BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

DOCKET NO. UE-160228

DOCKET NO. UG-160229

REBUTTAL TESTIMONY OF

DR. GRANT D. FORSYTH

REPRESENTING AVISTA CORPORATION

I. INTRODUCTION

Q. **Please state your name, employer and business address.**

A. My name is Dr. Grant D. Forsyth. I am employed by Avista Corporation as its Chief Economist. My business address is 1411 E. Mission Avenue, Spokane, Washington.

Q. **Dr. Forsyth, please provide information pertaining to your educational background and professional experience.**

A. I am a graduate of Central Washington University with a Bachelor of Arts Degree in Economics, the University of Oregon with an MBA in Finance, and Washington State University with a Ph.D. in Economics. Before joining Avista in April 2012, I was a tenured faculty member in the Department of Economics at Eastern Washington University. In my 13-year career at EWU, beginning in 1999, I specialized in money and banking, macroeconomics, international finance, and regional economic analysis. The majority of my academic research used applied econometrics. Prior to EWU, I worked in the Czech Republic as an academic economist (1996-1997) and private sector economist (1997-1999) in the Czech financial industry. My financial industry position was the Director of Research for a diversified Czech financial holding company. In this position I oversaw a staff doing both equity and macroeconomic research.

My primary job duties at Avista include generating the customer and load forecasts for electric and natural gas operations,[1] and generating the peak load forecast for electric operations. I also participate in various external policy groups, such as the Washington Governor's Council of Economic Advisors and Washington's Citizen Commission for Performance Measurement of Tax Preferences.

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[1] My forecasts are used in the Company's revenue model and are frequently used as modeling inputs by the Company's Power Supply and Gas Supply departments.

1   **Q.   What is the scope of your testimony?**

2   A.   My testimony will examine methodological issues associated Mr. Mullins' electric

3   and natural gas attrition model regression analyses, as well as Mr. Hancock's natural gas regression

4   analyses. For both Mr. Mullins and Mr. Hancock, their regression analyses are applied to generate

5   annualized electric or natural gas attrition growth rates. In this proceeding, witness Mr. Mullins

6   presents testimony on behalf of the Industrial Customers of Northwest Utilities (ICNU) for

7   Avista's electric service, and the Northwest Industrial Gas Users (NWIGU) for Avista's natural

8   gas service. Mr. Hancock presents testimony on behalf of the Staff of the Washington Utilities

9   and Transportation Commission (WUTC Staff or Staff).

10   In addition, my testimony will also examine the application of price indices used by Staff

11   witness Mr. Hancock within his analysis of determining appropriate growth rates for trending

12   operating and maintenance (O&M) expenses. I also discuss the use of certain price indices by Mr.

13   Watkins, who compares these indices to the trend in Avista's actual expenditures over time. Mr.

14   Watkins provides testimony on behalf of the Public Counsel Unit of the Washington Office of

15   Attorney General (Public Counsel). My testimony is organized as follows:

20

21   **Q.   Are you sponsoring any exhibits to be introduced in this proceeding?**

22   A.   Yes I am sponsoring Exhibit No. __(GDF-2) prepared by me, which provides a

23   Technical Appendix in support of my testimony.

24

1 ## II. REGRESSION METHODOLOGY

2 **Q.** **Did you review the attrition studies, specifically regarding the use of regression**

3 **analyses, sponsored by Mr. Mullins and Mr. Hancock?**

4 A. Yes, I did. I reviewed the attrition study regression analyses as prepared by both

5 Mr. Mullins and Mr. Hancock. Regarding Mr. Mullins' analyses, I found specific methodological

6 issues and inconsistencies within his analysis related to his electric and natural gas attrition models,

7 which produces attrition results which are unreasonable. With regards to Mr. Hancock, I found

8 specific methodological issues and inconsistencies within his analysis related to his natural gas

9 attrition model, which I also find unreasonable. With the exception of Mr. Hancock's O&M

10 trended analysis, which I discuss later in my testimony, I otherwise found Mr. Hancock's electric

11 attrition model's regression analysis to be reasonable.[2]

12 **Q.** **What are the methodological issues and inconsistencies you have found**

13 **regarding Mr. Mullins' regression analyses?**

14 A. The first issue I found with Mr. Mullins relates to the years chosen by Mr. Mullins

15 between the period 2000-2015, which vary depending upon the specific category of cost he is

16 trending. The second is the regression trending analysis applied to each category of cost, which is

17 inconsistently and inappropriately applied across his electric and natural gas models. Of particular

18 concern is Mr. Mullins' decision to ignore "kink points" which exist over the 2000-2015 time

19 periods Mr. Mullins' has chosen to use. Mr. Mullins' approach ignores recent data trends. This has

20 the effect of understating the escalation factors used in his electric and natural gas models.

21 **Q.** **Please explain what you mean by "kink-points".**

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[2] The historical least-squares linear regression trending analysis used by Mr. Hancock in his electric Attrition Study, with the exception of O&M expenses, is the same approach applied to Avista's electric Attrition Study sponsored by Company witness Ms. Andrews on direct and rebuttal.

1   A.   As discussed in Avista's prior 2015 general rate case (GRC) proceeding, Docket

2   Nos. UE-150204 and UG-150205, Avista's capital and other expenditures for the 2000-2014

3   period clearly show a significant shift in the trend of expenditures in the second half of this period,

4   namely starting in 2007. Specifically, expenditures started increasing at a significantly faster pace

5   compared to the earlier period. This is the case for both electric and natural gas operations.

6   In my prior 2015 testimony, I discussed the appearance of what are called "kink points"

7   that clearly existed within Avista's initial normalized Commission Basis Data (CBR) (2001 –

8   2013) reviewed to determine the appropriate data years to trend for attrition purposes in that

9   proceeding.[3]   After review of all testimony in the 2015 GRC proceeding, the Commission

10 approved the use of the period 2007-2014 for both the electric and natural gas attrition studies,

11 even though the Commission Staff had proposed the period 2009-2014 for its natural gas attrition

12 study, noting at page 42, paragraph 114 of Order 05:

13   Mr. McGuire's attrition study uses a sound methodology for developing an
14   escalation rate from historical data. With corrections, the Company largely
15   adopts Staff's methodology on rebuttal, but insists that the 2007-2014 time
16   period is the most appropriate. In this instance, we agree with the
17   Company's time period rather than that of Staff.

19   Nothing significant has changed between the conclusion of that proceeding and this current

20 case that would warrant a change or shift in the appropriate period of data to use within the attrition

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[3] The Commission summarized this testimony starting at page 28, paragraph 71 of order 05 as follows: "On direct, Dr. Forsyth presents the use of a compounding growth rate factor (CGF) in the attrition study. Further, Dr. Forsyth uses 2007-2013 as the time period for determining escalation rates. He presents data spanning 2001 to 2013, pointing out what he calls a "kink point" in 2007 showing an increase in the rate of plant additions. Concluding that the rate of plant additions from 2007 through 2013 is generally similar and represents the expected future rate of plant investment, he recommends the 2007-2013 time period for use in Avista's attrition study." *(footnotes excluded)*

1   models being considered, namely 2007 and beyond,[4] other than adding an additional historical

2   year (2015) to the end of the previous historical time period as it became available.

3   **Q.   Is there an example you can provide to illustrate this issue of "kink -points"**

4   **within Avista's expenditures.**

5   A.   Yes. Figure No. 1 below, for illustrative purposes, shows the observed shift in the

6   second half of the 2000-2015 period. In Figure No. 1, E($) is the annual expenditure level in

7   dollars for a 16 year period. The black dots are annual expenditures for years 1 through 8; these

8   are highlighted by a dashed trend line. The grey dots are expenditures for years 9 through 16;

9   these are also highlighted by a dashed trend line.

Figure No. 1
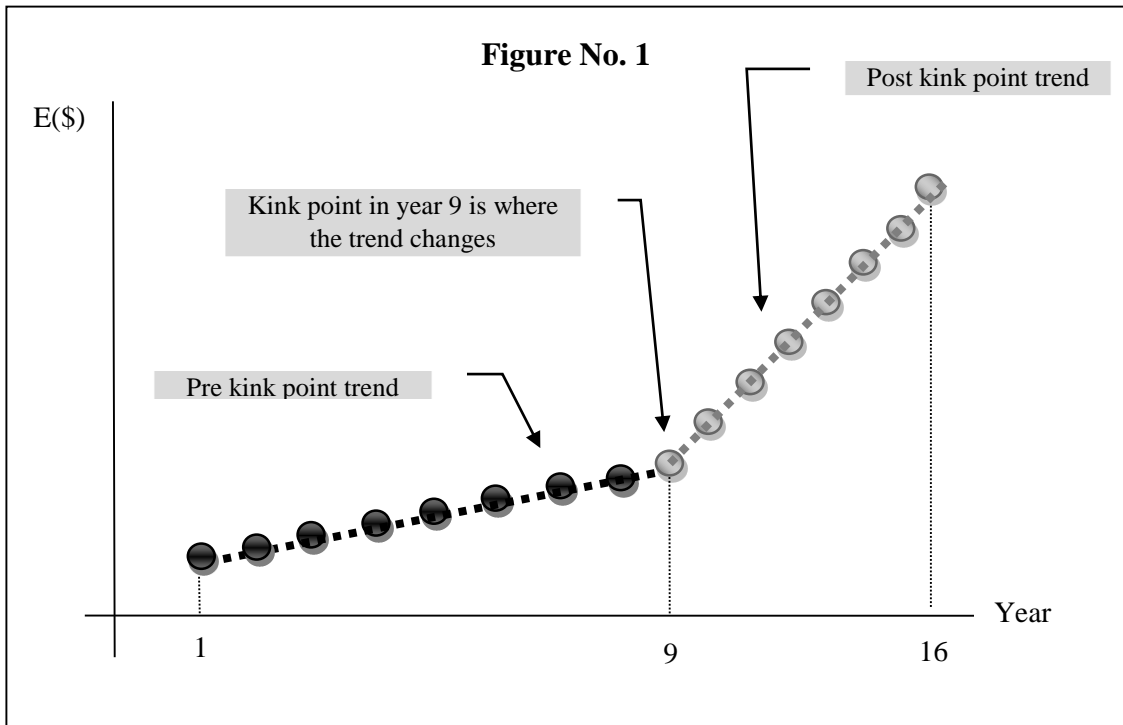
22   Year 9 represents a transition or "kink point" in the previous historical trend. In year 9 the

23   trend is steeper following the kink point. If the Company's plans call for expenditures to continue

[4] Mr. Hancock for Commission Staff and Ms. Andrews for Avista use the data period 2007 – 2015 within their attrition models.

1   at the higher level on an annual basis, then the expenditure trend for years 1 through 8 is not a

2   valid reference period, because it is no longer representative of the Company's expenditure trend.

3   Therefore, estimating a regression line through years 1 through 16 without appropriately

4   controlling the kink point in year 9 will understate the slope or growth rate, for calculating attrition

5   rates.

6   Figure No. 2 below shows what the regression line would look like by not controlling for

7   the kink point.

Figure No. 2

E($)

Black solid regression line: impact of ignoring kink point. Slope of regression line not representative of the pre- or post-kink trend.

Year

9
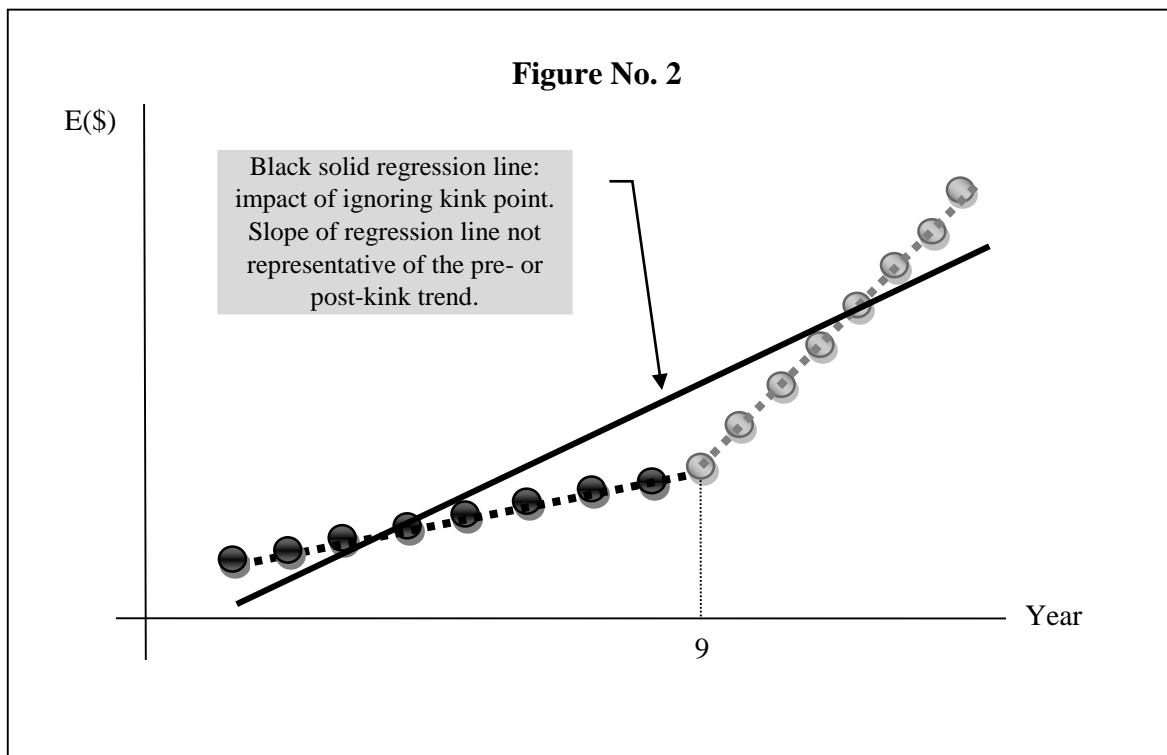
19   The regression line is insufficient for explaining the pre- or post-kink trend. Regardless of

20   the time period under analysis, sharp changes in growth need to be controlled for to accurately

21   describe expenditure trends.

22   **Q.**   **Is there an example in Mr. Mullins' testimony that clearly highlights your**

23   **methodological concerns?**

1   A.   Yes. One such example of this issue is discussed below. First, Figure No. 3 below,

2   shows a clear example where a "kink point" exists within the data series chosen by Mr. Mullins.

3   Figure No. 3 is reproduced from Mr. Mullins' Exhibit No. _(BGM-4), page 15, representing the

4   regression line for the natural gas expense category "Administrative and General Depreciation

5   Expense" (AGDE). The data period for the regression analysis used by Mr. Mullins is 2000 to

6   2015. The regression trend line produced is shown by the dashed line.

7   **Figure No. 3**

17   Like Figure Nos. 1 and 2 shown above, there is a "clear kink" point in 2009, which the

18   regression line does not correct for. As a result, the slope of the regression, like Figure No. 2, does

19   not accurately reflect the trend in AGDE before or after the kink. This is an example of the results

20   produced by Mr. Mullins' attrition models which supports Avista's conclusion that his modeling

21   results are not reasonable.

22   **Q.   How would the regression results for natural gas AGDE differ using a method**

23   **that adjusts for the kink point in 2009?**

1   A.   Given that Mr. Mullins has chosen to use the data series 2000-2015, Figure No. 4

2 shows an alternative regression line that takes into account the change in trend in 2009, but

3 continued use of the period 2000-2015. This regression method, sometimes called the "switching

4 model," is discussed in my "Technical Appendix" provided as Exhibit No. __(GDF-2).

5

Figure No. 4
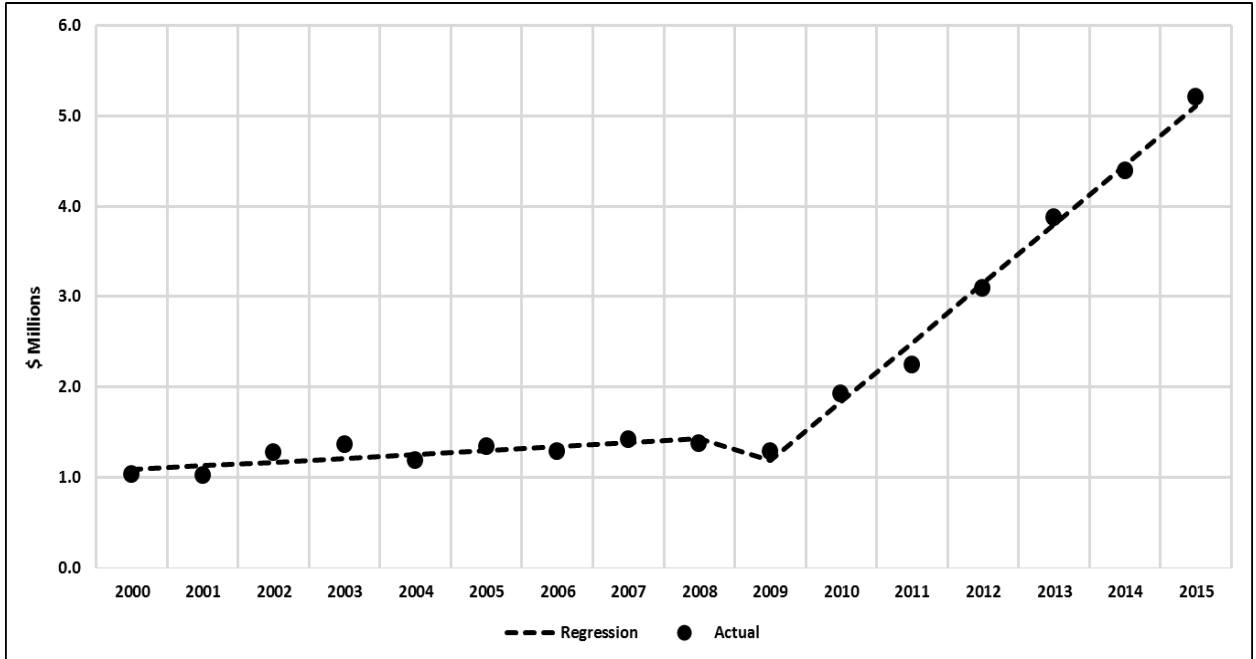
15   Note how the regression line switches to a steeper slope in 2009, which better reflects the

16 impact of the kink point for AGDE.

17   Table No. 1 below provides a comparison of the slope estimates and fit statistics between

18 the regression lines in Figure Nos. 3 and 4.

19

Table No. 1

Statistic	Corrected (Figure No. 4)	Mullins (Figure No. 3)
R^2 (R-Square)	0.99	0.72
2009-2015 Slope Estimate	654.32	236.54
2015 Dollar Base ($ thousands)	5,206	5,206
Estimated Annual Attrition Rate (slope estimate divided by 2015 dollar base)	654.32/5,206 = **12.57%**	236.54/5,206 =**4.54%**

20

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1   The R^2 (a measure of fit) and slope estimate (for the 2009-2015 period) for the switching

2   model are considerably higher than Mr. Mullins' estimates. As a result, the estimated annual

3   attrition rate is considerably higher—12.57% compared to Mr. Mullins' 4.54%. Correcting just

4   this cost category within Mr. Mullins' natural gas attrition model would result in a significant

5   increase in his proposed revenue requirement.

6   Noting that this same "kink point" exists within this same cost category in the electric

7   Attrition Study, if a similar correction was made as that discussed above, the electric AGDE annual

8   attrition rate would increase from 8.56% per Mr. Mullins, to 9.96%. The impact of correcting just

9   this cost category within Mr. Mullins' electric attrition model would also result in an increase Mr.

10   Mullin's in revenue requirement.

11   **Q.   Are there other examples you would like to discuss?**

12   A.   Yes. Although there are several examples where Mr. Mullin's excludes "kink

13   points," one other significant example is that of General Plant. As can be seen from the table

14   below the annual attrition rate included by Mr. Mullins in his natural gas attrition model is 5.21%.

15   However, a clear "kink point" exists. Correcting for this "kink point" would produce a growth rate

16   of 10.07%.

17   For electric, the General Plant cost category does not have a "kink point" issue which needs

18   correcting, however, Mr. Mullins used a linear regression when this data set has a non-linear

19   relationship.

20   Table No. 2 summarizes the three examples discussed above.

1

Table No. 2

Mullins' Gas Expenditure Category	Mullins' Regression Period	Mullins' Excel Tab	Kink Year in Adjusted Regression	Adjusted Annual Attrition Rate	Mullins' Original Annual Attrition Rate
Admin. and General Depreciation Exp.	2000-2015	Gas: 4.11	2009	12.57%	4.54%
Admin. & General Depreciation Exp.	2005-2015	Electric: 4.10	2009	9.96%	8.56%
General Net Plant	2000-2015	Gas: 4.14	2009	10.07%	5.21%

2

3   **Q.   What concern do you have with the varying years of data Mr. Mullins has**

4   **reflected in electric and natural gas regression analysis?**

5   A.   First, as noted above, this Commission reviewed and approved the time period

6   including 2007 and beyond as the appropriate historical data to include within Avista's Attrition

7   Studies in the Company's prior general rate case. Mr. Mullins' ignores this Commission guidance

8   and varies the years he chooses to trend depending on the cost category. For electric, his data

9   series by cost category ranges anywhere from 2005-2015, as is the case with "Distribution Taxes

10   Other Than Income," to only 2013-2015 for "Accumulated Deferred Income Taxes." For Natural

11   gas, however, he has several data series that range from 2000-2015, such as "Administrative and

12   General Depreciation Expense," to only 2012-2015 for "Administrative and General Expenses."

13   For natural gas "Accumulated Deferred Income Taxes" he trends the 2009-2015 time period.

14   However it is unclear why Mr. Mullins chooses these variations, and especially why he uses on

15   several instances the entire time period for natural gas, but chooses to truncate the time period for

16   electric. Adding to this concern for electric, the truncation points also do not always correspond

17   to "kink points" as demonstrated in Figure No. 1 above.

18   In summary, Avista does not agree that Mr. Mullins' electric and natural gas attrition study

19   methodologies produce reasonable results. Even adjusting for the few "kink points," provided as

20   examples in Table No. 2 above, does not fully reflect the concerns Avista has with Mr. Mullins'

1   Attrition Studies. Other areas, such as his use of years before 2007-2015 for example, are still of

2   particular concern.   Ms. Andrews within her rebuttal testimony discusses the appropriate

3   methodology used within Avista's electric and natural gas attrition studies.

4   **Q.   Turning now to Staff witness Mr. Hancock, do you see kink point or related**

5   **issues within his testimony and exhibits?**

6   A.   Yes. With regards to Mr. Hancock's natural gas attrition model, he discusses how

7   he disaggregates his cost categories compared to those used by the Company, and chooses to use

8   linear regression on certain natural gas categories. In contrast, the Company consistently applied

9   non-linear regression analysis for its natural gas attrition studies across its cost categories

10   consistent with the methodology approved in the Company's previous 2015 general rate case.

11   Similar to the discussion above regarding Mr. Mullins use of linear regression within his

12   natural gas model, even though Mr. Hancock used the shorter data set period 2007-2015, given

13   that he used <u>linear</u> regression analysis for certain cost categories that are not strictly linear, there

14   also appears to be kink points on certain cost categories that Mr. Hancock should have applied.

15   In addition to the kink point issue, Mr. Hancock uses a combination of linear and non-

16   linear (polynomial) regression lines to calculate attrition growth rates. <u>However, his application</u>

17   <u>of linear versus non-linear regression does not appear to be consistent.</u> For example, for natural

18   gas General Plant and General Plant Accumulated Depreciation, Mr. Hancock applies a <u>linear</u>

19   regression to expenditures that <u>appear </u>to have a <u>non-linear</u> time path; in contrast, he does apply

20   <u>non-linear</u> regression to Underground Storage and Distribution Plant that do appear to have <u>non-</u>

21   <u>linear</u> time paths.

22   In cases where <u>linear</u> regression is applied, as Mr. Hancock has, for certain natural gas cost

23   categories, failed to recognize "kink points" that must be considered. There are two specific

1 regressions for natural gas that kink points should be applied to adjust for trend changes: 1)

2 Distribution Depreciation and Amortization Expense and 2) General Depreciation and

3 Amortization Expense.

4   Table No. 3 below shows how the Company adjusted the linear regression attrition rates

5 using Mr. Hancock's data.

6   **Table No. 3**

Hancock's Gas Expenditure Category	Hancock's Regression Period	Hancock's Excel Tab	Kink Year in Adjusted Regression	Corrected Annual Attrition Rate	Hancock's Original Annual Attrition Rate
Distribution Depreciation and Amortization Exp.	2007-2015	UTC - DistrDeprAmorExp	2012	7.61%	4.91%
General Depreciation and Amortization Exp.	2007-2015	UTC - GenrlDeprAmorExp	2011	12.29%	8.55%

7

8   Correcting Mr. Hancock's methodology for just these two items noted in Table No. 3,

9 provide significant changes to these two annual attrition rates and would result in a higher revenue

10 requirement as explained by Ms. Andrews.

11   However, the Company believes, based on the actual data for the period 2007 – 2015, Mr.

12 Hancock's methodology should be adjusted by more than just the kink points noted in Table No.

13 3. Specifically for natural gas, the application of non-linear regression is a more reasonable

14 methodology and should be consistent across expenditure categories. Ms. Andrews within her

15 testimony discusses the appropriate methodology to apply across Avista's natural gas Attrition

16 Studies.

17   **PRICE INDEX METHODOLOGY**

18   **Q.   With regards to price indices, how have Staff witness Mr. Hancock and Public**

19 **Counsel witness Mr. Watkins used these indices within their testimonies?**

1   A.   Mr. Hancock uses the Producer Price Index for utilities (PPI-U) and the

2   Employment Cost Index for utilities (ECI-U) as an input into the <u>weighted</u> average growth rate

3   used within his electric and natural gas attrition studies to determine the annual "Adjusted

4   Operating Expense" growth rates.

5   Mr. Watkins, however, refers to the Producer Price Index (PPI) and the Consumer Price

6   Index for all urban consumers (CPI) in discussing recent inflation trends in relation to cost

7   escalation, and uses this information to make assumptions regarding Avista's historical and future

8   costs.

9   **Q.   What are your methodological concerns regarding Mr. Hancock's usage of the**

10   **PPI-U and ECI-U in the calculation of the weighted growth rate for Adjusted Operating**

11   **Expenses?**

12   A.   Mr. Hancock uses PPI-U and ECI-U indices that are indices that do not accurately

13   reflect the Company's operations. The NAICS PPI-U code is described below in Table No. 4.

14

Table No. 4

NAICS Title	NAICS Code	PPI	NAICS Description from the U.S. Census
Utilities	221	PPI-U	Industries in the Utilities subsector provide electric power, natural gas, <u>steam supply, water supply, and sewage</u> removal through a permanent infrastructure of lines, mains, and pipes. Establishments are grouped together based on the utility service provided and the particular system or facilities required to perform the service. (emphasis added)

15

16   Note that the category of "Utilities" for the PPI-U includes all types of utilities, including

17   steam, water, and sewage. ECI-U also includes all types of utilities, including steam, water, and

18   sewage. These types of all-inclusive utility indices would most likely show expense trends

19   differently than for electric or natural gas utility operations.

20   **Q.   Do you have other concerns regarding Mr. Hancock's weighted average**

21   **growth methodology?**

1   A.   Yes. The primary concern is on the choice of weights. To arrive at the final growth

2   rate for Adjusted Operating Expenses, Mr. Hancock uses the following weighting:

3

4   Growth = 0.50*Avista Growth 2007-15 + 0.25*PPI-U Growth 2007-15 + 0.25*ECI Growth 2007-15

5

6   Mr. Hancock's rational for this weighting is based on the weighting used in the Company's 2015

7   rate case:

8   Growth = 0.50*Avista Growth 2007-14 + 0.50* Avista Growth 2013-14

9

10   However, the calculation for the 2015 rate case was based on "Avista only" data. In effect,

11   the Company's data was given a 100% weighting. Mr. Hancock's current proposal is something

12   very different because it averages non-Company data with Company data. This has the effect of

13   reducing the Company specific weighting from 100% to 50%. This is a significant departure from

14   the method approved by the Commission in the 2015 GRC and artificially reduces the Company's

15   expected growth trend to a level that is not representative of Avista's historical experience in costs

16   nor its expected increase in costs during the rate year, as explained in more detail by Ms. Andrews.

17   **Q.   Now turning to Public Counsel witness Mr. Watkins, what methodological**

18   **concerns do you have regarding his use of price indices?**

19   A.   First, Mr. Watkins also refers to the Producer Price Index. PPI is too broad of an

20   index for the types of goods and services purchased by Avista, and therefore is not representative

21   of the inflation experienced by the Company. Since PPI does not accurately reflect the Company's

22   operations it would show expense trends differently than Avista's electric or natural gas utility

23   operations.   Second, Mr. Watkins refers to the consumer price index for all urban consumers

24   (CPI). The use of CPI is not appropriate because the CPI is tracking inflation on retail goods and

1   services in urban areas. Therefore, the CPI does not reflect prices on the goods and services

2   purchased by businesses. Neither of these indices are reasonable comparisons with what Avista

3   has experienced or what it expects to experience in the future.

4   **Q.   Does this conclude you testimony?**

5   A.   Yes.