Mid-Cap Edition, as I do.[20]   The final cost of equity recommendation in the Chaves
2   Direct relies on an average of four estimation methods applied to the sample of water
3   companies. However, three of the six water utilities in the Chaves Direct do not have
4   earnings or dividend projections from Value Line so that some the estimation methods in
5   the Chaves Direct is based on data from only three companies.[21]

6   **B. THE DCF METHOD**

7   **Q15. Please summarize the DCF methods relied upon in the Chaves and Rigsby Direct**
8   **Testimonies.**

9   A15. The Chaves Direct relies on a constant growth rate DCF and on a multi-stage DCF model.
10   In the constant growth rate model, the growth rate is estimated as the average of 6 growth
11   rates: historical and predicted dividend growth, historical and predicted earnings growth,
12   and historical and predicted sustainable growth.[22] The Chaves Direct relies on 10 years
13   of dividend and earnings-per-share data for the historical dividend and earnings growth
14   rate. It relies on Value Line forecasts for the 2005 to 2010 period for three of the six
15   companies to estimate the forecasted dividend and earnings growth rate.[23]   The
16   sustainable growth rate consists of an internal growth rate, the (earnings) retention ratio
17   multiplied with the return on equity, plus an external growth rate financed through the
18   issuance of new shares.[24] The standard sustainable growth model states that

19    $$g = b \times r + s \times v \qquad (1)$$

20   where   b   is the earnings retention ratio

21   r   is the return on common equity

22   s   is the growth in shares

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[20]   I also consider York Water and a subsample of companies without Southwest Water.
[21]   *See*, Chaves Direct, Schedules PMC-4 and PMC-5.
[22]   The sustainable growth rate consists of an internal growth rate, the (earnings) retention ratio multiplied
with return on equity, plus an external growth ratio, growth financed through the issuance of new shares.
[23]   Chaves Direct, Schedule PMC-4.
[24]   The Chaves Direct does not rely on the number of shares issued in the calculation but determines the funds
raised from issuing common stock. See, Chaves Direct workpapers.

1   v = [(Market Value per Share) / (Book Value per Share) - 1] **(2-a)**

2   The Chaves Direct calculates the historical internal growth rate over the period 1996-

3   2005, while the historical external growth is calculated using a mixture of date for the

4   1997-2005 period and current data.[25] The Chaves Direct calculated the dividend yield as

5   of a specific date, January 10, 2007.[26] In the multi-stage DCF model, the Chaves Direct

6   relied on *Value Line* projected dividend growth for the first four years and historical GDP

7   growth for the long term ("Stage-2 growth").

8   The Rigsby Direct relies on a constant growth DCF model with a sustainable growth rate.

9   Rigsby calculates the five-year historical and forecast retention ratio, book return on

10   equity, book value per share, and growth in shares. Based on five-year historical

11   averages and forecasted growth rates, Rigsby decides on an internal growth rate.[27] He

12   also estimates the share growth. However, the Rigsby Direct relies on a model where v is

13   replaced by[28]

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

15   As v^* is less than v whenever the stock price per share is higher than the book value per

16   share, the formula in (2-b) results in a lower growth rate than the standard formula for

17   companies with a market-to-book (or price to book value per share) above one.

18   **Q16. Do you have any comments on the Chaves Direct or the Rigsby Direct's**

19   **implementation of the DCF model?**

20   A16. Yes. The Chaves Direct presented four estimates of the sample's cost of equity. The

21   constant growth DCF is based on an average of six growth rates.[29] One of these growth

22   rates is so low that it would result in a cost of equity estimate that is lower than the

23   current yield on a BBB-rated utility bond.[30] This is an unreasonable outcome as no

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[25]   See Chaves Direct, Schedule PMC-5 and workpapers supporting this schedule.

[26]   Chaves Direct, Schedule PMC-8.

[27]   *See* Rigsby Direct p. 26-27 and Schedules WAR-4, WAR-5, and WAR-6.

[28]   Rigsby Direct, Schedule WAR-4, page 2.

[29]   Chaves Direct, Schedule PMC-7.

[30]   See Schedule BV-R1.

1   investor would provide equity capital to a company if he or she expected a return on

2   equity below the current yield on low risk bonds. For example, the Federal Energy

3   Regulatory Commission ("FERC") commonly excludes all cost of equity estimates that

4   are lower than the cost of debt plus 100 basis points.[31] Consequently, this estimate

5   should not be relied upon in the determination of Anthem's cost of equity. Tables R-2

6   below summarizes the Chaves Direct's estimates and provides a revised estimated that

7   ignores the growth rate that would give rise to a cost of equity estimated below the

8   current yield on low risk bonds. The reliance on this unusual low growth rate is

9   particularly troubling because two (American States Water and California Water) of the

10   three companies with very low historical dividend payments operate in a regulatory

11   environment that has changed dramatically in recent years.[32] In other words, the

12   companies are expected to experience significantly increased cash flow going forward.

Table R-2 The Impact of the Chaves Direct Relying on Cost of Equity Estimates Below the Cost of Debt	
Constant Growth DCF with CoE > CoD	8.9%
Constant Growth DCF (Chaves Direct)	8.4%
Difference	**0.5%**

13   Source: Chaves Direct, Schedule PMC-2. Schedule BV-R1. Difference calculated.

14

15   Reliance on the unusually low growth rate is particularly unreasonable because it is

16   calculated as a 10-year average of the dividend growth and the water industry has

17   changed significantly over the past ten years.

18 **Q17. Above you mentioned that the Rigsby Direct adjusted the typical sustainable growth**

19   **model. What are the consequences?**

20 A17. In essence, the adjustment lowers (increases) the sustainable growth rate when the

21   market-to-book ratio is higher (lower) than one. Table R-3 below reports the results from

[31] See, for example, Federal Energy Regulatory Commission, Opinion No. 445, Southern California Edison Company, Docket Nos. ER97-2355-000, ER98-1261-000, and ER98-1685-000, issued July 26, 2000.

1   using the data in the Rigsby Direct's Schedules WAR-2 and WAR-4 page 2 but removing

2   the adjustment factor. For the water companies the cost of equity estimate increases by

3   about 180 basis points while the cost of equity estimate for the gas LDC sample increases

4   by about 50 basis points for an average increase of approximately 1.15%.

Table R-3
The Impact on the Cost of Equity of the Rigsby Direct's Adjustment
to the Sustainable Growth Model

	Water Utility	Natural Gas LDC
Rigsby-based DCF without Adjustment	10.65%	9.70%
Rigsby DCF (with Adjustment)	8.81%	9.18%
Difference	1.84%	0.52%

5   Source: Rigsby Direct p. 36 and Schedule BV-R3.

6

7   As can be seen from Table R-3 above, the impact of this one adjustment is significant

8   and biases the DCF estimates obtained in the Rigsby Direct downward.

9

10   **Q18.   Why did you modify the calculation of the external growth rate?**

11   A18. The adjustment made in the Rigsby Direct is founded on the notion that "[t]he market

12   price of a utility's common stock will tend to move toward book value, or a market-to-

13   book ratio of 1.0, if regulators allow a rate of return that is equal to the cost of capital."[33]

14   Thus, it appears that the Rigsby Direct relies on the so-called market-to-book test, which

15   is based on the assumption that the value of a utility's stock equals the present value of

16   the returns of and on a rate base equal to the net book value of the utility's equity. To

17   illustrate the consequences of a strict belief in the market-to-book test,[34] I will discuss a

18   hypothetical example.

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[32]   See Value Line Investment Survey, American States Water and California Water, January 26, 2007.

[33]   Rigsby Direct p. 17.

[34]   Neither the Chaves Direct nor the Rigsby Direct appear to argue that regulators should seek a market-to-book ratio of one.

1   Assume the market-to-book test worked, and that all parties agreed that at a cost
2   of equity of 11 percent is appropriate for Utility A.[35] For simplicity, assume that Utility
3   A has an actual and ratemaking capital structure consisting of 40 percent equity. Assume
4   that Utility A's market-to-book ratio is 2, which if the market-to-book test were valid
5   would signal that 11 percent is above the cost of equity at the regulatory equity ratio.
6   Suppose also that the book value of the utility is expected to grow at a long-term annual
7   rate of 5 percent. Lastly, suppose that investors expected an extreme form of regulatory
8   lag: regulators will leave allowed rates of return at the current 11 percent level for X
9   years. On the last day of the Xth year, regulators will readjust the allowed rate of return
10   down to the cost of equity, so that the market-to-book ratio falls to 1.0 on that day. In
11   short, the assumptions are that (1) investors put up $2 now for every $1 of book equity
12   rate base, (2) earn an allowed rate of return of 11 percent (which by hypothesis is above
13   the cost of capital) on the book value of the equity rate base (which grows at 5 percent
14   per year) for X years, and (3) then end up with a stock value equal to only the book-value
15   rate base, i.e., they lose 50 percent of their original investment after X years. If the
16   market-to-book test were valid, the discount rate that makes the present value of these
17   hypothesized returns equal to twice the book value of the stock is the utility's true cost of
18   equity. Figure R-1 plots the implied true cost of equity associated with values of "X"
19   running out to 20 years. As benchmarks, it adds the assumed 11 percent allowed rate of
20   return on equity and the associated long-term bond rate, 5 percent.

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[35]   The 11 percent is used for illustrative purposes only.

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.)
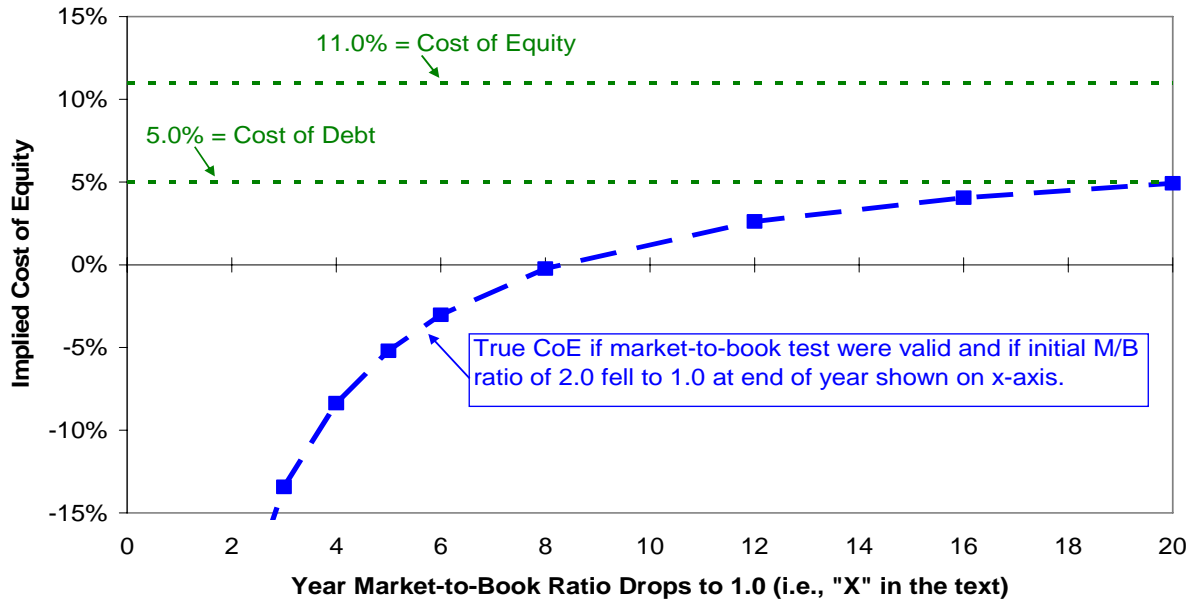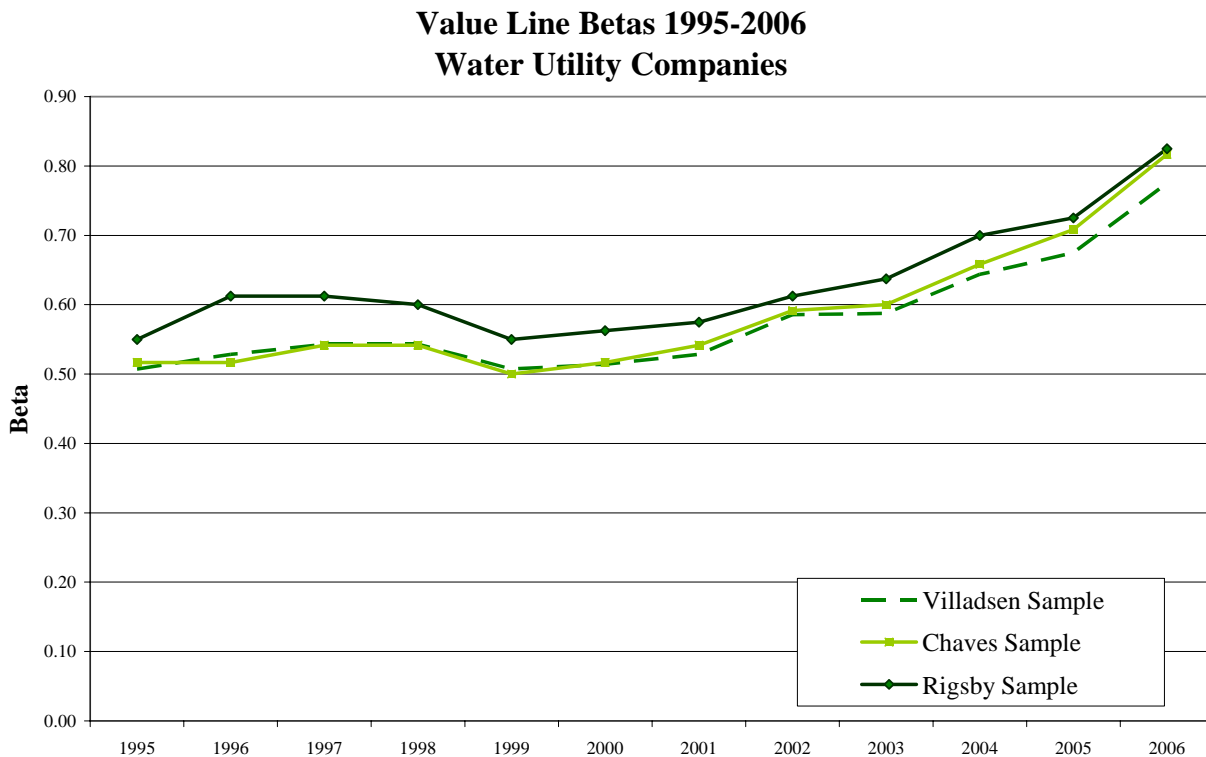

Figure R 1

The curved line (blue in color copies) depicts the true cost of capital as the length of the regulatory lag (X) grows from three years to 20 years. With a loss of 50 percent of the original investment due at the end of the regulatory lag, X must exceed 8 years for the true cost of equity to become positive, and during the 20-year period considered it never exceeds the cost of debt (or risk-free rate).   As investors clearly expect a return in excess of the risk-free rate, trying to regulate to obtain a market-to-book ratio of one is not viable. The example illustrates that it is unlikely that the simple market-to-book test works. Because the test does not work, I firmly believe the regulators should not attempt to maintain, increase, or decrease a utility's market-to-book ratio.[36]

Q19.   Do you have any general comments regarding choice of growth rates in the Chaves Direct and Rigsby Direct?

---

[36]   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.

1   A19.   Yes, both testimonies rely on historical growth rates as well as projected growth rates.

2   The Chaves Direct also argues that analyst forecasts are overly optimistic.[37] Because, as

3   discussed below, the water industry currently is in transition, historical growth rates may

4   not be representative for future growth. As noted above, the water utility industry is

5   expected to make significant infrastructure investments, the industry is facing a number

6   of mergers and acquisitions, and the water utility companies' risk appears to be

7   increasing.[38]   Additionally, the water utility industry's risk is clearly increasing as

8   indicated by, for example, increasing beta estimates. This is shown in Figure R-2 below.

Value Line Betas 1995-2006
Water Utility Companies

9
10 **Figure R 2**
11

12   As can be seen from Figure R-2, the betas for the water industry have increased in recent

13   years and even within the last few months. Schedule BV-R4 shows company-specific

14   *Value Line*'s estimate for beta during a recent time period. Because of the rapid changes

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[37]   Chaves Direct pp. 39-42.

1   in the water utility industry the heavy reliance on historical growth rates may bias the

2   cost of capital estimate which, as the Chaves Direct points out,[39] is a forward looking or

3   expected measure. There is a large academic literature that indicates that analysts'

4   forecasts are statistically more accurate than growth forecasts solely based on historical

5   earnings, dividends, book value and equity growth rates.[40] For example, a paper by

6   Gordon, Gordon and Gould (1989)[41] demonstrates that for utilities, forecasted earnings

7   growth outperform past growth in earnings, past growth in dividends, and past growth in

8   earnings retention in explaining utilities expected return. (Note that one of the authors,

9   Myron J. Gordon, developed the Gordon Growth Model, or DCF model, relied upon in

10   the Rigsby Direct).

11   **Q20. Do you have any comments on the Chaves Direct and the Rigsby Direct's**

12   **discussions of optimism bias in analysts' forecasts?**

13   A20. Yes. I will first address the Chaves Direct's discussion of optimism bias, and then I will

14   address the Rigsby Direct's comments on *Value Line*'s projected and actual rates of

15   return on equity.

16   **Q21. Please address the Chaves Direct's discussion of optimism bias in analysts' forecasts.**

17   A21. The Chaves Direct argues that "it is reasonable to assume that investors also rely on past

18   growth."[42] The Chaves Direct also cites studies that found that analysts' forecasts of

19   future earnings are optimistic.[43] The Villadsen Direct[44] discussed the optimism bias in

20   analysts' forecast which, I agree, the academic literature has documented. As noted in

21   the Villadsen Direct, Chan, Karceski, and Lakonishok (2000)[45] found that for companies

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[38]   *Section IV* discusses this issue further.

[39]   See Chaves Direct p. 3.

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

[41]   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.

[42]   Chaves Direct p. 40.

[43]   Chaves Direct p. 41-42 references David Dreman (1998), *Contrarian Investment Strategies: The Next Generation*, Simon & Schuster ("Dreman"), Jeremy J. Siegel (2002), *Stocks for the Long Run*, McGraw-Hill ("Siegel"), and Burton G. Malkiel (2003), *A Random Walk Down Wall Street*, W.W. Norton & Co.

[44]   Villadsen Direct, Appendix C, pp. 6-8.

[45]   L. K.C. Chan, J. Karceski, and J. Lakonishok (2003), "The Level and Persistence of Growth Rates," *Journal of Finance* 58(2):643-684.

1   in the lowest quintile when sorted by size, there was no obvious bias. Because utilities

2   and especially water utilities tend to be small in size, the results indicate that analysts'

3   optimism bias may be much less in the water industry than in many other industries.

4   Among the text cites in the Chaves Direct, it appears that only Professor Malkiel

5   explicitly includes utilities.[46] Professor Malkiel[47] discusses the findings, the utility

6   industry and the "unpredictable events" in the industry that presumably cause analysts'

7   forecasts to over or underestimate earnings. He cites, among other factors, the fuel costs

8   of the 1970's, the 1979 Three Mile Island accident, unexpected unfavorable rulings of

9   public utility commissions, and in the 1990's the impact of deregulation and competition.

10 These factors pertain primarily to a segment of the electric utility industry, so it is not

11 obvious to which utilities Professor Malkiel refers in the statement quoted in the Chaves

12 Direct. Without knowing exactly which utilities and companies are included in the

13 studies cited, it is difficult, if not impossible, to determine the study's impact on the

14 choice between analysts' forecasts and other growth rates. After all, there is ample

15 evidence in the academic literature that analysts' forecasts outperform historical growth

16 rates.[48] Further, according to a recent joint report by NASD and the NYSE,

17   … the SRO Rules have been effective in helping restore integrity to
18   research by minimizing the influences of investment banking and
19   promoting transparency of other potential conflicts of interest. Evidence
20   also suggests that investors are benefiting from more balanced and
21   accurate research to aid their investment decisions.[49]

22 Lastly, analysts have ample access to historical information on companies they follow

23 and presumably use whatever information is available to them in projecting future

24 earnings or other factors for a company. Therefore, I believe that historical data are

25 incorporated in analysts' forecasts and that to implement a truly forward looking DCF

26 model, only forward looking growth rates should be included.

---

[46]   Dreman p. 95-97 discuss 15 industries none of which appear to be dominated by utilities.

[47]   Malkiel (2003), *Op. Cit.*, p. 177.

[48]   See footnote 1 p. 5 in Appendix C to the Villadsen Direct.

[49]   Joint Report by NASD and NYSE on the Operation and Effectiveness of the Research Analyst Conflict of
       Interest Rules, December 2005, p. 44.

1   **Q22.** **Do you have any comments on the Rigsby Direct's comparison of *Value Line*'s**

2   **projected and actual returns?**

3   A22.   Yes. The Rigsby Direct (pp. 49-50) presents historical data on Value Line's projected

4   rates of return and realized rates of return for the water industry. The projected return is

5   the one-year projection. I have three comments. First, the one-year ahead is more volatile

6   and difficult to predict than, for example, the average growth over a five year period - -

7   which is what I used in the DCF implementation. Second, the composition of the water

8   industry may change between the time of the forecast and the time the actual return is

9   realized. Third, Value Line estimates are based on one analyst's analysis which is a

10   reason for using other sources of growth forecasts.

11   **Q23.** **Do you have any other comments on growth rates?**

12   A23.   Yes. In commenting on my Direct Testimony and optimism bias, the Rigsby Direct

13   states on p. 58

14   This tendency, referred to as optimism bias by Dr. Villadsen, is addressed
15   in Appendix C of her testimony and, according to Dr. Villadsen, is
16   eliminated by the use of a long-term growth rate estimate for gross
17   domestic product ("GDP") in her multi-stage model.
18

19   First, as argued above and in Appendix C of my Direct Testimony, optimism bias is less

20   of an issue for smaller companies and utilities than for the average industry. Second, my

21   multi-stage model serves several purposes. It takes into account that no publicly

22   available analysts' forecasts, to the best of my knowledge, provide information beyond at

23   most five years. Consequently, assumptions have to be made regarding the growth rate

24   of companies beyond that horizon. If a company were to grow significantly faster

25   (slower) than the economy as a whole for a very long time, it would become an

26   increasingly larger (smaller) portion of the economy which appears illogical as water

27   companies and utilities in general serve the public. Third, the multi-stage model does

28   adjust for overly optimistic or pessimistic company-specific forecasts.

1   **C. THE RISK POSITIONING METHOD**

2   **Q24.   Please summarize the risk positioning model relied upon in the Chaves and Rigsby**

3   **Direct Testimonies.**

4   A24.   Both the Chaves Direct and the Rigsby Direct report results from risk positioning models

5   and both witnesses rely on the standard Capital Asset Pricing Model ("CAPM") using

6   betas from *Value Line* Investment Survey. The Chaves Direct reports results from two

7   models. The first model uses a market risk premium ("MRP") equal to the average

8   historical arithmetic difference between the S&P 500 and the intermediate-term

9   government bond income return and a risk-free rate of 4.7 percent. The second model

10   uses a projected market risk premium where the projection is based on *Value Line*'s

11   expected dividend yields and the current yield on 30-year Treasury notes.[50] The Rigsby

12   Direct also reports results from two risk positioning models. In one model, the Rigsby

13   Direct relies on the difference between the arithmetic, historical average return on the

14   S&P 500 and the current yield on 91-day treasury bills for the MRP. In a second model,

15   the Rigsby Direct relies on the difference between the historical, geometric average

16   return on the S&P 500 and the current yield on 91-day treasury bills for the MRP. The

17   Rigsby Direct uses the average yield on the 91-day Treasury bills over the six week

18   period ending March 9, 2007.[51]

19 **Q25.   Do you have any comments on the implementation of the risk positioning model in**

20   **the Chaves or Rigsby Direct Testimonies?**

21 A25.   Yes. The Rigsby Direct reports results that rely on a geometric estimate of the market

22   risk premium. Current finance theory and practice has ruled out the reliance on the

23   geometric MRP for cost of capital estimation.

24 **Q26.   Please address the issue of geometric versus arithmetic market risk premia.**

25 A26.   While the magnitude of the market risk premium currently is the subject of scrutiny in the

26   academic literature,[52] there is no doubt among academics that the geometric market risk

---

[50]   See Chaves Direct, Schedule PMC-2.
[51]   See Rigsby Direct, Schedule WAR-7.
[52]   See Villadsen Direct, Appendix B pp. 3-10 for a discussion.

1   premium does not apply to cost of capital estimation. For example, Ibbotson Associates

2   state

3   The equity risk premium data presented in this book are arithmetic
4   average risk premia as opposed to geometric average risk premia. The
5   arithmetic average equity risk premium can be demonstrated to be most
6   appropriate when discounting future cash flows. For use as the expected
7   equity risk premium in either the CAPM or the building block approach,
8   the arithmetic mean or the simple difference of the arithmetic means of
9   stock market returns and riskless rates is the relevant number. This is
10   because both the CAPM and the building block approach are additive
11   models, in which the cost of capital is the sum of its parts. The geometric
12   average is more appropriate for the reporting past performance, since it
13   represents the compound average return.[53]

14

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

16   Only arithmetic means are correct for forecasting purposes and for
17   estimating the cost of capital. There is no theoretical or empirical
18   justification for the use of geometric mean rates of returns as a measure of
19   the appropriate discount rate in computing the cost of capital or in
20   computing present values. There is no dispute in academic circles as to
21   whether the arithmetic or geometric average should be used for purposes
22   of computing the cost of capital.[54]

23

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

25   [I]f our focus is on future performance, then the arithmetic average is the
26   statistic of interest because it is an unbiased estimate of the portfolio's
27   expected return (assuming, of course, that the expected return does not
28   change over time). In contrast, because the geometric return over a
29   sample period is always less than the arithmetic mean, it constitutes a
30   downward-biased estimator of the stock's expected return in any future
31   year.[55,56]

32

33   Based on the academic and other literature, the geometric average based MRP is invalid.

34   It leads to downward biased cost of capital estimates and should be ignored. Table R-4

---

[53]   Ibbotson Associates, *Stock, Bonds, Bills and Inflation, Valuation Edition*, 2006 Yearbook, p. 77.
[54]   Roger A. Morin (2006), *New Regulatory Finance*, Public Utilities Reports, Inc., pp. 116-117.
[55]   Zvi Bode, Alex Kane, and Alan J. Marcus (2005), *Investments*, 6'th Edition, McGraw-Hill, p. 865.
[56]   See also Richard A. Brealey, Stewart C. Myers, and Franklin Allen (2006), *Principles of Corporate Finance*, 8th Edition, McGraw-Hill, p. 150-151.

1   below shows the difference between the Rigsby Direct's cost of equity estimates using
2   the arithmetic and geometric MRP.

3

Table R-4
Arithmetic versus Geometric CAPM Cost of Equity Estimates in the
Rigsby Direct

	Water Companies	Natural Gas LDC
Arithmetic MRP	11.40%	11.33%
Geometric MRP	9.74%	9.69%
Difference	1.66%	1.64%

4   Source: Rigsby Direct Schedule WAR–7. Difference calculated.

5

6   As can be seen from the table, the Rigsby Direct's CAPM cost of equity estimates are
7   about 165 basis points lower when relying on the geometric MRP than when relying on
8   the arithmetic MRP. Using the arithmetic CAPM, the Rigsby Direct estimates an average
9   cost of equity of 11.37 percent before any adjustments for Anthem's higher leverage.
10   Considering the 50 basis points upward adjustment for financial leverage that the Rigsby
11   Direct relies upon, the CAPM with an arithmetic MRP results in a cost of equity of about
12   11.85%, which is higher than the Company's requested return on equity.

13

14   **Q27. Are there other issues in the implementation of the risk positioning model that you**
15   **need to address?**

16   A27. Yes. Both the Chaves Direct and the Rigsby Direct relied on *Value Line* betas as did the
17   Villadsen Direct. However, both the Chaves Direct and the Rigsby Direct relied on
18   adjusted betas as reported by *Value Line,* while in the Villadsen Direct I unadjusted the
19   *Value Line*'s betas. The Villadsen Direct choose to unadjust *Value Line*'s betas as a

1   conservative estimate, although current 52-week estimates of betas indicate that the

2   companies' betas are of the magnitude reported by *Value Line*.[57]

3   **D.   CONSEQUENCES OF THE ESTIMATION METHODS RELIED UPON IN THE**
4   **CHAVES DIRECT AND THE RIGSBY DIRECT**

5   **Q28. Do you have any comments on the impact of the Chaves Direct's implementation**
6   **choices for the DCF and CAPM methods?**

7   A28.   Yes. As noted above, the Chaves Direct presented four estimates of the sample's cost of

8   equity. The constant growth DCF is based on an average of six growth rates.[58] One of

9   these growth rates is so low that it would result in a cost of equity estimate that is lower

10   than the current yield on a BBB-rated utility bond.[59] As discussed above, this is an

11   unreasonable outcome, so this estimate should be ignored. Table R-5 below summarizes

12   the Chaves Direct's estimates and provides a modified estimated that ignores the growth

13   rate that would give rise to a cost of equity estimated below the current yield on low risk

14   bonds.

Table R-5
Summary of the Chaves Direct's Results and Modifications

	Chaves Direct	Modified
Constant Growth DCF	8.4%	8.9%
Multi-Stage DCF	9.4%	9.4%
Average DCF	**8.9%**	**9.2%**
CAPM with Arithmetic	10.8%	10.8%
CAPM with Current MRP	9.4%	9.4%
Average CAPM	**10.1%**	**10.1%**
Average	**9.5%**	**9.7%**
Average plus 90 basis points	*10.4%*	*10.6%*

15   Source: Chaves Direct, Schedule PMC-2, Schedule BV-R1.

16

---

[57]   Schedule BV-R6 attached to this rebuttal shows so-called 52-week rolling betas for the water utilities
relied upon in the Villadsen Direct.
[58]   Chaves Direct, Schedule PMC-7.
[59]   See Schedule BV-R1.

1   As can be seen from Table R-5, if the unreasonably low historical growth in

2   dividends is ignored, then the resulting cost of equity estimate increases from 10.4

3   percent to 10.6 percent.

4

5   **Q29.   Please comment on impact of the Rigsby Direct's implementation choices for the**

6   **DCF and CAPM methods.**

7   A29. I have two key comments, but first note that the Rigsby Direct obtained its recommended

8   cost of equity by averaging the two samples and then the results from the DCF and the

9   CAPM methods. First, the low DCF cost of equity estimate was obtained using a non-

10   standard downward adjustment when calculating the sustainable growth. Second, the

11   Rigsby Direct relies on a version of the CAPM that uses a geometric market risk

12   premium, which for reasons discussed above should be avoided. Table R-6 below

13   presents the results of the analysis in the Rigsby Direct with those two modifications.

14   The non-standard external growth in the sustainable growth model is replaced by a

15   standard version of the model and CAPM with the geometric market risk premium is

16   dropped from the analysis. The results are presented in Table R-6 below.

Table R-6 Summary of the Rigsby Direct's Results and Modifications		
	Rigsby Direct	Modified
Sustainable Growth - Water	8.81%	10.65%
Sustainable Growth – Gas LDC	9.18%	9.70%
Average DCF	**8.99%**	**10.17%**
Arithmetic-CAPM, Water	11.40%	11.40%
Arithmetic-CAPM, Gas LDC	11.33%	11.33%
Geometric-CAPM, Water	9.74%	na
Geometric-CAPM, Gas LDC	9.69%	na
Average CAPM	**10.54%**	**11.37%**
Average	9.77%	10.78%
Average plus 50 basis points	*10.27%*	*11.27%*

17   Source: Rigsby Direct, Schedule WAR-1, Schedule BV-R3.

18

1   Replacing the non-standard external growth by a textbook version and dropping the

2   geometric based CAPM results in a cost of equity estimate that is approximately 100

3   basis points higher than the one recommended in the Rigsby Direct.

4

5   **Q30. Does the fact that you do not address all issues or findings discussed in the Chaves**

6   **Direct or Rigsby Direct imply that you accept their positions or findings?**

7   A30.   No, not necessarily.

8   **Q31. Is this the conclusion of your rebuttal testimony?**

9   A31.   Yes.

SCHEDULES BV-R1 Through BV-R6

Schedule BV-R1

Simple DCF Method

	Dividend Yield [1]	Growth Rate [2]	Cost of Equity [3]
DPS Growth - Historical	2.70%	2.70%	5.40%
DPS Growth - Projected	2.70%	5.00%	7.70%
EPS Growth - Historical	2.70%	4.20%	6.90%
EPS Growth - Projected	2.70%	7.90%	10.60%
Sustainable Growth - Historical	2.70%	5.70%	8.40%
Sustainable Growth - Projected	2.70%	8.40%	11.10%
Average [a]*			8.94%

Sources and Notes:
[1]: Schedule PMC-2, [c].
[2]: Schedule PMC-7, [b].
[3]: [1] + [2].
[a]: Average over all estimates.
* Excludes Cost of Equity Estimates that are less than the Cost of Debt.
   Cost of Debt is assumed to be the yield on a BBB Utility Bond, currently 6.10%.

Schedule BV-R2

Calculation of Hamada Adjustment

	Risk-Free Rate [1]	Value Line Beta [2]	Market Risk Premium [3]	CAPM RoE [4]
Chaves Direct CAPM				
Historical Market Risk Premium	4.68%	0.82	7.50%	10.81% [a]
Current Market Risk Premium	4.77%	0.82	5.71%	9.43% [b]
Average				10.12% [c]
Using Market Values and 64/36 Capital Structure				
Historical Market Risk Premium	4.68%	1.10	7.50%	12.94% [d]
Current Market Risk Premium	4.77%	1.10	5.71%	11.05% [e]
Average				11.99% [f]
Difference				1.87% [g]
Using Market Values and 60/40 Capital Structure				
Historical Market Risk Premium	4.68%	1.04	7.50%	12.45% [h]
Current Market Risk Premium	4.77%	1.04	5.71%	10.68% [i]
Average				11.56% [j]
Difference				1.44% [k]

Sources and Notes:
[1]: Chaves Workpapers.
[2][a], [b]: Chaves Workpapers.
[2][d], [e], [h], [i]: Workpaper 1 to Schedule BV-R2.
[3]: Chaves Workpapers.
[4]: [1] + [2] x [3].
[c]: Average of [4][a] and [b].
[f]: Average of [4][d] and [e].
[g]: [f] - [c].
[j]: Average of [4][h] and [i].
[k]: [j] - [c].

Workpaper 1 to Schedule BV-R2

Adjusted Relevered Beta Calculation

Company [1]	Unadjusted Beta [2]	Tax Rate [3]	Debt to Market Value Ratio [4]	Equity to Market Value Ratio [5]	Unlevered Beta [6]
American States Water	0.67	46.0%	0.42	0.58	0.48
California Water	0.75	40.0%	0.35	0.65	0.56
Aqua America	0.75	39.0%	0.29	0.71	0.60
Connecticut Water	0.75	22.9%	0.25	0.75	0.59
Middlesex Water	0.67	31.1%	0.37	0.63	0.48
SJW Corp	0.60	42.1%	0.30	0.70	0.48
Average					0.53

	Unlevered Beta [7]	Tax Rate [8]	Book Value of Debt [9]	Book Value of Equity [10]	Relevered Beta [11]	Adjusted Relevered Beta [12]
Anthem's Capital Structure at 64/36	0.53	38.60%	0.64	0.36	1.12	1.10
Anthem's Capital Structure at 60/40	0.53	38.60%	0.60	0.40	1.02	1.04

Sources and Notes:

[1] - [3]: Chaves Workpapers.

[4]: 1 - [5].

[5]: Workpaper 2 to Schedule BV-R2.

[6]: [2] / (1 + ([4] / [5]) x (1 - [3])).

[7]: Average of [6].

[8] - [10][a]: Chaves Workpapers.

[8] - [10][b]: Proposed Capital Structure.

[11]: [7] x (1 + ([9] / [10]) x (1 - [8])).

[12]: [11] x 0.67 + 0.35.

Workpaper 2 to Schedule BV-R2

Market Value Capital Structure for Unlevered Beta Calculation

Company	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]
	5-Year Average Capital Structure		
American States Water Co	0.58	0.00	0.42
California Water Service Gp	0.65	0.00	0.35
Connecticut Water Svc Inc	0.75	0.00	0.25
Middlesex Water Co	0.63	0.01	0.36
Aqua America Inc	0.71	0.00	0.29
SJW Corp	0.70	-	0.30
Southwest Water Co	0.67	0.00	0.33
York Water Co	0.74	-	0.26

Sources and Notes:

[1] - [3]: Table No. BV-4.

Schedule BV - R3

DCF Cost of Equity Estimates Without Adjustment Using Rigsby Direct Data

Stock Symbol	Company	Dividend Yield [1]	Internal Growth [2]	Share Growth [3]	Market to Book [4]	External Growth [5]	Sustainable Growth [6]	Estimated Cost of Equity Capital [7]
AWR	AMERICAN STATES WATER CO.	2.44%	5.00%	4.00%	2.33	5.32%	10.32%	12.76%
CWT	CALIFORNIA WATER SERVICE GROUP	2.88%	3.25%	3.75%	2.39	5.21%	8.46%	11.34%
SWWC	SOUTHWEST WATER COMPANY	1.80%	4.45%	2.00%	1.92	1.84%	6.29%	8.09%
WTR	AQUA AMERICA, INC.	2.03%	6.00%	1.00%	3.36	2.36%	8.36%	10.39%
WATER COMPANY AVERAGE								10.65%
ATG	AGL RESOURCES, INC.	4.05%	5.75%	0.50%	1.93	0.47%	6.22%	10.27%
ATO	ATMOS ENERGY CORP.	4.03%	4.50%	5.00%	1.41	2.05%	6.55%	10.58%
LG	LACLEDE GROUP, INC.	4.53%	3.00%	2.75%	1.56	1.54%	4.54%	9.07%
NJR	NEW JERSEY RESOURCES CORPORATION	3.14%	5.50%	1.25%	2.01	1.26%	6.76%	9.90%
GAS	NICOR, INC	4.05%	3.65%	0.10%	2.24	0.12%	3.77%	7.82%
NWN	NORTHWEST NATURAL GAS CO.	3.37%	4.75%	0.75%	1.86	0.65%	5.40%	8.77%
PNY	PIEDMONT NATURAL GAS COMPANY	3.68%	3.25%	0.75%	2.17	0.88%	4.13%	7.81%
SJI	SOUTH JERSEY INDUSTRIES, INC.	2.85%	10.50%	1.15%	2.10	1.27%	11.77%	14.62%
SWX	SOUTHWEST GAS CORPORATION	2.24%	6.25%	2.65%	1.73	1.93%	8.18%	10.42%
WGL	WGL HOLDINGS, INC.	4.29%	3.25%	0.25%	1.68	0.17%	3.42%	7.71%
NATURAL GAS LDC AVERAGE								9.70%
AVERAGE OF WATER COMPANY AND GAS LDC								10.17%

Sources and Notes:

[1]: Rigsby Direct Schedule WAR - 2, column (A). [5]: [3] x ([4] - 1)

[2]: Rigsby Direct Schedule WAR - 4 page 1, column (A). [6]: [2] + [5].

[3]: Rigsby Direct Schedule WAR - 4 page 2, column (A). [7]: [1] + [6].

[4]: Rigsby Direct Schedule WAR - 4 page 2, column (B).

Schedule BV-R4

Summary of Historical and Current Value Line Betas

Companies in Value Line [1]	[2]	[3]	Beta as of 7/28/06 [4]	Beta as of 1/26/07 [5]
American States Water	*	*	0.75	0.80
Aqua America	*	*	0.80	0.90
California Water	*	*	0.80	0.90
Connecticut Water Services	*		0.80	0.90
Middlesex Water	*		0.80	0.85
SJW Corp	*		0.70	0.75
Southwest Water		*	0.70	0.90
York Water			0.45	0.55
Average			0.73	0.82
Chaves Sample Average			0.78	0.85
Rigsby Sample Average			0.76	0.88

Sources and Notes:

[1]: Companies in the Value Line Plus Edition Water Utility Universe.
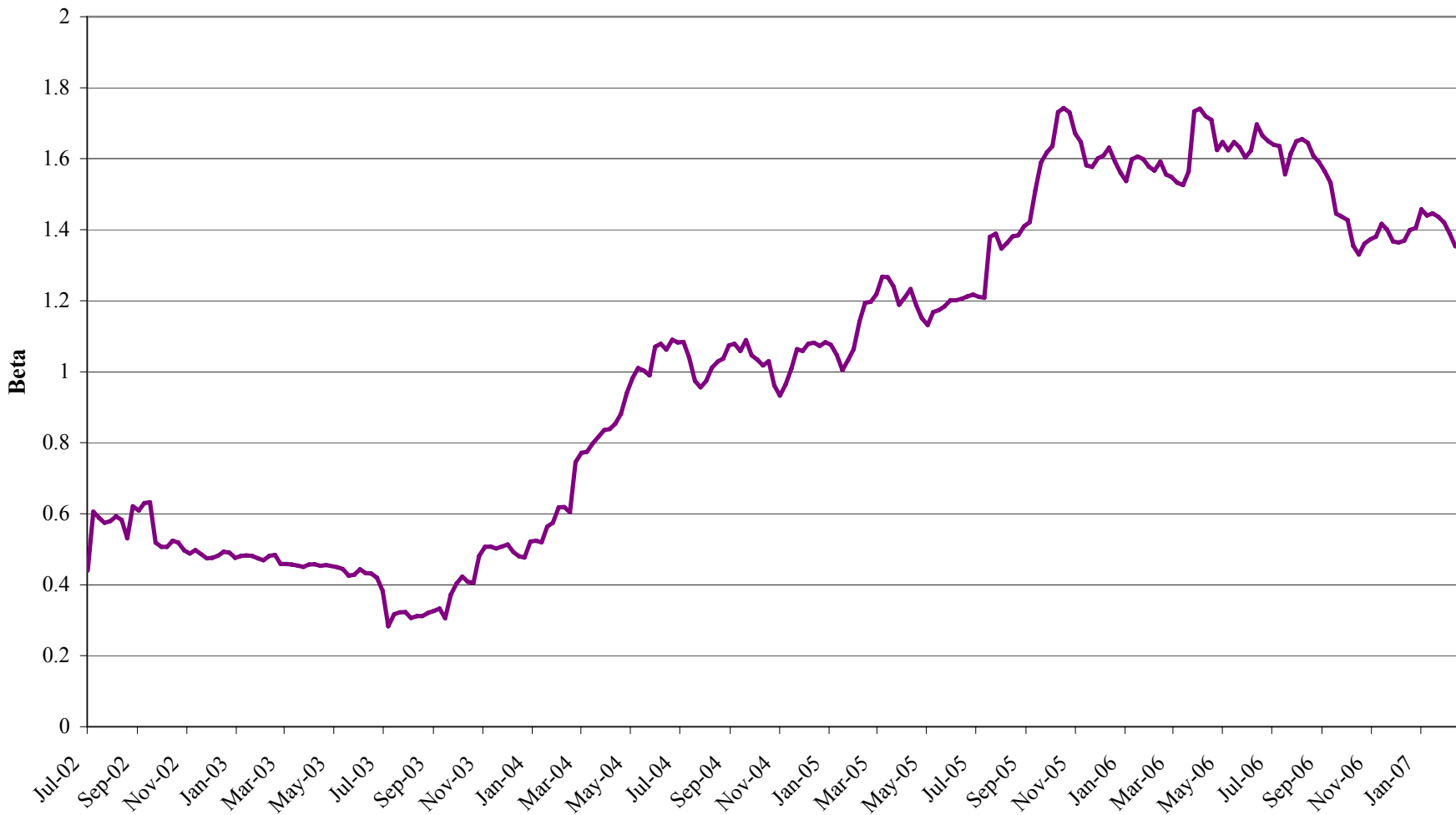
[2]: * if in the Chaves Sample.

[3]: * if in the Rigsby Sample.

[4]: Value Line Beta as of July 28, 2006.

[5]: Value Line Beta as of January 26, 2007.

Schedule BV-R5
52-Week Rolling Betas for the Water Utility Sample*
from July 2002 through March 2007

*Excludes Southwest Water due to non-statistically significant betas and York Water due to low trading volume.

Schedule BV-R6

Summary of Short-Term and Long-Term Risk-Free Rates

	1-Month [1]	20-Year [2]
January-06	4.12%	4.65%
February-06	4.38%	4.73%
March-06	4.55%	4.91%
April-06	4.61%	5.22%
May-06	4.70%	5.35%
June-06	4.71%	5.29%
July-06	4.90%	5.25%
August-06	5.16%	5.08%
September-06	4.77%	4.93%
October-06	4.97%	4.94%
November-06	5.21%	4.78%
December-06	4.87%	4.78%
January-07	4.94%	4.95%
February-07	5.18%	4.93%
March-07	5.21%	4.81%

Sources and Notes:

[1], [2]: St. Louis Federal Reserve Bank,
    Treasury Constant Maturity Series.