

STATE OF ALASKA

THE REGULATORY COMMISSION OF ALASKA

Before Commissioners:

Robert M. Pickett,  
Chair  
Paul F. Lisankie  
T. W. Patch  
Norman Rokeberg  
Janis W. Wilson

In the Matter of the Tariff Revision  
Designated as TA148-122, filed by  
MUNICIPALITY OF ANCHORAGE  
d/b/a ANCHORAGE WATER AND  
WASTEWATER UTILITY, for its  
Water Utility, for Interim and  
Permanent Rate Relief

U-13-201

In the Matter of the Tariff Revision  
Designated as TA147-126, filed by  
MUNICIPALITY OF ANCHORAGE  
d/b/a ANCHORAGE WATER AND  
WASTEWATER UTILITY, for its  
Wastewater Utility, for Interim and  
Permanent Rate Relief

U-13-202

PRE-FILED SUPPLEMENTAL DIRECT  
TESTIMONY OF BENTE VILLADSEN

September 19, 2014

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EXHIBIT BV-1: Resume of Dr. Bente Villadsen

EXHIBIT BV-2: Revised Cost of Equity Estimates

EXHIBIT BV-3: Market Value Equity Percentage

EXHIBIT BV-4: Asset Size for Sample, AWU and ASU

EXHIBIT BV-5: Technical Details of the Multi-Stage DCF Model

EXHIBIT BV-6: Percentage of CIAC to Plant-in-Service

1 **I. INTRODUCTION AND SUMMARY**

2 **Q1. Please state your name, occupation and business address.**

3 A. My name is Bente Villadsen and I am a principal at The Brattle Group (Brattle). My  
4 business address is The Brattle Group, 44 Brattle Street, Cambridge, MA 02138,  
5 USA.

6 **Q2. Please summarize your background as it pertains to this matter.**

7 A. I have more than 15 years of experience consulting on regulatory finance for  
8 regulated infrastructure companies in the electric, natural gas, railroad, water and  
9 wastewater industries. I have provided expert reports and testified on cost of capital  
10 in many jurisdictions including state regulatory settings, Bonneville Power Authority,  
11 Surface Transportation Board, U.S. and international arbitrations, U.S. federal court,  
12 and in Australia, Canada, Italy, and the Netherlands. This work has pertained to  
13 electric utilities, pipelines, railroads, telecommunications, water utilities and  
14 wastewater utilities. Examples of my recent cost of capital work include reports or  
15 testimony on the cost of capital methodology for Australian pipelines before the  
16 Australian Energy Regulator, and cost of equity for regulated U.S. water utilities and  
17 a Canadian pipeline in arbitration. In connection with a tax matter before U.S. federal  
18 court, I testified on the cost of capital for infrastructure owned by municipal and state  
19 entities. I am an instructor at Edison Electric Institute's Advanced Rate School  
20 teaching "Current Issues in Cost of Capital" and a frequent speaker on regulatory  
21 finance and regulation. I hold a Ph.D. from Yale University and joint MS and BS

1 degrees in mathematics and economics from University of Aarhus, Denmark. My  
2 full resume is attached to this testimony.

3 **Q3. What is the purpose of your supplemental testimony?**

4 A. I have been asked by Anchorage Water & Wastewater Utility (AWWU) to review the  
5 pre-filed direct testimony of Dr. Thomas M. Zepp (Zepp Testimony) on behalf of  
6 AWWU as well other materials filed in this docket and to (i) provide a  
7 recommendation regarding the reasonableness of the recommendations of the Zepp  
8 Testimony regarding the return on equity (ROE) and capital structure and (ii)  
9 comment on any issues in the Zepp Testimony, where I might have performed a  
10 different or supplemental analysis.

11 **Q4. Did you previously file direct testimony in this case?**

12 A. No. Direct testimony on cost of capital was filed by Dr. Thomas M. Zepp on behalf  
13 of AWWU. I adopt his recommended ROE of 10.9% and hypothetical capital  
14 structure (used for regulatory purposes) including 52% equity for both Anchorage  
15 Water Utility (AWU) and Anchorage Wastewater Utility (ASU) as of the date of  
16 filing.<sup>1</sup> In the remainder of this supplemental testimony I (i) summarize why the  
17 recommended ROE and capital structure is reasonable and (ii) comment on each  
18 method relied upon in the Zepp Testimony and discuss research I have undertaken to  
19 confirm the estimated ROE. Section II also points to areas where I would have done

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<sup>1</sup> For the purposes of this testimony, I have been asked to consider the appropriate cost of equity as of the time of the original filing in this docket; November 14, 2013.

1 a slightly different study even if the resulting ROE is the same. Finally, Section III  
2 discusses AWU and ASU risk characteristics and why the cost of equity for AWU  
3 and ASU is higher than that of the sample estimate. I have reviewed the prior work,  
4 including testimony and responses to data requests, sponsored by Dr. Zepp and other  
5 than as explicitly stated in this supplemental testimony, I adopt all of Dr. Zepp's  
6 prepared direct testimony filed in these dockets. I also adopt AWWU's responses to  
7 discovery requests on Dr. Zepp's direct testimony except the responses to questions  
8 about whether and where Dr. Zepp's recommendations have been accepted or  
9 adopted by a regulatory agency or court. I have not made an exhaustive study of the  
10 rulings throughout Dr. Zepp's career.

11 **Q5. What are your views on Dr. Zepp's Pre-Filed Direct Testimony and**  
12 **recommendations?**

13 A. Dr. Zepp finds that the estimated return on equity for a sample of water utilities as of  
14 November 2013 was in the range of 9.9% to 10.8% and that AWU and ASU at 52%  
15 equity require an ROE that is at least 50 basis points higher than the ROE estimated  
16 for the sample, for a final range of 10.4% to 11.3%. The reasons for the addition of  
17 50 basis points are that the utilities are smaller size, have higher risks as discussed by  
18 Dr. Zepp, and historically have had difficulty earning the allowed ROE. In addition,  
19 the sample ROE was estimated using market data that are based on a market value  
20 capital structure with a five-year average equity of 60.7% (and an average of about

1           66.1% for 2013).<sup>2</sup> I.e., the regulated utilities, AWU and ASU, have higher leverage  
2           and thus higher financial risk than what is reflected in the cost of equity estimates.  
3           I also find the use of a hypothetical capital structure including 52% equity reasonable  
4           because the actual capital structure of AWU and ASU include unusually low equity  
5           percentages of 28-33% for AWU and 31%-34% for ASU during 2008 to 2012.<sup>3</sup> It is  
6           therefore necessary that the utilities be either allowed a “normalized” hypothetical  
7           capital structure or an unusually high ROE to ensure that the utilities have an  
8           opportunity to earn a reasonable return on equity and the ability to maintain a revenue  
9           bond debt coverage that allows the utilities to pay interest and principal on a timely  
10          schedule.<sup>4</sup> It is not uncommon in situations where the capital structure of the  
11          regulated entity is unusual to instead adjust the capital structure used in determining  
12          the revenue requirement.<sup>5</sup> To properly account for AWU and ASU’s higher financial  
13          and business risks I estimate a range of 10.1% to 11.9% but note that the range is  
14          wider than that of Dr. Zepp by a similar amount on both the downside and upside. I  
15          therefore consider Dr. Zepp’s range of 10.4% to 11.3% reasonable and find the  
16          midpoint of 10.9% to be a good point estimate.

17       **Q6. Please summarize your approach to determine whether an ROE of 10.9% and a**  
18       **capital structure including 52% equity is reasonable.**

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<sup>2</sup> See Exhibit BV-3 for details.

<sup>3</sup> Gibson Pre-filed Exhibit GJG-01 Page 50 and GJG-02 Page 50.

<sup>4</sup> See *Ibid.* for recent revenue bond coverage ratios.

<sup>5</sup> See, for example, FERC’s “Cost of Service Manual.”

1       A.     First and foremost, I reviewed the Zepp Testimony, considered the reasonableness of  
2             his approach, and compared the inputs to his models with those I commonly use.  
3             Second, I undertook diagnostic analyses to determine whether the estimated cost of  
4             equity was reasonable relative to estimates I would have determined as of November  
5             2013. Third, I combined my review of the Zepp Testimony and my diagnostic  
6             analyses to determine an appropriate range for AWU and ASU's cost of equity and  
7             capital structure.

8       **Q7. What is your overarching reaction to the Zepp Testimony's approach and**  
9       **conclusions?**

10       A.     Most cost of capital experts agree that there is a range of methods and models that are  
11             reasonable to use for the purpose of estimating the cost of equity for a regulated  
12             utility; including versions of the Discounted Cash Flow (DCF) model, the Capital  
13             Asset Pricing Model (CAPM), Risk Premium models, and possibly others. However,  
14             the exact version of the models and the implementation differ. Therefore, the key  
15             question is not whether I would have implemented a specific model in a different  
16             manner, but whether the overall results would have been in the same range and if my  
17             recommendation would have been the same. Having reviewed the Zepp Testimony  
18             and undertaken additional analysis, I conclude that I would have reached the same  
19             ROE and capital structure recommendation. I discuss the reasons for this conclusion  
20             in Section III.

1 **Q8. Please summarize the analysis and conclusions of the remainder of your testimony.**

2 A. Section II below provides a brief summary of the Zepp Testimony. Section III first  
3 reviews the sample selection in the Zepp Testimony and takes a second look at the  
4 recommended capital structure. I conclude that both are reasonable. Next, I look at  
5 the individual cost of equity estimates and comment on how reasonable the estimates  
6 are. The section then comments on the relative risk of AWU and ASU to assess how  
7 to place the utilities relative to the sample's cost of equity. Finally, Section IV  
8 concludes that the overall recommendations in the Zepp Testimony were reasonable.

9 **II. REVIEW OF THE ZEPP TESTIMONY METHODS AND INPUTS**

10 **A. SUMMARY OF THE ZEPP TESTIMONY AND PRELIMINARY DISCUSSION**

11 **Q9. Please summarize the recommendations of Dr. Zepp.**

12 A. Dr. Zepp estimates the ROE for AWU and ASU in three steps. First, Dr. Zepp  
13 estimates the ROE for 8 water utilities using several methods and market data.  
14 Second, Dr. Zepp assesses the risk of AWU and ASU relative to the sample and  
15 determines the associated company-specific risk premium. Third, Dr. Zepp  
16 recommends an allowed ROE of 10.9% and that AWU and ASU rely on a  
17 hypothetical capital structure comparable to the average book value capital structure  
18 of the sample companies.

19 **Q10. Do you agree with the three step approach taken by Dr. Zepp?**

20 A. Yes. It is common for cost of capital experts to rely on a sample of comparable  
21 companies to estimate the cost of equity for an industry. However, this is only a first



1 step in determining the cost of capital for a specific company, because any one  
2 company may face larger business or financial risks than the sample. Step two in Dr.  
3 Zepp's analysis assesses the risk of AWU and ASU relative to the sample. Finally,  
4 the allowed return on equity is determined as the allowed ROE multiplied by the  
5 equity component of rate base. Therefore, it is necessary to determine the appropriate  
6 capital structure for ratemaking purposes. This can be either an actual capital  
7 structure or a hypothetical capital structure, as recommended by Dr. Zepp. Because  
8 the cost of equity depends on the capital structure, the determination of the ROE and  
9 the ratemaking capital structure are linked.

10 **Q11. What are your thoughts on the Zepp Testimony's sample?**

11 A. The Zepp Testimony adopts a water utility sample from Value Line's group of water  
12 utilities. I have in the past adopted a group of water utilities and a group of gas  
13 distribution utilities when determining the cost of equity for water utilities, but the  
14 number of water utilities available for comparison have increased,<sup>6</sup> so that there now  
15 are 8 such utilities. I therefore find that using just a water sample and not including a  
16 gas distribution sample is reasonable.

17 Further, the *Value Line Investment Survey* follows 10 water utilities of which  
18 Consolidated Water Co. Ltd. only recently joined the group and primarily operates  
19 seawater desalination plants and water distribution systems in areas where potable

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<sup>6</sup> American Water became a fully publicly traded company in November 2009, so it now has 4-5 years of trading history. See American Water, "American Water Timeline."

1 water is scarce.<sup>7</sup> It is therefore not a water utility in the traditional sense. Further,  
2 Artesian Resources does not have a bond rating and also experiences limited trading  
3 of its stock.<sup>8</sup> Therefore, I agree with the Zepp Testimony's decision to exclude the  
4 company. Hence I adopt the Zepp Testimony's sample of 8 water utilities.

5 **Q12. Do you agree with the Zepp Testimony's recommended capital structure?**

6 A. Yes. I reviewed the data underlying the Zepp Testimony's Exhibit TMZ-02 p. 1 and  
7 agree that the average book value equity percentage among the 8 water utilities is  
8 approximately 52%. I also agree that it is a reasonable hypothetical capital structure  
9 for AWU and ASU.

10 **Q13. Please summarize the Zepp Testimony's cost of equity estimation methods and**  
11 **results.**

12 A. Having selected a sample of 8 water utilities, the Zepp Testimony estimates the cost  
13 of equity using the DCF model, the CAPM, and risk premium models. For each  
14 model, the Zepp testimony uses several versions or inputs to obtain a range. The  
15 Zepp Testimony then considers the risk of AWWU relative to the sample (i) using a  
16 company-specific risk analysis previously developed by Dr. Woolridge<sup>9</sup> and (ii)  
17 looking at the size of the utilities.<sup>10</sup> Based on the risks of AWWU, the Zepp  
18 Testimony adds 50 basis points to the raw estimates to assess the appropriate cost of

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<sup>7</sup> *Value Line Investment Survey*, "Consolidated Water," January 17, 2014.

<sup>8</sup> See Zepp Testimony pp. 22-23 and Artesian Resources 2013 10-K p. 11.

<sup>9</sup> Zepp Testimony Exhibit TMZ-02, p. 19.

<sup>10</sup> Zepp Testimony Exhibit TMZ-02, p. 14.

1 equity for AWU and ASU. A summary of the Zepp Testimony’s findings is in Table  
 2 1 below.

3 Based on the estimates for the sample and the risk characteristics of AWU and ASU,  
 4 the Zepp Testimony recommends an ROE of 10.9% for both AWU and ASU.

**Table 1: Dr. Zepp’s ROE Estimates and Recommended ROE<sup>11</sup>**

	Benchmark Estimate			Estimate for AWU and ASU		
<i>DCF Analysis</i>	9.6%			10.1%		
Using Analysts' Forecast	9.4%			9.9%		
Using Value Line	9.8%			10.3%		
<i>CAPM</i>	10.6%			11.1%		
Using Long-Term MRP	9.7%			10.2%		
Using Recent MRP	11.5%			12.0%		
<i>Risk Premium Range</i>	10.6%	-	11.1%	11.1%	-	11.6%
<i>Using Authorized Returns</i>						
5 year average			10.9%			11.4%
10 year average	10.4%			10.9%		
<i>Using Forecasted Returns</i>						
5 year average			12.1%			12.6%
10 year average	11.1%			11.6%		
<i>Current Estimate</i>		10.3%			10.8%	
<b>Range</b>	<b>9.9%</b>		<b>10.8%</b>	<b>10.4%</b>	<b>-</b>	<b>11.3%</b>
<b>Recommended ROE</b>						<b>10.9%</b>

5 I note preliminarily that the recommended ROE of 10.9% is close to the upper end of  
 6 the range estimated for the benchmark sample.

7 **Q14. Please explain why AWU and ASU command a higher cost of equity than the**  
 8 **benchmark sample.**

<sup>11</sup> Zepp Testimony Exhibit TMZ-02, p. 20.

1 A. There are at least three reasons why AWU and ASU require a higher cost of equity  
2 than the benchmark sample. I agree with Dr. Zepp that because of (i) the utilities'  
3 smaller size and (ii) higher relative risk, the utilities' cost of equity is higher than that  
4 estimated for the benchmark sample. In addition, I also note that (iii) the benchmark  
5 estimates are determined using market data (except for the risk premium estimate that  
6 uses authorized returns), which had substantially more than 52% equity.<sup>12</sup> Therefore,  
7 AWU and ASU at their hypothetical capital structure face more financial risk than  
8 what is reflected in the benchmark sample estimates. I discuss these three reasons in  
9 Section III.

10 **B. DISCOUNTED CASH FLOW ANALYSIS**

11 **Q15. Please comment on the Zepp Testimony's DCF analysis.**

12 A. The Zepp Testimony estimates the DCF cost of equity using the formula:

13 
$$\text{CoE} = D_0 (1 + 0.5 \times g) / P_0 + g \tag{1}$$

14 Where CoE is the estimated Cost of Equity,  $D_0$  is the current dividend,  $P_0$  is the  
15 current price and  $g$  is the growth rate. Thus,  $D_1 = D_0 (1 + 0.5 \times g)$  is the forecasted  
16 dividend and  $D_1 / P_0$  is the dividend yield. The Zepp Testimony obtains the growth  
17 rate from analysts' forecasts or Value Line and estimates the dividend yield using  
18 either 6 or 12 months of data.<sup>13</sup> I understand that the calculation of the current

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<sup>12</sup> See Exhibit BV-3 for details.

<sup>13</sup> Zepp Testimony Exhibit TMZ-02, pp. 8-9.

1 dividend yield follows the Commission's Order No. 10 in dockets U-08-157/U-08-  
2 158 ("Order No. 10") and relies on analysts' forecasts as does the order.<sup>14</sup>

3 Like the Zepp Testimony and Order No. 10, I usually rely on analysts' forecasts and  
4 the Value Line growth forecast to determine the relevant growth rate. I usually apply  
5 the full growth rate rather than  $\frac{1}{2}$  of the growth rate to the current dividend to  
6 determine the forecasted dividend and commonly estimate both the single-stage DCF  
7 model in formula (1) above and a multi-stage DCF model.<sup>15</sup>

8 **Q16. Do you apply the full growth rate to determine the dividend yield in the first period**  
9 **in your multi-stage DCF?**

10 A. Yes. There are two reasons for this. First, my multi-stage DCF model is a quarterly  
11 model that uses  $\frac{1}{4}$  of the annual growth rate each period and the most up-to-date  
12 dividend information. Therefore, it is logical that for each future period, dividends  
13 will grow by the quarterly growth rate. Should information about the next quarter's  
14 dividend be available I use the forward-looking information instead of the current  
15 dividend increased by the quarterly growth rate. Thus, the data are more  
16 contemporaneous than in an annual model and the fact that "firms tend to announce  
17 changes in dividends at different times during the year"<sup>16</sup> is of no consequence.  
18 Second, the DCF model is derived under the assumption that the growth rate is

---

<sup>14</sup> U-08-157(10)/U-08-158(10), pp. 37-38.

<sup>15</sup> Finally, I note that I reviewed the growth rate estimates, price and dividend information and found that while I commonly use a shorter period to estimate the dividend yield, there is nothing unusual in using 6 months to determine the dividend yield (FERC uses that horizon).

<sup>16</sup> U-08-157(10)/U-08-158(10) p. 38.

1 applied in full each period, so that the adjustment by 0.5 is ad hoc. However, because  
2 it is the method endorsed in Order No. 10, I rely on the method in the traditional DCF  
3 model but not in the multi-stage DCF model, where known changes in dividends are  
4 already reflected.

5 **Q17. Please explain the multi-stage DCF model**

6 A. There are many variations on the multi-stage DCF model. However, I commonly use  
7 a version that has three stages, where the stages are characterized by the growth rate  
8 relied upon. As is common, I rely on analysts' forecasts in stage 1, which lasts 5  
9 years, and a generic GDP growth rate in Stage 3, which starts in year 11. Stage 2  
10 starts in year 6 and ends in year 10. During those years, the growth rate relied upon  
11 converges linearly from the company-specific estimate analysts provide to the generic  
12 GDP growth. In addition, I usually use a version that incorporates quarterly dividend  
13 payments and thus relies on quarterly growth rates. The details of the model are  
14 presented in Exhibit BV-5. The advantage of this model is that it allows for growth  
15 rates to vary over time and incorporate both the near-term company specific growth  
16 as well as a long-term GDP growth. Specifically, I consider a variant of the multi-  
17 stage DCF model that uses the companies' individual growth rates during the first  
18 five years (20 quarters), which is consistent with the horizon over which analysts  
19 forecast growth. The growth rates then converge towards the long-term GDP growth  
20 over years 6-10 (quarter 21-40) and reaches an equilibrium growth assumed equal to

1 the long-term GDP growth in year 11. The multi-stage DCF model is described in  
2 more detail in Exhibit BV-5.<sup>17</sup>

3 **Q18. What are the results from your implementation of the multi-stage DCF?**

4 A. Using the consensus forecasted long-term GDP growth rate as of November 2013 of  
5 approximately 4.5%, the multi-stage DCF model would result in an estimated cost of  
6 equity of 8% for the sample companies as of November 2013 before any adjustments  
7 for utility-specific risks or financial leverage. This estimate is substantially below  
8 other estimates, but combined with Dr. Zepp's lowest estimate of 9.4%, the low end  
9 for the DCF estimates is best approximated by the average of the two estimates, or  
10 approximately 8.7%. I also note that I consider the standard DCF to be on the low  
11 side because it reflects only ½ of the growth rate in year one. Regardless, I consider  
12 an appropriate range for the DCF estimates for the sample to be approximately 8.7%  
13 to 9.8% before any considerations of financial risk or company-specific issues.<sup>18</sup>

14 **Q19. What adjustments should be considered for AWU and ASU?**

15 A. There are two types of adjustments that should be considered. First, the cost of equity  
16 estimate for the sample relies on market data and hence the market value capital

---

<sup>17</sup> For a textbook exposition of this model, see R. A. Brealey, S. C. Myers and F. Allen (2013), *Principles of Corporate Finance*, 11<sup>th</sup> Ed., McGraw-Hill Irwin, 2013, Ch. 16. Other multi-stage DCF models incorporate shorter or longer stages and rely on total cash flow to shareholders rather than dividends. This is true of, for example, the Surface Transportation Boards implementation of the model for determination of the return on equity for railroads. See, for example, STB Ex Parte No. 664 (Sub-No. 1), Decided January 23, 2009 and Verified Statement of Bente Villadsen in Docket No. EP 664 (Sub-No. 2), filed with the Surface Transportation Board September 5, 2014.

<sup>18</sup> Exhibit BV-2.

1 structure; for 2013 the average was approximately 66.1%.<sup>19</sup> In contrast, the allowed  
2 ROE for AWU and ASU will use the hypothetical capital structure of 52% equity, so  
3 the hypothetical capital structure has larger financial risk. Second, any risks specific  
4 to AWU or ASU that makes the sample more or less risky should be considered.

5 **Q20. Please explain your first point regarding the financial risk and how your approach**  
6 **differs from that of Dr. Zepp.**

7 A. I generally consider the impact of financial risk differences between the target utility  
8 (AWU and ASU) and the sample relied upon explicitly. This is part of my standard  
9 practice and important because cost of equity estimates such as the DCF model and  
10 Capital Asset Pricing model rely on market data. I acknowledge that the Zepp  
11 Testimony a Q/A 67 took a different approach and recommended AWU and ASU  
12 rely on the book value capital structure of the sample and no adjustment for financial  
13 risk be made.<sup>20</sup> However, this adjustment only takes the difference in the accounting  
14 measure of book equity into account and not the fact that all market based estimation  
15 methods rely on market data (and hence the market value capital structures), which is  
16 key for investors.<sup>21</sup> Dr. Zepp also acknowledges that

---

<sup>19</sup> See Exhibit BV-3. For the purpose of determining the market value capital structure as of the time of filing, I used the average capital structure for the beginning of 2013 (end of 2012) and Q3, 2013 to be conservative.

<sup>20</sup> This position is also reflected in Bell Pre-Filed Direct Q/A 51 and Gibson Pre-Filed Direct Q/A 39.

<sup>21</sup> Richard A. Brealey, Stewart C. Myers, and Franklin Allen, Principles of Corporate Finance, 9<sup>th</sup> edition, 2008, pp. 530-533.



1 It appears the smaller companies offset higher business risk of being small  
2 by reducing financial risk. This result suggests it is prudent for small  
3 utilities to have thicker equity ratios than larger utilities.<sup>22</sup>  
4

5 Thus, the Zepp Testimony recognizes a relationship between financial risk and size-  
6 related risks. I agree with Dr. Zepp and therefore merely take a different approach to  
7 assess the overall risk of AWU and ASU. As discussed below, I agree that AWU and  
8 ASU have larger risk due to their smaller size, but my ultimate recommendation on  
9 the ROE stays within the bands determined by adjusting for financial risk; i.e., to be  
10 conservative I do not adjust for both financial risk and size. Dr. Zepp chooses to  
11 adjust for the utilities' smaller size but does not adjust for financial risk. Thus,  
12 neither Dr. Zepp nor I adjust for both factors.

13 I note that, for example, the Florida Public Service Commission has acknowledged  
14 the importance of considering financial risk and uses the following formula to  
15 determine the impact for water utilities:<sup>23</sup>

16  
17 
$$\text{ROE}_{\text{TARGET}} = (\text{Estimated ROE})_{\text{Sample}} + 1.610 / (\text{Equity Ratio})_{\text{Target}} \quad (2)$$
  
18

19 This formula captures the essence of my standard consideration of financial leverage,  
20 where I determine the After-Tax Weighted-Average Cost of Capital and ensure that  
21 the target utility's ROE is such that the average cost of capital is the same for the  
22 target and the sample. Mathematically,

23 
$$\text{ATWACC} = \text{CoE} \times \text{E}\% + \text{CoD} \times \text{D}\% \times (1 - \text{tax rate}) \quad (3)$$

---

<sup>22</sup> Zepp Testimony p. 55.

<sup>23</sup> Florida Public Service Commission, Order No. PSC-11-0287-PAA-WS p. 2.

1  
2 where CoE denotes the estimated Cost of Equity, E% is the market value equity  
3 percentage in the capital structure, CoD is the Cost of Debt and D% is the market  
4 value debt percentage in the capital structure.<sup>24</sup>

5 Equation (3) is used to determine the weighted-average cost of capital for the  
6 benchmark sample. This benchmark weighted average cost of capital can then be  
7 expressed as a cost of equity for a specific utility using the formula:

8  
9 
$$\text{CoE}_{\text{Target}} = (\text{ATWACC} - \text{CoD}_{\text{Target}} \times \text{D}\%_{\text{Target}} \times (1 - \text{tax rate})) / \text{E}\%_{\text{Target}} \quad (4)$$

10  
11 where the  $\text{CoD}_{\text{Target}}$  is the market cost of debt for the target entity (e.g., the yield on A  
12 rated utility bonds).

13 Exhibit BV-2 shows that the financial risk imposed on AWU and ASU at a capital  
14 structure with 52% equity requires a compensation of no less than 100 basis points  
15 and provides a DCF cost of equity estimate of 10.3% to 11.7% for a utility with 52%  
16 equity.<sup>25</sup>

17 The impact of AWU and ASU's smaller size and company-specific risks are  
18 considered in Section III.

19 **Q21. What are your conclusions regarding the DCF estimates for the cost of equity?**

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<sup>24</sup> See, for example, R. A. Brealey, S. C. Myers and F. Allen (2013), *Principles of Corporate Finance*, 11<sup>th</sup> Ed., McGraw-Hill Irwin, 2013, Ch. 19 for an exposition.

<sup>25</sup> I note that an alternative uses the so-called Hamada adjustment, which lever and unlever betas to obtain a measure of the inherent financial risk. For a discussion of this method, see, for example, R.S. Hamada, "Portfolio Analysis, Market Equilibrium, and Corporate Finance," *Journal of Finance* 24, 1969

1 A. In summary, I modify the Zepp Testimony's DCF estimates for a generic water utility  
2 with 52% equity to be 10.3% to 11.7%.

3 **C. CAPITAL ASSET PRICING MODEL**

4 **Q22. Please comment on the Zepp Testimony's CAPM analysis.**

5 A. The Zepp Testimony estimates the CAPM cost of equity using the formula:

6 
$$\text{CoE} = R_f + \beta \times \text{MRP} \quad (5)$$

7 Where the CoE is the estimated Cost of Equity while  $R_f$  denotes the risk-free rate,  $\beta$   
8 measures the security's systematic risk and MRP is the Market Risk Premium (MRP).  
9 The Zepp Testimony obtains its estimated risk-free rate by averaging the forecasted  
10 risk-free rate from Blue Chip Economic Indicators and Value Line. Beta estimates  
11 for the sample companies are obtained from Value Line and the Zepp Testimony uses  
12 Ibbotson's beta estimates for low and micro-cap companies to adjust the average beta  
13 for AWWU's smaller size. Finally, the Zepp Testimony uses two versions of the  
14 MRP – the long-term historical average as calculated by Ibbotson and a forecasted,  
15 contemporaneous MRP based on Value Line.<sup>26</sup>

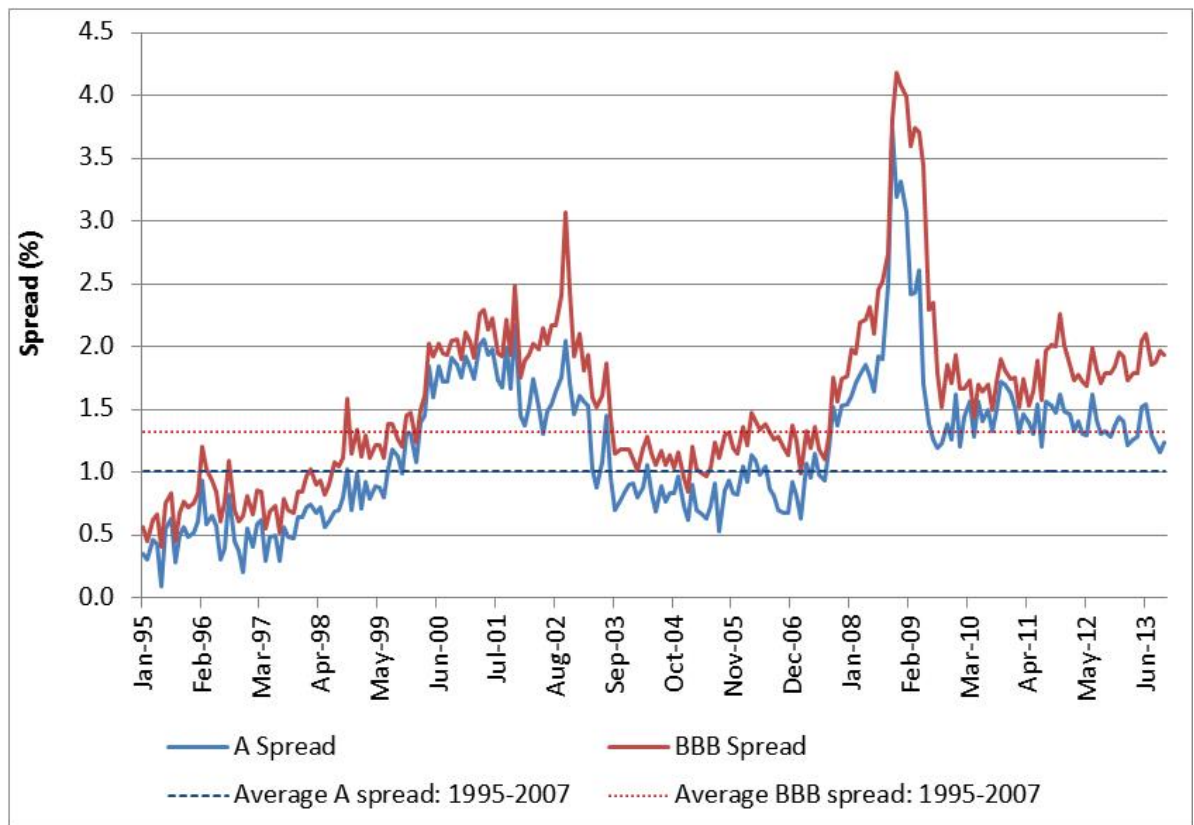
16 I agree with the Zepp Testimony that the contemporaneous risk-free rate is downward  
17 biased due to monetary policy and that the MRP was understated by the historical  
18 average MRP due to the financial crisis as of 2009 and its consequences. This is  
19 illustrated in Figure 1 below, which shows that the spread between the yield on utility  
20 and government bond with the same maturity was wider towards the end of 2013 than

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<sup>26</sup> Zepp Testimony, Exhibit TMZ-02, pp. 11-15.

1 has historically been the case. This indicates that the cost of capital for utilities  
2 cannot adequately be determined using the current risk-free rate and the historical risk  
3 premium.<sup>27</sup>

4 **Figure 1: Spread Between 20-Year Utility and Government Bond Yields (%)**



5  
6  
7 Figure 1 above illustrates that the yield spread at the time of filing was higher than  
8 usual. This is important because an increase in the yield spread indicates an increase  
9 in the cost of capital faced by utilities. Investors select investments based on their  
10 risk preferences and the fact that the spread between utility bond yields and

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<sup>27</sup> For a recent exposition of why the market risk premium is higher than in the past, see Fernando Duarte and Carlo Rosa, "The Equity Risk Premium: A Consensus of Models," Federal Reserve Bank of New York, 2014.

1 government bond yields were higher than usual is an indication that investors require  
2 a higher than usual risk premium to hold utility bonds. As bonds are less risky than  
3 equity, the equity also requires a higher than usual risk premium. The magnitude of  
4 the risk premium can be assessed using a forward-looking approach to estimate the  
5 MRP. The Zepp Testimony used Value Line data to determine a forward-looking  
6 MRP of approximately 8.97%.<sup>28</sup> I checked this figure against Bloomberg's estimate  
7 for January through October 2013, which ranged from 7.2% to 8.9%, so Dr. Zepp's  
8 estimate is near the range of what other sources estimate. The lower end of Dr.  
9 Zepp's MRP is the historical average MRP as reported by Ibbotson Associates, which  
10 is a common source for the MRP.<sup>29</sup>

11 Regarding the Zepp Testimony's beta estimate, I consider it reasonable and  
12 commonly use Value Line betas in my CAPM analysis. However, to be conservative,  
13 I considered the impact of using the average beta of .70 rather than the micro beta of  
14 .8.<sup>30</sup> Using a beta of .7 in combination with a risk-free rate of 4.33% and a MRP of  
15 6.7% and 8.97% would result in a raw CAPM cost of equity estimate 9.0% to 10.6%  
16 before considering financial risk.<sup>31</sup> Once financial risk is considered, the estimates  
17 range from 10.1% to 11.9%<sup>32</sup> before considering the utilities' smaller size or

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<sup>28</sup> Zepp Testimony, Exhibit TMZ-02, p. 15.

<sup>29</sup> Morningstar, Ibbotson 2013 SBBI Valuation Yearbook, p 54.

<sup>30</sup> See also the discussion in Q/A 20 above.

<sup>31</sup> Exhibit BV-2, p. 2.

<sup>32</sup> Exhibit BV-2, p. 1.

1 company-specific risks. As a result, I consider the Zepp Testimony's approach and  
2 recommended CAPM reasonable.<sup>33</sup>

3 **D. RISK PREMIUM MODEL**

4 **Q23. What comments do you have on the Zepp Testimony's risk premium analysis?**

5 A. The Zepp Testimony estimates three versions of the risk premium model. First, the  
6 historical risk premium is determined as the difference between the allowed ROE for  
7 water utilities and 30-year treasury bonds. Over 10 or 5 years, this method results in  
8 a cost of equity estimate of 10.4 to 10.9%. Second, the historical risk premium is  
9 determined as the difference between the estimated cost of equity using a DCF  
10 approach and the 30-year Treasury bond yield. This results in a ROE estimate of 11.1  
11 to 12.1% over the most recent 10 or 5 years. Finally, the Zepp Testimony determines  
12 the current risk premium using a statistical regression analysis resulting in the risk  
13 premium being determined as

14 
$$\text{Risk Premium} = 7.8\% - .43 \times 30\text{-year Treasury Rate} \quad (6)$$

15 As the forecasted risk-free rate is 4.33%, the resulting cost of equity is 10.3%. There  
16 are many ways in which a risk premium approach can be implemented, but I believe  
17 the Zepp Testimony has reasonably spanned the range of plausible estimates. While I  
18 commonly do not implement a risk premium model, I do look to the relationship

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<sup>33</sup> I often rely on the so-called Empirical CAPM when estimating the cost of equity. This specification takes into account the empirical observation that empirically the CAPM understates the cost of equity for companies with a beta below one. Therefore, the Empirical CAPM adds an amount,  $\alpha$ , to the risk-free rate and subtracts the same amount from the market risk premium. The impact in this case would be a small increase in the estimated cost of equity. I shall ignore this model in this proceeding because I am relying on a forward-looking risk-free rate and consider a range of MRPs.

1 between allowed ROEs and a benchmark government bond yield (and/or a utility  
2 bond yield) as information about the appropriate ROE. While I don't have any issues  
3 with the implementation of the risk premium models, I do consider the combined last  
4 five years of a DCF approach being a bit unrepresentative as it overlaps the financial  
5 crisis. I therefore adopt Dr. Zepp's range for the risk premium model but ignore the  
6 results from the DCF model over the last five years. Exhibit BV-2 shows that at 52%  
7 equity the risk premium models result in an ROE range of 11.9% to 12.5%.

#### 8 **E. SUMMARY CONCLUSIONS ON COST OF EQUITY ESTIMATES**

##### 9 **Q24. Do you have any other comments on the estimates?**

10 A. Yes. I noted above that the implementation of the multi-stage DCF model results in  
11 very low estimates that are unreasonable compared to other estimates. Similarly, the  
12 risk premium model that relies on the most recent 5 years of data from DCF estimates  
13 provides a very high figure relative to other estimates.<sup>34</sup> It is therefore reasonable to  
14 ignore the estimates from these models so that neither the highest nor the lowest raw  
15 estimate is considered. Therefore, the relevant range becomes 10.1% to 11.9% before  
16 considering AWU or ASU specific risks.

##### 17 **Q25. What do you conclude from the discussion above?**

18 A. Having reviewed each of the cost of equity estimates in the Zepp Testimony and  
19 performed my own analysis, my range of estimates for a generic water utility spans  
20 the range the Zepp Testimony suggests for AWU and ASU. I also note that the

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<sup>34</sup> Exhibit BV-5 p. 3 and Zepp Testimony, Exhibit TMZ-02, p. 17, 5-year average.

1 midpoint of my two lowest reliable estimates is 10.65% and the midpoint of my three  
2 highest reliable estimates is 11.8% adjusted for financial risk.<sup>35</sup> This is consistent  
3 albeit slightly higher than the findings of the Zepp Testimony. I also agree with the  
4 Zepp Testimony that it is necessary to consider (i) AWWU's smaller size and (ii)  
5 company-specific risks.

6 I discussed the plausible adjustment for financial risk differences above and consider  
7 AWU and ASU's size as well as other risk factors in Section III below.

### 8 III. AWU AND ASU RISKS

#### 9 Q26. What are the risks factors for AWWU?

10 A. First, while there is no market capitalization available for AWWU, the book value of  
11 assets is approximately \$562 to \$558 million for AWU and approximately \$382 to  
12 \$399 million for ASU for 2011-12.<sup>36</sup> In comparison, the average asset size for the  
13 sample over the same period exceeds \$3 billion.<sup>37</sup> Thus, AWU and ASU are smaller  
14 than the average sample company albeit comparable to the smallest entities.

15 Second, AWU and ASU have been unable to earn their allowed ROE since 2008.<sup>38</sup> I  
16 understand that the utilities recently have been granted additional riders and trackers

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<sup>35</sup> Prior to any adjustment for financial risk the range is 9.2% to 10.2% while Dr. Zepp's estimates, which are already adjusted for micro betas, obtain a range of 9.9% to 10.8%.

<sup>36</sup> Gibson Pre-filed Direct Exhibit GJG-01 Page 18 and GJG-02 Page 18.

<sup>37</sup> See Exhibit BV-4.

<sup>38</sup> Zepp Testimony, Exhibit TMZ-02, p. 19 and Gibson Pre-filed Direct Exhibit GJG-01 Page 50 and GJG-02 Page 50.



1 that may offset regulatory lag pertaining to infrastructure investments.<sup>39</sup> Therefore,  
2 the historical performance may not be indicative of future performance.

3 Third, AWU and ASU have a very large portion of their assets financed by  
4 Contributions In Aid of Construction (CIAC).<sup>40</sup> The presence of a large CIAC has  
5 two effects. As AWU and ASU do not earn a return on these funds, they have larger  
6 than usual operating risks; in essence, the utilities are responsible for fixed costs over  
7 and above what they earn a return on. Therefore, the exposure to asset-related risks is  
8 larger than what is reflected in the rate making process. Further, as the funds are  
9 being replaced by utility provided funds, the utilities face financing risks.

10 Third, the impact of financial risk was discussed above and the figures displayed in  
11 Exhibit BV-2 takes into account the financial risk of AWU and ASU. Therefore, I  
12 shall not discuss this further in this section.

13 **Q27. Please discuss the impact of AWU and ASU being small size.**

14 A. The size of AWU and ASU is such that they fall in the micro or small category as  
15 defined by, for example, Ibbotson Associates.<sup>41</sup> Empirically, investors have required  
16 a higher premium to invest in smaller companies than in larger ones. For example,  
17 Morningstar / Ibbotson data indicate that small-cap companies (\$514 - \$1,909 million  
18 in market capitalization) on average have a return on equity that is 1.63% higher than  
19 that of large companies and micro-cap companies have a return that is 2.80% higher

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<sup>39</sup> 3 AAC 52 Amendment: Article 9. Plant Replacement and Improvement Surcharge Mechanism, June 29, 2014 (<http://aws.state.ak.us/OnlinePublicNotices/Notices/Attachment.aspx?id=95760>)

<sup>40</sup> Gibson Pre-filed Direct Exhibit GJG-01 Page 42 and GJG-02 Page 42.

<sup>41</sup> Morningstar / Ibbotson, 2013 Classic Yearbook, p. 293-294.

1 than that of larger companies.<sup>42</sup> Therefore, empirical evidence suggests that investors  
2 in small-cap companies require a higher return than do investors in larger or mid-cap  
3 companies. The magnitude of the additional return required for micro-cap over  
4 small-cap companies can therefore be approximated by 1.17% (2.80% - 1.63%) as  
5 stated by Dr. Zepp.<sup>43</sup> As some of the companies relied upon to assess the sample's  
6 cost of equity also are micro-cap, an adjustment of approximately half of the  
7 empirical difference between small and mid-cap companies is reasonable. I.e., an  
8 adjustment of upward 50 basis points to a raw cost of equity estimate is reasonable.

9 **Q28. What are the implications of AWU and ASU being unable to earn their allowed**  
10 **ROE?**

11 A. As shown in the Zepp Testimony and AWU and ASU's audited financial statements  
12 (attached to Gibson Pre-filed Direct), the utilities have not earned their allowed ROE  
13 for at least 6 years. This indicates that there has been an asymmetry between over-  
14 and under-earning. I.e., the utilities could not expect to earn their allowed ROE on  
15 average. Thus, if the allowed ROE is set at the utilities fair cost of capital, they  
16 cannot expect to earn it. Because of the recent initiatives to ensure early recovery of  
17 infrastructure investments, I do not suggest any additional adjustment to the estimated  
18 ROE at this point in time.

19 **Q29. Please summarize the impact of a large CIAC amount on the utilities' risk.**

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<sup>42</sup> Morningstar / Ibbotson, 2013 Classic Yearbook, p. 96.

<sup>43</sup> Zepp Testimony, Exhibit TMZ-02, p. 3.

1       A.     As can be seen from AWU and ASU's audited financial statements, the utilities have  
2             a very large amount of CIAC relative to total assets. As of year-end 2011 and 2012,  
3             AWU had net CIAC of about \$234 million and \$231 million, respectively. In  
4             comparison, total assets were \$562 million and \$558 million, respectively, so CIAC  
5             constitutes about 40% of assets over 45% of Plant-in-Service.<sup>44</sup> Similarly, ASU had  
6             \$169 million and \$171 million in CIAC for 2011 and 2012 while assets were \$382  
7             million and \$399 million, respectively. Thus, CIAC was in excess of 40% of assets  
8             and more than 48% of Plant-in-Service in both 2011 and 2012.<sup>45</sup> These are very large  
9             figures that expose AWU and ASU to a larger than usual operating leverage meaning  
10            that fixed operating costs is large relative to the utilities' rate base.

11   **Q30. What conclusions do you draw from the discussion above?**

12       A.     There are several reasons why AWU and ASU have a higher level of risk than the  
13             comparable companies. It is important to recognize the relative risk of the targeted  
14             entity (AWU and ASU) versus that of the sample companies used to determine the  
15             ROE. Because the utilities are more risky along several dimensions, I find that AWU  
16             and ASU should be placed in the upper end of the reasonable range having adjusted  
17             for financial leverage or viewed alternatively that at about 100 basis points should be  
18             added to the unadjusted ROE estimates.

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<sup>44</sup> Gibson Pre-filed Direct Exhibit GJG-01 Page 18 and Page 42 and Exhibit BV-6.

<sup>45</sup> Gibson Pre-filed Direct Exhibit GJG-02 Page 18 and Page 42 and Exhibit BV-6.

1 **IV. OTHER COMMENTS**

2 **Q31. Did you review the submitted responses to data requests in this filing?**

3 A. Yes.

4 **Q32. What comments do you have on the data responses submitted by Dr. Zepp?**

5 A. Several of data requests and responses evolve around Dr. Zepp’s prior filing, filings  
6 of others in those filings, and decisions / orders / settlements in those proceedings.  
7 This is particularly true for AG 2-1, AG 2-2, AG 2-3, AG 2-4, AG 7-5, AG 7-8 (c)  
8 and (d), AG 7-9, AG 7-10, AG 7-11, and AG 8-1. Those data requests I have no  
9 specific insights into and thus cannot speak to.

10 As for other data responses, I have a few comments on AG 2-14, AG 2-16, AG 2-27,  
11 AG 2-32, AG 2-39, and AG 7-7. I discuss these responses below.

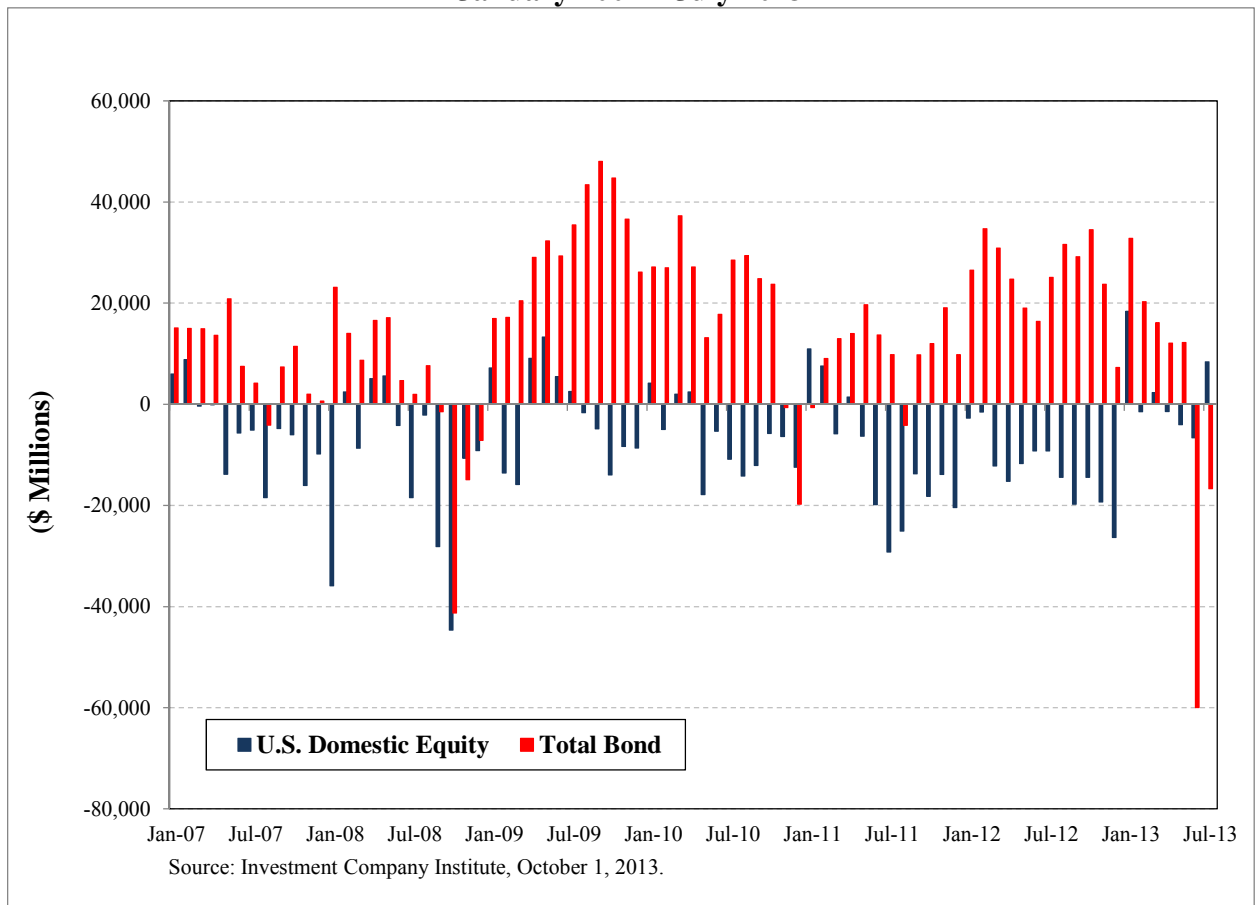
12 AG 2-14 (a) – (d):

13 As discussed in Section II and III above, I consider both the financial and operating  
14 risk of the utilities. As is my common practice, I calculate a range of potential cost of  
15 equity estimates for the target utility taking financial risk into account, then place the  
16 utility in the range or possibly below or above the range based on other risk  
17 characteristics. In this case, I considered the risk factors listed by Dr. Zepp and also  
18 the presence of a very large CIAC. As is my practice, I did not assign specific  
19 weights to the risk factors.

20 AG 2-16 (a) – (b):

1 As of mid-November 2013, I would add to the factors listed by Dr. Zepp that during  
2 the last several years, investors have been reluctant to invest in equity and have  
3 instead focused on bonds. This can be seen from Figure 2 below, which shows the  
4 net monthly new funds flow by equity and bonds. It is clear from the chart that bonds  
5 for a long time dominated the new funds flow, but as of mid-2013, a significant  
6 amount of bonds were sold off.<sup>46</sup>

7 **Figure 2: Net Monthly New Funds Flow: Domestic Equities vs. Total Bonds**  
8 **January 2007 – July 2013**



<sup>46</sup> The sell-off may have been impacted by Dr. Bernanke’s statement on the future of the Fed’s monthly \$85 billion asset purchase, which some interpreted as signal that the Fed would ease its monthly purchases. CNN Money, “Fed Sets Road Map for End of Stimulus,” June 19, 2013.

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AG 2-27 (a) – (c):

As noted in Section II above, I used the average sample beta in the calculation of the CAPM, so the response to AG 2-27 is not applicable. I prefer to consider the size issue separately from the estimation of the sample’s cost of equity.

AG 2-32:

In addition to the information provided by Dr. Zepp, I note that the large sell-off of bonds in the summer of 2013 indicated investors were considering changes in the bond market and most likely the policies of the Federal Reserve. It therefore lends support to the notion that the contemporaneous yield on Treasury bond is artificially suppressed by monetary policy and not representative of investor expectations regarding the cost of equity.

AG 2-39:

As noted in Section III above, I consider the financial and operating leverage in addition to the risk factors listed by Dr. Zepp. Q/A 19-20 and Q/A 20 above discuss the financial and operating risk, respectively.

AG 7-7:

Not applicable. See AG 2-27.

1 **V. CONCLUSIONS**

2 **Q33. Please summarize your findings regarding the Zepp Testimony.**

3 A. As noted above, the Zepp Testimony, as is common, selects a sample of 8 water  
4 utilities for which the cost of equity is estimated. I adopt this approach. Dr. Zepp  
5 then relies on standard methods to determine the cost of equity for the sample. It is  
6 important to note that while Dr. Zepp and I rely on different implementations of the  
7 models, any discrepancies in the implementation is offsetting. For example, while I  
8 use a multi-stage DCF in combination with a single-stage DCF, I also explicitly  
9 consider differences in financial risk. The degree to which a multi-stage DCF reduces  
10 the raw cost of equity estimates is offset by an increase due to the consideration in  
11 financial leverage. Similarly, while I avoid adding to the beta estimate for small-cap  
12 companies, I do consider size differences an important issue and simply place a  
13 small-cap company towards the upper range of the estimated ROEs. Again, this is  
14 largely offsetting.

15 **Q34. What is your ultimate recommendation regarding the cost of equity for AWU and**  
16 **ASU?**

17 A. I adopt Dr. Zepp’s recommendation of using a capital structure with 52% equity for  
18 rate making purposes. I also adopt his estimated range of 10.4% to 11.3% and  
19 midpoint recommendation of 10.9%. While Dr. Zepp estimated the benchmark ROE  
20 for the comparable sample and added 50 basis points for company-specific risks, I  
21 rely on (i) an explicit recognition of the added financial risk for AWU and ASU, (ii)

1 the fact that AWU and ASU require a size premium, and (iii) AWU and ASU larger  
2 than usual operating leverage and the inherent risk in replacing the CIAC over time.  
3 Therefore, I look to the estimates in Exhibit BV-2, which range from 10.1% to 11.9%  
4 if I ignore the lowest and highest estimate. The midpoint of these estimates is 11%,  
5 so the recommended ROE of 10.9% is reasonable and defensible even without  
6 considering AWU and ASU's smaller size, higher operating leverage or re-financing  
7 risks. I therefore conclude that allowing AWU and ASU an ROE of 10.9% and a  
8 hypothetical capital structure with 52% equity is reasonable and within the range  
9 estimated. I therefore adopt the Zepp Testimony's recommendation regarding the  
10 ROE and capital structure.

11 **Q35. Does this conclude your supplemental testimony?**

12 A. Yes.