BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Docket No. R-2015-2518438

UGI Utilities, Inc. – Gas Division

Statement No. 5-R

Rebuttal Testimony of
John F. Wiedmayer C.D.P.

Topics Addressed: **Depreciation**

Date: May 10, 2016

REBUTTAL TESTIMONY OF

JOHN F. WIEDMAYER

DOCKET NO. R-2015-2518438

I. INTRODUCTION

Q. Please state your name and address.

A. My name is John F. Wiedmayer. My business address is 1010 Adams Avenue, Audubon, Pennsylvania 19403.

Q. Did you previously submit direct testimony in this proceeding on behalf of UGI Utilities, Inc. – Gas Division ("UGI Gas" or the "Company")?

A. Yes. I submitted my direct testimony, UGI Gas Statement No. 5, on January 19, 2016.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to address the depreciation related issues discussed in the direct testimony of Office of Consumer Advocate ("OCA") witness James S. Garren, OCA Statement No. 5.

Q. Please summarize your rebuttal testimony.

A. My rebuttal testimony responds to certain adjustments related to depreciation expense proposed in the direct testimony of James S. Garren, OCA Statement No. 5. Specifically, Mr. Garren proposes to reduce the Company's claimed amount of depreciation expense of $41.516 million by $7.8 million. Mr. Garren's recommendation to reduce depreciation expense is based on two primary reasons, as follows: 1) he recommends increasing the service lives for 14 distribution plant accounts even though the company plans to accelerate replacements of its gas plant assets over the next 14 to 30 years as part of its Long-Term Infrastructure Improvement Plan ("LTIIP"); and 2) he recommends *a change in the longstanding, approved depreciation calculation procedure* known as the Equal Life Group ("ELG") procedure to the Average Service Life ("ASL") procedure. UGI Gas has been using the Equal Life Group procedure to calculate depreciation rates for vintages 1982 and subsequent for over 30 years. Also, most other Pennsylvania utilities use ELG to calculate depreciation and have used ELG for many years.

Q. Can you please provide an overview of Mr. Garren's proposals?

A. Yes. Mr. Garren is proposing that UGI Gas reduce depreciation expense by 20 percent or by approximately $7.8 million. Of the $7.8 million reduction, approximately $1.8 million is related to the proposed increase in service lives and approximately $6.0 million is due to the change in depreciation calculation procedures from ELG to ASL. This is a material overall reduction and Mr. Garren has not presented any credible evidence to support such a large reduction in depreciation expense. Additionally, even if Mr. Garren's service lives and shift from ELG to ASL are accepted, which it should not be, his proposed $7.8 million reduction should only be $7.5 million as Mr. Garren calculates depreciation incorrectly for certain general plant accounts including Common Plant and Information Services ("IS").

Q. Please explain the error in Mr. Garren's depreciation calculation for General Plant including Common Plant and IS.

A. In OCA Exhibit JSG-1, Mr. Garren compares his proposed curves with the curves used by UGI Gas. There are no differences listed on OCA Exhibit JSG-1 for General Plant, Common Plant and IS, yet on page 5 of his testimony he presents a $72,183 reduction for General Plant and a $328,629 reduction for Common Plant and IS. While a small amount of the difference can be attributed to the difference in depreciation calculation procedures (*i.e.*, ELG vs. ASL) for accounts not subject to amortization accounting such as Account 392 and 396, most of the difference is due to Mr. Garren using a different curve (*i.e.*, O1) for his calculations than the curve (SQ or Square) he presents in his testimony. The reduction to depreciation expense caused by Mr. Garren selecting the wrong survivor curve for accounts subject to amortization accounting (*i.e.*, 391, 394, 397, 398) is approximately $300,000.

Q. Does the Company agree with Mr. Garren's recommendations?

A. No. Mr. Garren's recommendations are largely without merit and should be rejected in their entirety. Mr. Garren's recommendations to increase service lives for 14 distribution plant accounts is incongruent with the Company's outlook and plans. Included in UGI Gas's LTIIP is a plan to replace all cast iron mains within 14 years and all bare steel mains within 29 years as of March 2013. UGI Gas expects to expend $51.2 million each year of the LTIIP from 2014 through 2018 for asset replacement. This is nearly double the amounts previously spent and it includes cast iron and bare steel main replacement and service line replacements. According to the LTIIP, UGI Gas will replace gas service lines on a planned basis in conjunction with the replacement of the mains to which they are connected. In addition to replacing certain types of mains and services made of cast iron, wrought iron and bare steel, UGI Gas plans to replace and relocate approximately 70,000 indoor meters; and replace risers, meter bars, regulator stations and house regulators in connection with the main replacement program and other items included in the LTIIP. In nearly all of the 14 accounts in which Mr. Garren is recommending a service life increase, UGI Gas has plans set forth in its LTIIP to accelerate the replacement of its distribution assets. These plans will put downward pressure on service lives and will likely decrease service lives in some accounts and increase the mode of the survivor curve in others. It is unlikely that the service lives for distribution plant will increase given the asset replacement programs set forth in the Company's LTIIP.

II. <u>GENERAL DEPRECIATION ISSUES</u>

Q. Are there any general issues related to depreciation that you would like to address?

A. Yes. In response to both statements made by Mr. Garren in his testimony and to his overall approach to his depreciation recommendations, there are two general issues I would like to address. The first is related to how depreciation impacts customer rates. Mr. Garren presents a brief discussion of this topic on pages 2 and 3 of OCA Statement No. 5 and makes suggestions that utilities have an incentive to "overcharge" for depreciation expense.[1] Mr. Garren's explanation of depreciation concepts is incomplete, and as a result his suggestions are incorrect.

The second issue is related to the depreciation study process in general. Depreciation is by its nature a forecast of events that will happen over many decades. The service life estimates presented in UGI Gas's depreciation study represent a projection of the retirements of property currently in service that will occur over the next fifty years or more. Because of the nature of forecasting service lives, it is critical that the depreciation professional not only incorporate statistical analyses of historical data, but also have detailed knowledge of the property studied and the plans of the Company. I have performed depreciation studies for UGI Gas for 27 years, have made field visits to observe their property in 12 Pennsylvania counties on numerous occasions, have prepared their annual depreciation reports for the past 27 years (and our firm has prepared these reports for UGI Gas for over thirty years) and, therefore, I have the requisite experience to provide reasonable forecasts of service life.

In contrast, Mr. Garren's testimony makes clear that he has little knowledge of the Company or its plans, and little knowledge of depreciation practices in the state of Pennsylvania. His service life estimates are based on little more than mechanically selecting curves from a curve matching algorithm. As a result, his estimates are in many cases inconsistent with the Company's plans (for example, replacement of cast iron and bare steel

[1] OCA Statement No. 5, p. 3 lines 5-7.

mains) and instead calculates depreciation amounts that are too low and are based on life estimates that are too high and inconsistent with well-known Company plans such as its cast iron and bare steel mains replacement plan.

Q. Please address Mr. Garren's comments on pages 2 and 3 of his testimony.

A. On pages 2 and 3 of OCA Statement No. 5, Mr. Garren presents a discussion on depreciation that inappropriately gives the impression that utilities intentionally overstate depreciation expense. Mr. Garren first states that depreciation represents the "[d]irect pass through of cash from the customers to the utility that the utility retains for non-utility purposes."[2] This cynical and unsupported statement is not an accurate description of depreciation.

Depreciation represents the allocation of the cost of the Company's assets over the period of time in which the assets will be in service. The costs of these assets have already been incurred by the Company, *i.e.*, UGI Gas has already spent money to install assets such as mains, services and measuring and regulating equipment that are used to provide gas service to customers. Depreciation represents the return of these costs to the Company, allocated over the time the assets are in service. It does not represent a "direct pass through of costs" that the utility can use for whatever it wants. *Instead, it represents the recovery of costs already incurred.*

Further, while it is technically correct that depreciation expense once recovered can be spent by the utility as needed, it is an inaccurate

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[2] OCA Statement No. 5, p. 2 line 14 to p. 3 line 1.

representation made by Mr. Garren that these funds will generally be used for "non-utility" purposes. Indeed, UGI Gas typically spends more on capital additions to plant in service than it records in depreciation expense. For example, as can be seen in UGI Gas's most recent Annual Depreciation Report, UGI Gas recorded $31.3 million in depreciation expense in 2015. However, the Company added $105.2 million in plant in the same year, and incurred an additional $6.0 million in costs to remove assets that were retired. UGI Gas therefore spent more than 3.5 times as much as it recovered in depreciation expense. Mr. Garren's implication that UGI Gas will use depreciation expense for purposes other than investment in utility service is therefore misplaced. The Company regularly spends much more than its depreciation expense, and therefore has to use funds in addition to depreciation, typically raised in capital markets, in order to operate its business.

Q. Are there any other statements made by Mr. Garren that you would like to address?

A. Yes. Mr. Garren also states that "[i]n practice, this means that depreciation expense provides a company with a source of free cash flow. This can incentivize a company to overcharge for depreciation by understating the period over which the depreciation is allocated, or overstating a future cost of removal allowance."[3] I have already explained that a Company such as UGI Gas typically spends more on capital investments than it recovers in

[3] OCA Statement No. 5, p. 3, lines 4-7.

depreciation, and so Mr. Garren's implication of "free cash" flow is inaccurate. Mr. Garren's statement that a Company has an incentive to "overcharge" for depreciation is also incorrect since accumulated depreciation is a reduction to rate base.

Q. How does depreciation impact customer rates?

A. Depreciation impacts customer rates in two ways. The first is that depreciation expense is a direct component of the revenue requirement. Mr. Garren only discusses this impact. However, Mr. Garren does not mention that accumulated depreciation[4] is also an offset to rate base. A higher level of accumulated depreciation results in a lower return on rate base and therefore lower customer rates when compared to a lower level of accumulated depreciation.

The implication of Mr. Garren's statement is that a utility has an *incentive for higher depreciation because it results in higher customer rates*, and therefore "free cash flow." However, over the long term this is fundamentally incorrect. Higher depreciation expense can result in higher customer rates in the short term, but will over time result in higher accumulated depreciation. Because average depreciation rates for a utility are typically in the 2% to 3% range and the return on rate base is higher (typically 7% to 8% or higher), higher depreciation expense tends to produce <u>lower</u> customer rates over time. Mr. Garren's accusation that a utility has an incentive to "overcharge" for depreciation expense is therefore incorrect.

[4] Accumulated depreciation is the depreciation expense recorded to date, less recorded retirements and cost of removal, plus recorded gross salvage.

Q. Can you provide an example of the impact of depreciation on customer rates?

A. Yes. One concept that Mr. Garren challenges is UGI Gas's (and Pennsylvania's) longstanding use of the Equal Life Group ("ELG") procedure. I will discuss his proposal in more detail in the Section IV of my testimony. However, it is true that because ELG produces higher depreciation rates for younger vintage assets than the Average Service Life ("ASL") procedure, all else equal, composite ELG depreciation rates are often higher than composite ASL depreciation rates.

UGI Gas has used ELG depreciation rates for new assets since the early 1980s, and therefore accumulated depreciation is higher than had ASL been used for this period of time. The use of ELG depreciation rates means that rate base is lower and the Company earns less of a return than had ASL been used since the 1980s. As a result, customer rates are lower today than they would have been had ELG not been adopted. From a revenue requirement perspective, the use of the ELG procedure has a greater impact on reducing rate base returns than increasing annual depreciation expense over a medium to long-term period.

Q. Based on Mr. Garren's presentation, what can you conclude regarding OCA's overall presentation on depreciation?

A. As I have explained above, Mr. Garren's overall presentation of depreciation concepts is inaccurate and inappropriate. Additionally, his recommendations and discussions in his testimony demonstrate that he has little knowledge of the Company or of depreciation practices in Pennsylvania – both of which are necessary to provide informed estimates of depreciation. I will explain these deficiencies in Mr. Garren's recommendations in more detail in subsequent sections of my rebuttal testimony.

In contrast to OCA's presentation, my recommendations are based on informed judgment that incorporates the knowledge I have gained from performing depreciation studies for UGI Gas for nearly thirty years. Additionally, my firm, Gannett Fleming Valuation and Rate Consultants, LLC, has been providing depreciation consulting services to UGI Gas for over 50 years. As a result, the recommended depreciation rates in my study provide far more reasonable and appropriate return of UGI Gas's investments.

III. SERVICE LIFE ESTIMATES

A. Introduction

Q. What will you address in this section of your testimony?

A. In this section I will address the erroneous manner in which service life estimates were made by Mr. Garren. Not only has Mr. Garren employed an inappropriate approach to estimating service lives, but his statistical analysis – which forms the entire basis of his proposals – includes numerous calculation errors. In this section, I explain the process for life estimation and demonstrate that service life estimates must be based on more than mechanical curve matching. Because my survivor curve estimates incorporate the proper experience and judgment, they set forth the best representation of future service life expectations for UGI Gas related to gas plant in service. In contrast, the process employed by Mr. Garren is inappropriate and produces results that are unreasonable and unrealistic. I will also discuss the calculation errors in Mr. Garren's presentation. Given that he bases his recommendations entirely on the results of his statistical analyses, the fact that he has made errors in these analyses further compounds the issues with his approach.

Q. Can you summarize the OCA's service life recommendations?

A. Yes. I have summarized both my estimates and Mr. Garren's estimates in the table below. As the table shows, there are 14 distribution plant accounts where Mr. Garren and I have different service life estimates. In all 14 instances the service lives estimated by Mr. Garren are longer than the service lives that I had estimated (resulting in a decrease in depreciation, all else equal) for these 14 distribution plant accounts.

Table 1: Comparison of UGI Gas Proposed and OCA Proposed Service Life Estimates

ACCOUNT	UGI GAS PROPOSED ESTIMATE	OCA PROPOSED ESTIMATE
(1)	(2)	(3)
DISTRIBUTION PLANT		
375	55 - S0.5	60 - L0.5
376.1	72 - R2.5	76 - R2.5
376.2	70 - R1	82 - L0.5
376.3	65 - R3	68 - R3
376.5	70 - R1	70 - R1
378	50 - S0.5	61 - L0.5
378.1	13 - S2	13 - S2

379	40 - R3	44 - R2.5
380	47 - R2	50 - S1
381	36 - R1.5	37 - S0.5
381.2	20 - S2	20 - S2
382	47 - R2	50 - S1
383	47 - R2	50 - S1
384	47 - R2	50 - S1
385	42 - R2	55 - R2.5
386	47 - R2	50 - S1
386.1	47 - R2	50 - S1
386.2	25 - R3	25 - R3
387	32 - L2	32 - L2
387.1	25 - SQ	25 - SQ

GENERAL PLANT

390.1	VARIOUS	VARIOUS
390.2	SQUARE	SQUARE
391	20 - SQ	20 - SQ
391.1	5 – SQ	5 - SQ
392.1	7 - L2.5	7 - L2.5
392.2	11 - L3	11 - L3
392.4	14 - L4	14 - L4
394	20 - SQ	20 - SQ
396	14 - L2.5	14 - L2.5
397	10 - SQ	10 - SQ
398	10 - SQ	10 - SQ

COMMON PLANT

390.2	SQUARE	SQUARE
391	20 - SQ	20 - SQ
391.1	5 – SQ	5 - SQ
392.1	7 - L2.5	7 - L2.5

INFORMATION SERVICES (IS)

391	20 - SQ	20 - SQ
391.1	5 – SQ	5 - SQ
391.3	10 - SQ	10 - SQ
391.4	15 - SQ	15 - SQ

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Q. Do you have any comments on table 1?

A. Yes. Table 1 demonstrates that for many accounts Mr. Garren's estimates represent significant changes from my service life estimates, which are the same estimates approved by the Pennsylvania Public Utility Commission ("PUC" or "Commission") in the Company's most recent service life study filed in 2012 with Docket Number M-123100ADR2012. For example, Mr. Garren has recommended increasing the service life for Accounts 376.2 and 378 by 12 and 11 years, respectively. These are much larger increases than should be expected in a single depreciation study given that the company performed a service life study just 4 years ago. Also, his proposed life estimates would be: 1) above the typical range of service life estimates used by other Pennsylvania gas utilities; 2) among the longest service lives estimated for gas plant in Pennsylvania; and 3) are inconsistent with company plans and outlook of engineering management.

Q. Please explain the process used for life analysis.

A. The estimates I have made for the depreciation study are based in part on the most commonly used statistical analysis of aged retirements known as the retirement rate method. This method is applied to assets in the distribution and general classes of plant and is described in more detail in the Depreciation Study. The retirement rate method was used for all accounts in the above classes of plant except for certain accounts in general plant where amortization accounting was continued.

Application of this method requires an extensive compilation of historical aged retirement data as well as related plant accounting data including additions, acquisitions, sales and transfers. Plant accounting data for the years 1960 through 2011 were available to study. The life analyses were performed using Gannett Fleming's depreciation software programs. The actuarial data may or may not produce a complete life cycle of experience. A complete life cycle is indicated by the life table reaching zero percent surviving for the last age interval shown on the life table. The curve-fitting portion of Gannett Fleming's depreciation software program matches the stub survivor curves (*i.e.*, from the original life tables) with each member of the Iowa curve family. The curve-fitting results are based on a least squares solution of the differences between the stub curve and the Iowa curve. Survivor data developed by the actuarial analysis and set forth on the original life table are graphed and compared visually and statistically with the Iowa curves.

There are two distinct steps in the estimation of service lives and retirement dispersions that must be recognized in the interpretation of the service life analysis results. The first step, *life analysis*, refers to the application of statistical procedures to determine life and dispersion indications based solely on past experience. The second step, *life estimation*, refers to the exercise of informed judgment in making sound estimates of service lives and retirement dispersions. Life estimation incorporates known historical experience, estimated historical trends and estimated future trends or events in order to define complete patterns of estimated service life characteristics. The results of the life analyses, performed as the first step, are only one of the relevant factors to be considered during the decision making process of life estimation.

Q. Please explain the process used for life estimation.

A. The service life estimates were based on informed judgment which considered a number of factors. Among the factors receiving consideration included the results of the life analyses using UGI Gas's property accounting data; current Company policies, plans and outlook as determined during conversations with engineering management and other technical subject matter experts; and the survivor curve estimates from previous studies of this company and other gas companies. I have used my professional judgment based on a consideration of a number of factors, listed above, to arrive at the most appropriate average service life and dispersion curve for each of the accounts studied. These results were provided in pages II-3 through II-4 of UGI Gas Exhibit C (Fully Projected). The statistical support for the survivor curve estimates is presented in the section of the UGI Gas Exhibit C (Future) entitled "Service Life Statistics," and set forth on pages VI-2 through VI-68.

Q. Has Mr. Garren employed the same process as you?

A. No. While Mr. Garren has also used the retirement rate method, there are two serious issues with his analysis. The first issue is that he bases his estimates entirely on the statistical analysis, mechanically selecting best fit curves in almost all cases and ignoring information about the future. As I will explain, Mr. Garren's approach is explicitly rejected by authoritative depreciation texts, which are clear that judgment must be incorporated into the estimation of service life. Mr. Garren's approach has also been rejected by the PUC in previous cases in which his firm has testified. Mr. Garren's approach is further compromised by the fact that the calculations used in his life analysis are in many cases incorrect. The result is that Mr. Garren recommends *inappropriate life estimates that not only are unreasonable, but in many cases* defy common sense.

B. <u>Mr. Garren's Approach to Life Estimation is Inappropriate</u>

Q. You have described the retirement rate method in the previous section, which is a method of the statistical analysis of historical data. Should the service life estimates be based solely on a mechanical curve-fitting *approach related to the performed historical life analysis?*

A. No. Authoritative depreciation texts are quite clear that life estimation should not simply be a mechanical exercise based on statistical analysis of historic data. Proper judgment must be used to ensure the estimates based on historic data are the best representation of future life characteristics for the property being studied. I have incorporated informed judgment based on the knowledge of UGI Gas's property and Company plans that I have acquired over the past 27 years of performing depreciation studies for UGI Gas, including submitting annual depreciation reports and service life study reports to the PUC.

Q. How does Mr. Garren's analysis differ from yours?

A. Based on Mr. Garren's testimony, his estimates appear to be based almost entirely on the results of the historic statistical analysis. For the 14 distribution plant accounts that he is recommending an increase in the service life, he simply selects the survivor curve that best fits the historical retirement data. He appears to have incorporated no other information into his life estimation, and has instead simply accepted the results of the historic statistical analysis, whether these results are reasonable or not. The result of his approach is that many of his estimates are very unreasonable for the Company's assets.

Q. So Mr. Garren did not incorporate any information or judgment other than the statistical analysis?

A. No, he did not. Instead, Mr. Garren simply selected the best mathematical fit survivor curve for each account (or at least for most accounts), without consideration of any other factors or assessment of the reasonableness of his results.

Q. Is the acceptance of the mathematical curve fitting results using historical data, as Mr. Garren has done, an acceptable practice for depreciation analysis?

A. No, it is not. As I describe in the Depreciation Study (UGI Gas Exhibit C – Future) on pages III-2 and III-8, the service life estimates I have made were based on "judgment that incorporated statistical analysis of retirement data, discussions with management regarding company plans and outlook and consideration of estimates made for other gas utilities." It is standard practice in the industry to consider each of these factors. However, Mr. Garren appears to have only considered one factor – the statistical analysis of historical (*i.e.*, past) retirement data.

Q. Do any authoritative depreciation texts support your assertion that a depreciation study should incorporate factors other than statistical analysis"?

A. Yes, all depreciation texts are clear that service life estimates are forecasts of *future* expectations. As a result, sole reliance on the statistical analysis of *historical* data is inappropriate for life estimation.

One such text is the National Association of Regulatory Public Utility Commissioners' publication "Public Utility Depreciation Practices" ("NARUC Manual"). Chapter VIII of the NARUC Manual discusses life analysis.

Q. Does the NARUC manual support Mr. Garren's dependence solely on mathematical analysis for his life estimates?

A. No. To the contrary, the NARUC Manual is clear that "depreciation analysts should avoid becoming ensnared in the mechanics of the historical life study and relying solely on mathematical solutions."[5] Thus, the NARUC Manual advises against the exact approach Mr. Garren has used.

The NARUC Manual also explains that "several factors should be considered in estimating property life. Some of these factors are:

1. Observable trends reflected in historical data,

[5] NARUC Manual, p. 126

2. Potential changes in the type of property installed,

3. Changes in the physical environment,

4. Changes in management requirements,

5. Changes in government requirements, and

6. Obsolescence due to the introduction of new technologies."[6]

Q. Has Mr. Garren incorporated any of these factors into his life estimation?

A. No, he has not. All of the factors in the NARUC manual cited above require judgment based on future conditions that are likely to be encountered. Mr. Garren has recommended 14 changes to the service lives estimated for distribution plant strictly on the ones that best fit the historical data based on his determination of which data points from the life table to include. He did not consider or exercise professional judgment with respect to any additional factors that would affect service lives in the future.

Q. On page III-4 of UGI Gas Exhibit C (Future), you indicate that the service life estimates were based on "judgment which considered a number of factors." Does the NARUC Manual discuss "judgment"?

A. Yes, it does. The NARUC Manual discusses the use of "informed judgment" in detail on page 128, explaining that "the use of informed judgment can be a major factor in forecasting." It goes on to explain that:

"Judgment is not necessarily limited to forecasting and is used in situations where little current data are available. The analysis gathers

[6] NARUC Manual, page 129

what is known about a particular situation and modifies and refines the data to reflect the actual circumstances. The analyst's role in performing the study is to review the results and determine if they represent the mortality characteristics of the property. Using judgment, the analyst considers such things as personal experience, maintenance policies, past company studies, and other company owned equipment to determine if the stub curve represents this class of property."

Q. Did Mr. Garren incorporate any judgment to "review the results and determine if they represent the mortality characteristics of the property"?

A. No, he did not.

Q. Is judgment also important in the actual curve fitting process?

A. Yes. As discussed above, judgment is critical in the life estimation process. Indeed, although he does not appear to incorporate any judgment in his estimates, Mr. Garren appears to acknowledge that judgment may be required in some cases, stating "[t]here are numerous factors that might lead a utility depreciation expert, familiar with the particular plant account for a given company for a given account, to deem that future depreciation expectations are different than historical experience."[7] I will explain that Mr. Garren's recommendations demonstrate that he is not at all familiar with UGI Gas's property.

[7] OCA Statement No. 5, p. 16, lines 14-17.

However, judgment is also critical for the actual curve fitting process. Depending on the selection of data points and the judgment in extrapolating the survivor curve beyond the available or significant data, the curve fitting process can produce very different results. For this reason, judgment is also important to ensure that the data is interpreted and extrapolated properly. Mr. Garren's approach, which is to mechanically select mathematical, best-fitting survivor curves based on almost all of the data points – whether significant or not – does not properly interpret the historical data.

Q. Are there any examples of cases in Pennsylvania in which Mr. Garren or his firm used a similar approach to service life estimation?

A. Yes. There are two examples in which Michael Majoros, a colleague of Mr. Garren at Snavely King, proposed service life recommendations using the same inappropriate approach of solely relying on mathematical curve matching. Both cases were litigated before the PUC. In each of those cases, my firm prepared the utility's depreciation study using the same well-accepted approach to life estimation and curve fitting that I employed in the Depreciation Study in this case. In each of those cases, Mr. Majoros testified on behalf of the OCA and, as with Mr. Garren here, recommended significantly longer depreciable lives for some accounts based on a formulaic application of mathematical curve fitting to all historical retirement data without regard to the statistical relevance of the data.

In the first case, *Pa. P.U.C. v. Philadelphia Suburban Water Co.*, 219 PUR 4th 272 (2002), the PUC adopted the life estimates developed in Gannett

Fleming's depreciation study and expressly rejected Mr. Majoros's sole reliance upon mathematical curve fitting, stating as follows:

> We agree with the ALJ that the OCA's proposal on this issue should be rejected. (R.D., p. 50). We have previously, in a number of cases, rejected similar OCA proposals which are based on insignificant data, even when supported by a retirement rate analysis. We have never viewed the calculation of the appropriate survivor curves as a purely mechanical exercise, based simply on a statistical analysis of unadjusted data. In this case, PSWC properly exercised its expert judgment in rejecting insignificant data.[8]

The second case was *Pa. P.U.C. v. Pennsylvania-American Water Co.*, 231 PUR 4th 277 (2003). In that case, the PUC again rejected Mr. Majoros's curve fitting approach.[9]

Q. Are you aware of any other Pa. PUC decision rejecting Mr. Majoros's mathematical curve fitting approach to life estimation?

A. Yes. In *Pa. P.U.C. v. The York Water Co.*, 62 Pa. P.U.C. 459 (1986), Gannett Fleming prepared the depreciation study submitted by the utility. Mr. Majoros testified on behalf of the OCA, disagreed with the life estimates developed in the depreciation study, and proposed significantly longer lives derived from his purely mathematical approach to fitting smooth survivor curves to all (or almost all) available historical retirement data regardless of its statistical significance.

Before addressing the specific issue presented, the PUC referenced a summary of general principles for service life estimation that it had developed in prior cases:

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[8] 219 PUR 4th at 300.
[9] 231 PUR 4th at 308-309.

> Life estimates are essentially based upon engineering judgment, and, where possible, such judgment should, to an extent, be predicated upon respondent's actual retirement experience, together with future plans with respect to the specific plant in question. In the absence of these data, average service lives which appear reasonable should be selected. The experience of comparable utilities, though not controlling, has certain probative value in developing estimated average service lives and may be considered.[10]

The PUC rejected Mr. Majoros's recommendations as inconsistent with the fundamental and well-accepted principles of service life estimation, quoted above, stated in 62 Pa P.U.C. at 469.

Q. Does the lack of informed judgment exercised in Mr. Garren's study lead to any problems with his results?

A. Absolutely. Had he reviewed his results with the proper informed judgment, it should have been clear that many of his estimates do not represent the future "mortality characteristics of the property" being studied. Examples of some of the accounts studied provide clear evidence to demonstrate how unreasonable some of Mr. Garren's estimates are.

Q. Please provide an example to illustrate the unreasonableness of Mr. Garren's recommendations.

A. Account 376.2, Mains - Cast Iron provides a very good example of Mr. Garren ignoring information regarding future conditions and strictly adhering to his curve fitting algorithm when making a life estimate. In 2013, UGI Gas publicly

[10] 62 Pa. P.U.C. at 468

declared its intention to accelerate its replacement of cast iron mains and retire all cast iron mains by March 1, 2027. As of December 31, 2012, UGI Gas had 348 miles of cast iron mains in service. UGI Gas plans to replace between 24-26 miles per year for the next 14 years starting in 2013. Prior to 2013, UGI Gas was replacing cast iron mains at a pace of approximately 7 miles per year. Based on the Company's plans to accelerate the replacement of cast iron mains as set forth in the LTIIP, all cast iron mains will be replaced by March 1, 2027, 33 years ahead of the prior timetable. This is important information related to specific company plans that needs to be factored into the life estimate for cast iron mains. The survivor curve estimates that I have made incorporate this information while Mr. Garren's survivor curve estimates does not. I will demonstrate this later on in the testimony. In the Company's most recent service life study performed and approved in 2012, the survivor curve estimate was revised from a 78-R0.5 to a 70-R1 in anticipation of the company formalizing a plan to accelerate the replacement of their cast iron mains. Mr. Garren's recommendation is to increase the service life estimate from 70 years to 82 years solely based on the Company's historical retirement experience for cast iron mains. This recommendation is astoundingly inappropriate given the Company's plans to replace all cast irons mains by March 1, 2027. The calculated composite remaining life for cast iron mains using the survivor curve estimated by Mr. Garren (*i.e.*, 82-L0.5) as of year-end 2017 is **44.8** years. All cast iron mains will have been replaced by March 1, 2027, which is less than 10 years beyond the end of the fully projected future test year. Clearly, the survivor curve estimated by Mr. Garren is wholly inadequate for UGI Gas's cast iron mains. Based on UGI Gas's cast iron main replacement plans it is impossible for Mr. Garren's survivor curve estimate (82-L0.5) to be correct since we know the remaining life for cast iron mains will be substantially less than 44.8 years.

Q. Please explain how you used information such as company plans to determine an appropriate survivor curve estimate for cast iron mains.

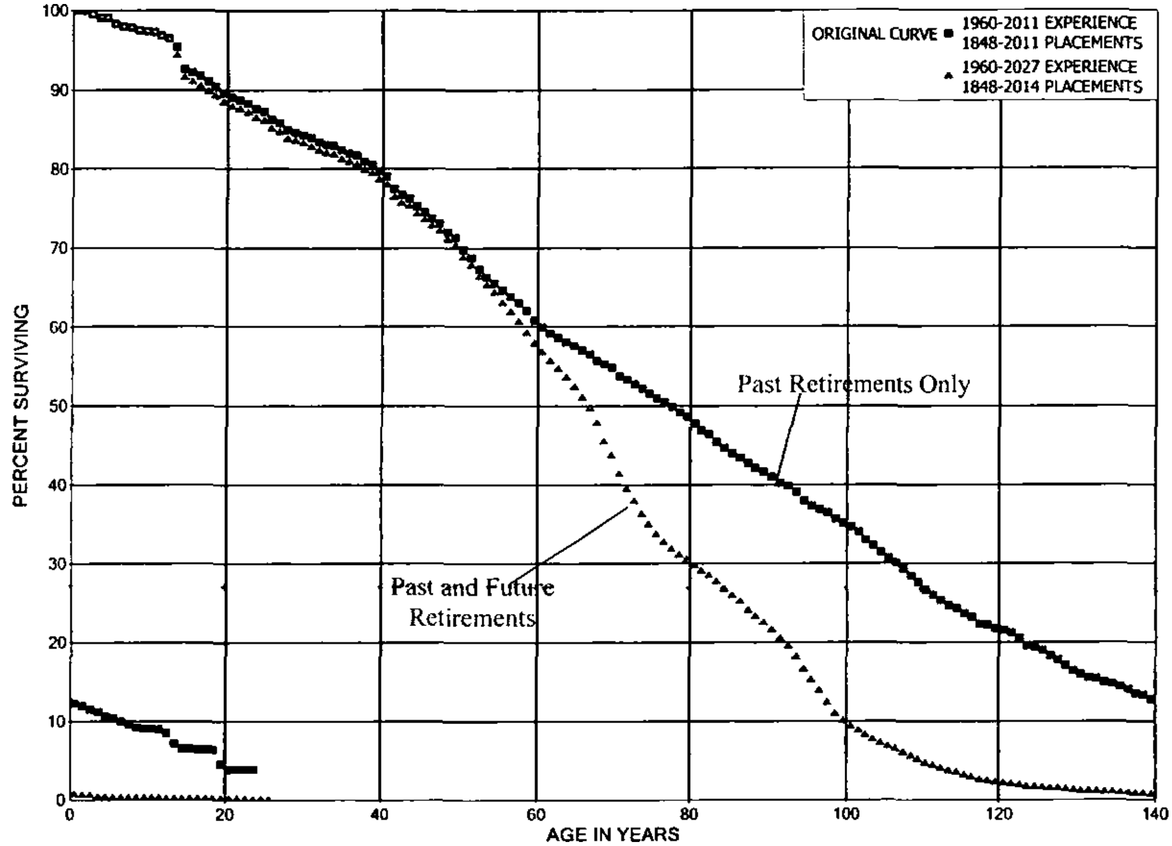
A. Cast iron mains were the pipe material of choice for UGI Gas and other gas companies since their formation in the mid-1800's. Cast iron and wrought iron pipe were used predominantly up through 1925 at UGI Gas at which time steel mains became prevalent. Cast iron mains along with steel mains continued to be installed at UGI Gas up through 1959. The most recent service life study for UGI Gas was submitted to the PUC in March 2012. At the time of the study, the company had not formalized its LTIIP plans although I was aware through discussions with company management that there were plans to accelerate the replacement of cast iron and bare steel mains and services. During our meeting with UGI Gas's engineering management, we were informed that the accelerated replacement of cast iron mains would likely occur over 20 years but they were working at the time to finalize their plans in conjunction with the PUC. This period later turned out to be a 14 years instead of 20 years. Using this information and professional judgment regarding cast iron mains, we estimated that future retirement rates for cast iron mains would increase particularly for those cast iron mains ages 52.5 and above. The youngest significant cast iron main installation occurred in 1959.

As of year-end 2011, the age of the 1959 installation pipe is approximately 52.5 years. Since there are no newer significant installations of cast iron pipe on the system than 1959, we knew future retirements were only going to affect the life tables for age intervals greater than 52.5. Based on this information, I visually fit the experience band from 1960-2011 trying to select a curve that fit the first 52 data points reasonably well, while also attempting to select a survivor curve that indicated higher rates of retirement for cast mains for age intervals 52.5 years and older. So, using my professional judgment, I envisioned a survivor curve that reasonably approximated the historical experience through age 52.5, but indicated greater rates of retirement for assets age 52.5 and older than what was indicated by the original survivor curve (a.k.a., "original life table", "OLT", "data points") from experience band 1960-2011. Based on my knowledge of company plans as of March 2012 to accelerate cast iron main replacements, I adjusted the survivor curve estimate for cast iron mains from 78-R0.5 to 70-R1. That is, in the most recent service life study, I reduced the average service life for cast iron mains from 78 years to 70 years and I increased the mode of the survivor curve to account for increased rates of retirements in the future occurring at ages older than 52 years regarding cast iron mains.

Q. Can you illustrate how you used professional judgment to incorporate Company plans such as the plans to accelerate the replacement of cast iron mains?

A. Yes. I assumed most of the changes to the original life table in future years would occur in ages 52.5 and older since 1959 was the last year of cast iron main installation of any significance. The 1959 installations of cast iron mains were 52.5 years old at December 31, 2011. In Figure 1 below, I have prepared a chart of the original life table for Account 376.2, Mains – Cast Iron depicting the full experience band (*i.e.*, 1960-2011) as of the last service life study and have also plotted the original life table incorporating future retirements of cast iron mains covering the period 1960-2027. This period, 1960-2027, is referred to as the experience band. Figure 1 presents a comparison of the 2 experience bands. The comparison clearly demonstrates that retirement rates have increased significantly for ages 52.5 and higher for the future experience band while the first 52 age intervals are relatively the same for both bands. The difference in the OLT's shown in Figure 1 below will occur in other distribution plant accounts as well as where future retirements rates are expected to increase at older ages than has been historically experienced.

Figure 1: UGI Original Life Table for Account 376.2



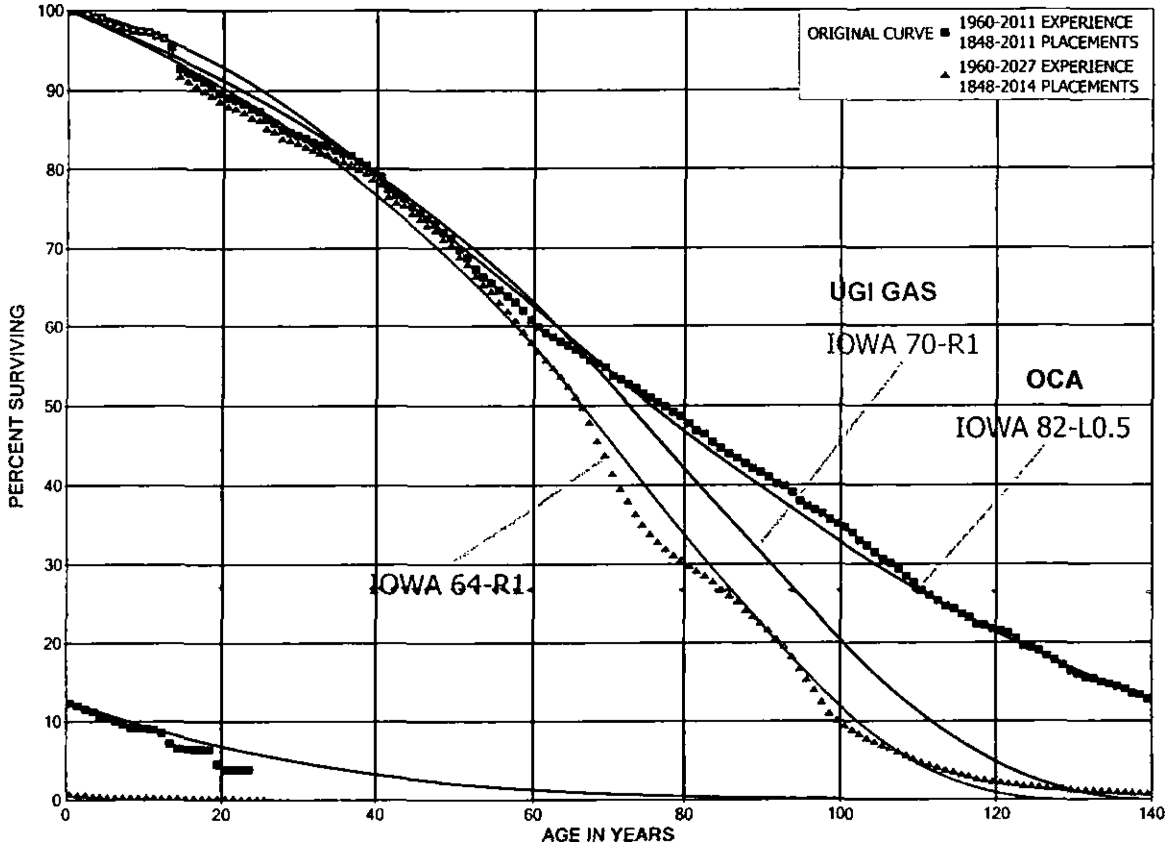
Q. Please continue with your life estimation process incorporating future plans related to cast iron mains.

A. On Figure 2 below, I have plotted the same two original life tables as Figure 1. Additionally, on Figure 2, I have graphed Mr. Garren's proposed survivor curve (82-L0.5) along with the survivor curve that I had proposed in the 2011 service life study (70-R1). The survivor curve estimates used in the 2011 service life study are the same as those used by UGI Gas in this proceeding. In addition, I have presented a third survivor curve (64-R1) which represents the best fit survivor curve encompassing past and future years, *i.e.*, experience band 1960-2027, based on information we have from the LTIIP filing. As shown on

Figure 2 below, Mr. Garren's estimate (82-L0.5) fits the OLT well for experience band 1960-2011. That is not surprising since he selected the best fit curve of the historical retirement data and used that as the basis for forecasting future service lives for cast iron mains. However, what is important to observe on Figure 2 is that Mr. Garren's proposed survivor curve estimate is a poor fit when future cast iron main retirement data is included, *i.e.*, experience band 1960-2027. This circumstance always will occur when the service life estimate is based solely on the historical retirement data and the historical data and future data are expected to be materially different.

In the 2011 service life study, I revised the prior survivor curve estimate of 78-R0.5 to the 70-R1 to incorporate Company plans for increased cast iron main replacements. I used informed professional judgment to select a curve that in my estimation would fit the historical data through age 52.5 well, but needed to be below the historical OLT (*i.e.*, experience band 1960-2011) for ages 52.5 and older in order to reflect increased rates of retirements for cast irons mains older than 52.5 years that would occur in future years. As indicated in Figure 2, my service life reduction from 78 to 70 years apparently was not a large enough life reduction as the original life table for experience band 1960-2027 indicates a 64 year average service life (*i.e.*, 64-R1 survivor curve). Regardless, Mr. Garren's recommendation to increase the service life for cast iron mains by 12 years is clearly inappropriate as it ignores pertinent information regarding the Company's replacement plans.

Figure 2: UGI Original Life Table and Survivor Curves for Account 376.2



Q. Did Mr. Garren indicate in his testimony that there are instances where using the mathematical best fit life and curve for life estimation purposes are not appropriate?

A. Yes, he did. On page 16, lines 12-20 of OCA Statement No. 5, Mr. Garren stated:

> The mathematical best fit is appropriate in most cases where the future depreciation can reasonably be expected to follow historical experience. However, this is not always the case. There are numerous factors that might lead a utility depreciation expert, familiar with the particular plant account for a given company for a given account, to deem that future depreciation expectations are different than historical experience. These factors, including major replacement or maintenance projects, differing life

> expectations of new technologies, or simply economic or engineering decisions of utility management might significantly affect the expectations for future retirement rates.

Q. Do you agree with Mr. Garren's statements on page 16, line 12-20 listed above?

A. Yes, I do. When making an estimate regarding future survivor characteristics of utility plant, one needs to consider all relevant factors that can impact future service lives. These factors include information regarding future conditions, changes in technology, company plans, etc. A depreciation professional needs to incorporate information about the future into existing historical information as much as possible when making a life estimate.

Q. Did Mr. Garren follow his own guidance as set forth on page 16, line 12-20 of his direct testimony?

A. No, he did not. For the 14 distribution plant accounts that he recommends a change in service life, all of his proposed survivor curve estimates are the ones that best fits the historical data. He increases the service lives for 14 distribution plant despite the fact that UGI Gas is embarking upon its largest and most aggressive asset replacement program in its history. Clearly, future retirements levels will be much different than those experienced by UGI Gas. Making service life forecasts based solely on past experience as Mr. Garren has proposed in this proceeding is inappropriate. As I have demonstrated with cast iron mains, future service lives for most distribution plant accounts will be different and shorter than those service lives historically experienced due to the level of replacement activity set forth in the LTIIP.

C. **<u>OCA's Approach to the actual curve fitting process is also inappropriate</u>**

Q. Is judgment also important in the actual curve fitting process?

A. Yes. As discussed above, judgment is critical in the life estimation process. Judgment is also critical for the life analysis of historical retirement data including the actual curve fitting process. Depending on the selection of data points and the judgment in extrapolating the survivor curve beyond the available or significant data, the curve fitting process can produce very different results. For this reason, judgment is also important to ensure that the data is interpreted and extrapolated properly. Mr. Garren's approach, which is to mechanically select best fitting mathematical curves based on almost all of the data points – whether significant or not – does not properly interpret the historical data.

Q. Do authoritative sources support your approach to curve fitting?

A. Yes, in the well-regarded depreciation text titled *Depreciation Systems*, by Wolf and Fitch, the authors explain that when curve fitting, the depreciation professional must "decide which points or sections of the curve should be given the most weight." Wolf and Fitch go on to explain:

> Points at the end of the curve are often based on fewer exposures and may be given less weight than points

> based on larger samples. The weight placed on those points will depend on the size of exposures. Often the middle section of the curve (that section ranging from approximately 80% to 20% surviving is given more weight than the first and last sections. This middle section is relatively straight and is the portion of the curve that often best characterizes the survivor curve.[11]

Wolf and Fitch also explain that mathematical curve matching should not be the only analysis performed:

> On the surface, the removal of judgment from the fitting process may appear to be an advantage, but blind acceptance of mechanical fitting processes will occasionally but consistently result in poor results. A better procedure is to use the least squares method to select *candidates* for the best fit. Comparison of the sum of squares will reveal situations where the difference between the best choices is small. The analyst should then visually examine the observed data and compare them to the theoretical curves. This can be done quickly on a computer with graphic capabilities so that the analyst need not use time to plot the observed curve by hand. The analyst can consider single points that contribute significantly to the sum of squares but that

[11] *Depreciation Systems*, Frank K. Wolf and W. Chester Fitch, 1994, pp. 46-47.

> may deserve less weight than other points. Fits at various sections on the curve can be evaluated and weighted using the judgment of the experienced analyst.[12]

Q. Have you followed this approach to curve fitting?

A. Yes.

Q. Has OCA followed this approach to curve fitting?

A. No. OCA relies solely on the results of mathematical curve matching, and includes almost all data points in its curve matching results. As Wolf and Fitch explain, this is not an appropriate approach. OCA gives equal weight to all data points (or almost all points) whether they are meaningful or not.

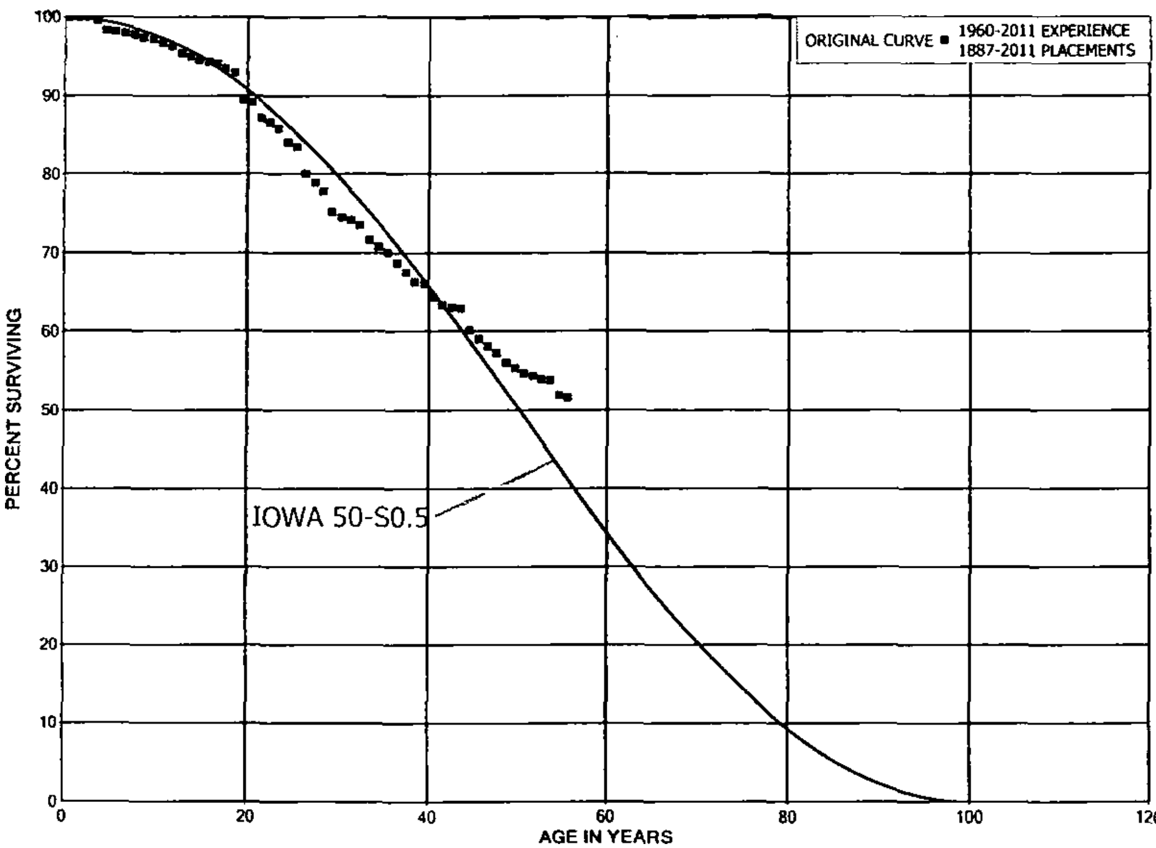
Q. Please provide another example to illustrate the unreasonableness of Mr. Garren's recommendations.

A. Account 378.0, Measuring and Regulating Station Equipment - General provides a very good example of the unreasonableness of his proposals. I have selected the 50-R0.5 survivor curve, which represents a good fit of the data through the most representative data points and is a reasonable representation of the mortality characteristics for the type of property in this account.

[12] Ibid, pp. 47-48.

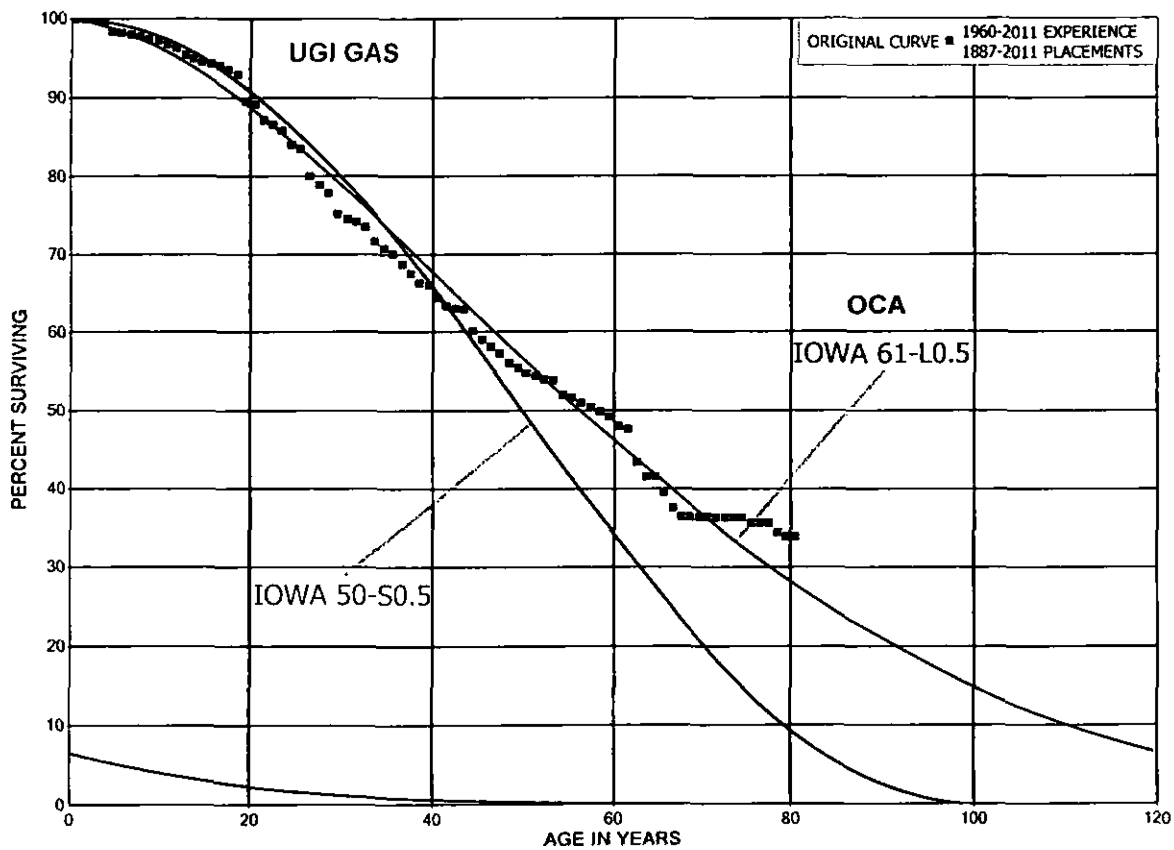
The original life table for this account has been presented on pages VI-25 through VI-27 of the Depreciation Study (UGI Gas Exhibit C – Future), and a graph of the survivor curve I have selected as well as the most representative data points from the original life table is presented on page VI-24 of UGI Gas Exhibit C (Future). I have reproduced this graph below in Figure 3 below. In my life analysis for this account, I have selected to study the data points from age 0 through age 56.5. Therefore, the T-cut that I have selected for this account is 56.5.

Figure 3. UGI Gas Estimate and Original Life Table for Account 378



As demonstrated in Figure 4 below, my estimate fits the data points through age 50 reasonably well and it takes into consideration increasing rates of retirement for assets beyond age 50. Future rates of retirement will increase for this account as the Company implements their accelerated cast iron and bare steel main replacement program. The Company's low-pressure gas system is located primarily in areas where cast iron mains are installed. As cast irons mains get replaced in the urban areas, the low pressure gas system (0.25 PSI or 7 inches of water column (wc)) will be replaced as the area will have been converted to medium or intermediate gas pressure (~55 PSI). Once the low pressure system has been replaced, there will no longer be a need for the district M&R stations that were built to serve the low pressure system.

Figure 4: UGI Original Life Table and Survivor Curves for Account 378



Additionally, my estimate is representative of the mortality characteristics of the assets being studied. One of the primary reasons for the retirement of M&R station equipment, other than functional obsolescence, is deterioration and the difficulty in getting spare parts to replace worn or deteriorated equipment. Thus it would be expected to see retirements increase as M&R station equipment age. My estimate reflects these phenomena as well as the expectation for increased rates of retirements beyond age 50 in the future as a result of the Company's asset replacement plans set forth in the LTIIP. Once the curve shown in Figure 4 above reaches about 40 years of age, my proposed survivor curve begins to move downwards at a higher rate (that is the slope of the curve becomes more negative) than Mr. Garren's. This curve shape reflects that assets are more likely to retire as they age, which is reasonable for this type of property. Mr. Garren's estimate, however, does not incorporate this trend and instead incorporates the expectation that some assets will last 120 years or more.

On Figure 4 above I show both proposed survivor curves, mine and Mr. Garren's. Additionally, on Figure 4 above, I show the data points from the OLT through age 80.5. The additional data points from the OLT from ages 57.5 to 80.5 are data points that Mr. Garren relies on and I do not. In general, the two proposed survivor curves fit the historical data through age 56.5 reasonably well as they are similarly shaped curves through age 45. The difference in the two proposed survivor curves becomes pronounced beyond age 56.5.

Relative to the age intervals beyond 56.5, Mr. Garren relies on these data points between ages 57.5 and 80.5 even though most data points for these age intervals contain less than $30,000 worth of plant investment (*i.e.*, a relatively small sample). The shape of the survivor curve proposed by Mr. Garren is unduly influenced by data points at the tail end of the original curve for ages containing few exposures (*i.e.*, minor plant investment). As I have demonstrated in the cast iron example above in Figures 1 & 2, the OLT will be different in the future for accounts where increased rates of retirement will occur at older ages than has been previously experienced. For life estimation purposes, future circumstances such as company plans need to be incorporated when extrapolating beyond the known and reliable portion of the original curve. I have attempted to do this by estimating survivor curves with higher rates of retirement at older ages than what previously has been experienced and Mr. Garren has not made this attempt.

Q. Do you have any comments on Mr. Garren's estimate?

A. Yes. An evaluation of the survivor curve selected by Mr. Garren confirms the unreasonableness of his estimate. An Iowa survivor curve, such as the 61-L0.5 curve he has selected, describes not only the average life of a group of property, but also the dispersion of lives around the average. Thus, the survivor curve estimate describes the range of lives expected to be experienced by the entire group. When one examines the implications of the survivor curve selected by Mr. Garren, it becomes clear how unreasonable the 61-L0.5 survivor curve is.

The graph in Figure 4 above shows the percentage of assets expected to survive, or remain in service, for each age. The smooth line describing the 61-L0.5 survivor curve in Figure 4 above represents Mr. Garren's estimate. Thus, because the smooth line reaches age 40 at about 67 percent surviving, Mr. Garren expects about 67 percent of the asset to have lives of at least 40 years. This is not unreasonable based on the data (shown as black squares in the graph), and is similar to the expectation based on my proposed curve *(i.e., 50-S0.5) shown in Figure 4 above. However, it is at the later ages where Mr.* Garren's estimate becomes very unreasonable. His estimate projects that 15 percent of the assets in this account will last at least 100 years, and that about 8 percent will last at least 120 years. The maximum life for the survivor curve he has selected occurs at about 247 years for M&R station equipment compared with 100 years for the survivor curve that I have estimated.

Q. Do you believe that this is unreasonable?

A. Absolutely. Services lives exceeding 120 years for measuring and regulating station equipment are unreasonable; yet, that is what Mr. Garren *recommends. The equipment included in this account such as regulators,* valves, heaters, piping, gauges, odorizing equipment will be removed well in advance of the assets reaching 120 years for safety and reliability reasons, in addition to other common reasons such as deterioration and obsolescence.

Q. Does any of the company's actual experience support that these types of assets can last this long?

A. No. Even the data points Mr. Garren has used, which are shown in Figure 4 above, only extend to 80 years of age. There are no actual data for assets that have lasted beyond 101 years at UGI Gas.

Q. Mr. Garren discusses a "T-cut" in his testimony.[13] What is a T-cut?

A. A T-Cut designates which points are included in a mathematical curve matching routine. Certain points can be excluded if they are not representative of the future experience for an account. The problem with mathematical matching is that it gives each data point equal weighting in the curve matching. As I will explain, this is not always a reasonable assumption. For this reason visual curve matching and judgment should also be used to determine the most appropriate survivor curve.

Q. Do you agree with the T-cut Mr. Garren has used for this account?

A. No. In my opinion Mr. Garren has incorporated too many data points that are not statistically robust enough to provide a reasonable indication of service life. Additionally, because his curve matching routine gives these data points equal weighting, he has placed far too great an emphasis on later ages.

Q. What is a more appropriate approach?

A. This account contains over 350 measuring and regulating ("M&R") stations on the UGI Gas system. The purpose of the M&R stations is primarily to regulate the pressure of the gas in the system by reducing the pressure generally from

[13] OCA Statement No. 5, p. 10-11.

intermediate pressure to low pressure. The account includes assets such as regulators, piping, valves, heaters, gauges, odorizing equipment, etc. Therefore, in order to have a fairly large sample of assets to study, there should be a reasonably large level of exposures in the original life table. The term "exposures" means the total population of asset investment exposed to retirement for a given age interval (*e.g.*, age interval 0.0 to 0.5 years).

The exposures and the original life table for this account are shown on pages VI-25 through VI-27 of the Depreciation Study. For example, age zero has $20,238,567 in exposures. The percent surviving listed in the life table for the next age interval, age 0.5, is based on this amount of exposures multiplied by its survivor rate. The percent surviving for subsequent ages is determined in the same manner. The exposures at age 0 of $20,238,567 is a large amount and contains a large number of assets. However, later ages contain far less exposures. For example, beyond age 60.5 the exposures are less than $40,000. This amount ($40,000) represents a fairly small number of assets and a relatively small sample size. Thus, the data for these ages in my judgment cannot be relied on. Yet, not only does Mr. Garren include many of these data points in his curve fitting, but he gives them equal weight to data points with much, much larger levels of exposures. The inclusion of these data points at very old ages near the tail of the original curve influences the results of the mathematical curve-fitting routine in a manner that, in my judgment, is inappropriate. The inclusion of these data points tends to improperly skew the service lives longer than what is reasonable and this is inappropriate.

Q. What is a more appropriate portion of the curve to consider for curve fitting?

A. In my opinion, data points through age 56.5 are more representative of the future experience for this account. The data for these ages based on relatively large dollar amounts (over $178 thousand) and therefore contains a reasonably large number of assets. Just as important, the data through these points also represents a reasonable indication of the life expectations for this account. As can be seen in Figure 4 above, after about age 60.5 the life table (black squares) begins to have a more erratic pattern and presents less of a definitive trend. After about age 70 it declines much more slowly. As I have discussed previously, I would expect the retirements in this account to tend to increase as they age, not decrease. Therefore, this later portion of the life table is most likely not representative of the actual life characteristics for this account. Instead, the erratic movements occur because there are relatively few exposures and sporadic retirements, and in my judgment these later ages beyond age 56.5 should not be relied on. Also, the M&R station equipment built to serve the company's low pressure gas system, primarily serviced by cast iron mains, will no longer be needed and will result in larger future retirements for this account.

Q. Do Mr. Garren's other estimates have similar problems?

A. Yes. Almost all of his estimates exhibit the problems one would expect when basing an estimate solely on the adherence to statistics. Mr. Garren selected survivor curves entirely based on the results of statistical analysis, and as a result ignored other factors, such as company plans and those other factors noted in the NARUC Manual including "personal experience, maintenance policies, past company studies, and other company owned equipment."[14] The fact that his analysis is based on erroneous data only compounds the problem.

D. <u>OCA's Calculation Issues</u>

Q. Are there issues with Mr. Garren's application of the retirement rate method?

A. Yes. Mr. Garren's estimates are based on original life tables developed from the Company's historical data using the proprietary software of his firm, Snavely-King. The original life tables calculated by Mr. Garren have differences from those I have calculated for the depreciation study. There should not be any differences. The same historical plant accounting data was used by both parties. There are a handful of reasons for the differences, including how Mr. Garren's software processes historical transactions. His software ignores certain correcting entries and accounting adjustments. However, there is one issue in particular I would like to focus on, as it is consistent with the fact that Mr. Garren is not familiar with UGI Gas, its operations and its accounting practices.

Q. On page 15 of his testimony Mr. Garren explains why his "best fitting" results differ from yours. Can you address his claim?

[14] NARUC Manual, p. 128

A. Yes. Mr. Garren states that the statistical best fitting curves from his analysis "differ from the best fits resulting from Mr. Wiedmayer's analysis because I am using the full band of depreciation data available, rather than only the data from 1960 forward."[15] In other words, Mr. Garren produces different mathematical results because he assumes that the Company has historical data prior to 1960.

Q. Does the Company have historical data prior to 1960?

A. No. Like many utilities, UGI Gas did not start to maintain aged plant accounting data (*i.e.*, data for which the vintage year of each transaction is known) until 1960. This is a piece of information I am aware of from my many years of conducting studies for UGI Gas. There is no data available for the life analysis prior to 1960, and therefore when I used "only the data from 1960 forward" I did in fact use the "full band of depreciation data available."

Mr. Garren assumed there was aged plant accounting data starting in 1852. There was not. Most utilities that I am familiar with didn't start recording aged plant accounting data until 1938 at the earliest, with other utilities starting later. Mr. Garren should have realized that there is no utility company in the country that maintains aged plant accounting data from 1852. He should have revised his experience band in accordance with the data he was provided which covered the period 1960-2011. Also, he should have analyzed additional bands such as the ones that I selected and used in the study.

[15] Direct Testimony of James Garren, p. 15, lines 10-12.

Q. What is the impact of Mr. Garren's erroneous assumption that data was available prior to 1960?

A. Mr. Garren uses experience bands for many accounts that go as far back as the 1850s. Because there is no plant accounting data prior to 1960, there are no recorded retirements prior to 1960. The effect of Mr. Garren's error is that he therefore assumes when constructing his original life tables that the Company did not retire a single asset from the 1850s through 1959. This is clearly an incorrect assumption.

Q. Do you have any further comments regarding the life tables calculated by Mr. Garren?

A. Yes, we asked Mr. Garren in UGI Gas to OCA-I-24 parts b-d to verify and explain the numbers listed in his life tables in his testimony on page 12 of OCA Exhibit JSG-3, particularly the exposure column for Account 376.1, Mains – Primarily Steel. He provided a response with an excel spreadsheet attachment showing the calculation. However, the amounts that he determined and listed in his response to UGI Gas to OCA-I-24 parts b-d do not even match the amounts set forth in his testimony on page 12 of OCA Exhibit JSG-3.

Q. Given Mr. Garren's approach to estimating service lives, is his error of particular concern?

A. Yes. The fact that Mr. Garren has not calculated the correct original life tables is of particular concern since Mr. Garren has mechanically selected best fit survivor curves, and did not incorporate professional judgment or other information into his life estimates. As I have explained, Mr. Garren's approach of simply selecting best fitting curves is inappropriate in its own right. However, the fact that he has mechanically selected the best fitting curves from the wrong data makes his estimates all the more incorrect.

E. Conclusion

Q. What can you conclude regarding OCA's service life estimates?

A. OCA's service life estimates are based both on a flawed methodology, erroneous data and a complete disregard of Company plans regarding asset replacements. They therefore have no sound basis and produce very unreasonable results. As a result, OCA's service life estimates should be rejected in their entirety. The estimates I have made in the depreciation study incorporate all relevant factors and represent the best estimates of future survivor characteristics for each account.

IV. EQUAL LIFE GROUP DEPRECIATION

Q. What is the Equal Life Group procedure?

A. Under the Equal Life Group procedure ("ELG"), a group of property (*e.g.*, a vintage within a property account) is subdivided into groups having equal service lives. The size of these "equal life groups" is based on the estimated survivor characteristics of the account. Depreciation can then be calculated for each equal life group based on the straight line method; that is, an equal amount of the group's service value is recorded as depreciation expense in each year of service. The total depreciation for an account is then the summation of the calculated depreciation for each equal life group. In other words, based on the survivor curve estimate for an account, the ELG procedure mathematically estimates the life for each unit in the account, and then depreciates each unit over its expected life. For this reason, the procedure is also known as the unit summation procedure. By calculating depreciation for each equal life group, the ELG procedure contrasts with the Average Service Life ("ASL", also referred to as "Average Life Group", or "ALG") procedure, which depreciates every asset within an account over the average life of the account.

Q. Has the ELG procedure been previously adopted in Pennsylvania?

A. Yes. ELG is the predominant method used in Pennsylvania, and has been used for many years. As Mr. Garren acknowledges,[16] ELG was adopted for UGI Gas in 1984 at Docket No. R-832331. UGI Gas has used ELG depreciation ever since.[17] Most other Pennsylvania utilities have adopted ELG and used this procedure for many years.

Q. Given that the use of ELG is the predominant and longstanding practice in Pennsylvania, has Mr. Garren provided evidence as to why UGI Gas *should be required to deviate from this practice?*

A. No. Mr. Garren has provided very little discussion of ELG. Apparently, he

[16] OCA Statement No. 5, page 18, lines 6-7.

[17] I should note that ELG was adopted for UGI, and many other PA utilities, on a go forward basis. For this reason, vintages of plant subsequent to the adoption of ELG use ELG and older vintages use ASL. For UGI, vintages 1982 and subsequent use ELG and vintages 1981 and prior use ASL.

wants the Commission to overturn its longstanding precedent, but simply fails to provide a valid reason for the change. As I will explain, his one argument against ELG – that it is more susceptible to "errors" than ASL - demonstrates little other than his lack of understanding of Pennsylvania depreciation practices. He also appears to disagree with ELG because it can produce higher depreciation rates. This of course is not a reason to overturn longstanding precedent. Moreover, as I will explain below, Mr. Garren is incorrect that the longstanding use of ELG costs customers more than ASL. In fact, the opposite is true.

Q. Before turning to your discussion of Mr. Garren's arguments, please explain the ELG procedure.

A. A simple two unit example will demonstrate how the ELG procedure more appropriately matches cost recovery through depreciation to consumption than the ASL procedure. In this example, each unit costs $1,000. Unit A will be in service for 5 years and Unit B will be in service for 15 years. There is no net salvage for these units.

Under the ASL procedure, the average service life for the two units is 10 years ((5+15)/2). The annual depreciation rate is 10% (1/10). Thus, for the first five years the total annual depreciation amount is $200 ($2,000 x 10%). At the end of year 5, the total of annual accruals for the account is $1,000 ($200 x 5). At this time, Unit A is retired, which results in a deduction of $1,000 from accumulated depreciation. At the start of year 6, Unit B remains in service and the original cost ($1,000) is offset by the accumulated depreciation of $0. However, at this point one third of Unit B's service life has expired, so its accumulated depreciation should not be zero.

For the remaining 10 years, $100 (10% x $1,000) of annual depreciation expense is charged to accumulated depreciation, for a total of $1,000 of expense over this period. When Unit B is retired, $1,000 is deducted from accumulated depreciation and both the original cost and accumulated depreciation will equal zero. Thus, at the time of Unit B's retirement, the Company will have fully recovered the total depreciable cost of both units. However, at the end of year five only one unit remained in service with two-thirds of its life expectancy still to be consumed, but with 100% of the original investment in that unit still to be recovered. As a result, the ALG procedure was ineffective in matching cost recovery to the actual consumption of the asset.

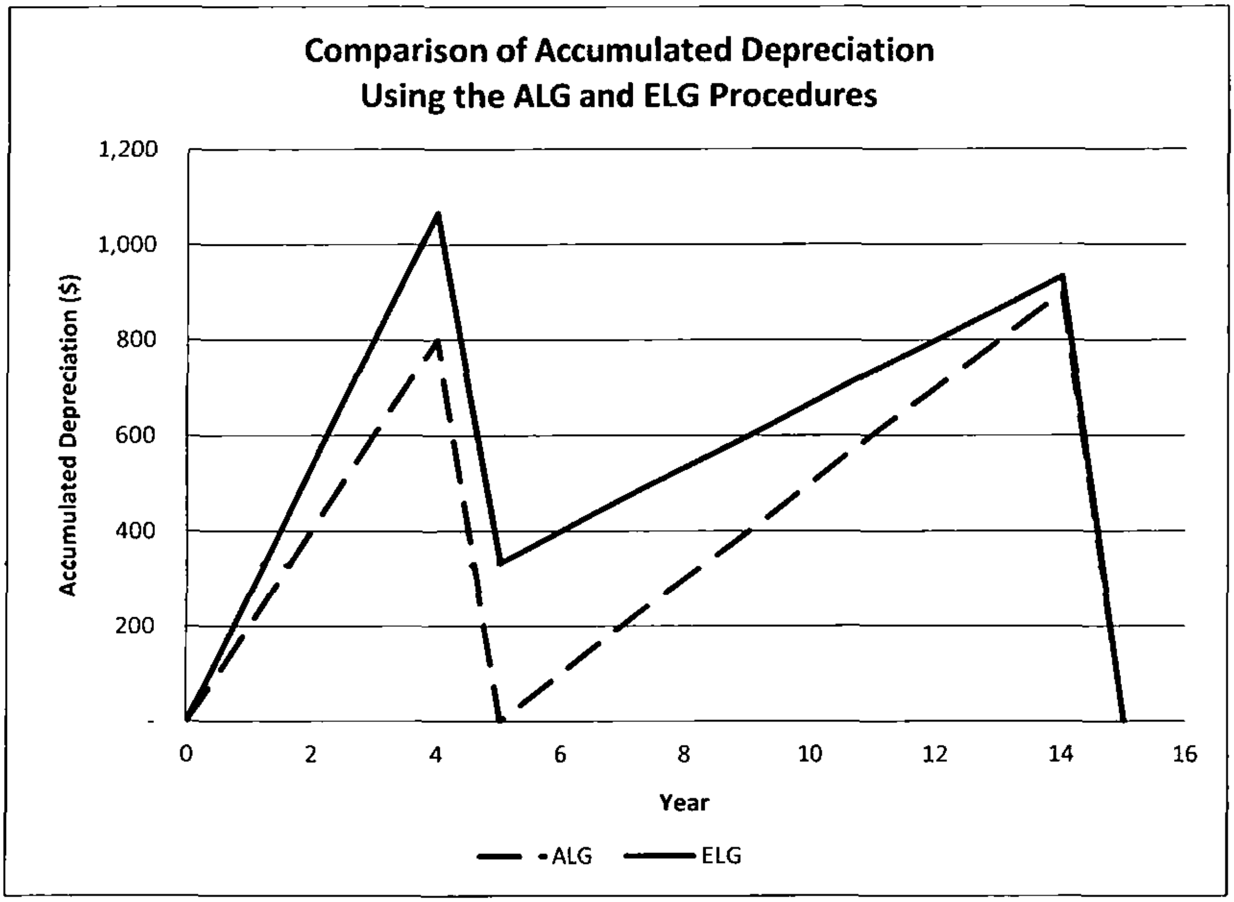
Q. How is depreciation determined using the ELG procedure?

A. When depreciation is determined using the ELG procedure, the pattern of cost recovery better matches actual consumption. Using the same two unit example, the annual depreciation expense under the ELG procedure is calculated by summing the annual expense for each equal life group. In this case, there are two equal life groups – one for Unit A, which has a life of 5 years, and one for Unit B, which has a life of 15 years. The annual depreciation rate for Unit A is 20% (1/5) and for Unit B is 6.67% (1/15). Thus, the annual accruals for years 1 through 5 will be $200 (20% x $1,000) for the first equal life group (Unit A) summed with $66.67 (6.67% x $1,000) for the second (Unit B), or $266.67. At the end of year 5, when Unit A is retired, the total accruals would be $1,333.33. The retirement of Unit A results in a deduction of $1,000 to accumulated depreciation and, at the start of year 6, the $1,000 original cost of Unit B remains with $333.33 in accumulated depreciation. Thus, with one third of Unit B's life consumed, accumulated depreciation is exactly one third of the original cost for this unit.

In the years 6 through 15, the annual depreciation expense is $66.67 for a total of $666.67 over the 10 year period. Thus, after the retirement of Unit B, the accumulated depreciation is $0 ($1,000 of accruals less the $1,000 retirement of Unit B), and the full recovery of both units has been obtained.

As this example shows, the ELG procedure better matches the cost recovery of both units with their actual service lives. Figure 5 below provides a graph of the accumulated depreciation for both procedures. The end of year 5 provides the best illustration of the difference between the two procedures. Under the ELG procedure, Unit A is fully recovered when retired at the end of year 5; Unit B is one third through its service life and has had one third of its cost recovered. This contrasts with the ALG procedure, in which accumulated depreciation is $0 at the end of year 5, despite the fact that the only unit remaining in service has consumed one third of its service life. Clearly, the ELG procedure better matches the actual service lives for these units.

Figure 5



Q. You have provided a simple two unit example demonstrating how ELG works. Do the same principles apply to larger property groups with many units?

A. Yes. The same principles apply when the ELG procedure is applied to a large group of property with many units, as is typical of utility property. The survivor curve estimated for each property account can be used to divide an account into equal life groups. The survivor curve allows for the calculation of the percentage of the property account that is in each equal life group, which allows for the calculation of ELG annual depreciation accruals for the entire

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property group. Under the ALG procedure, the depreciation expense for all property in the account is calculated based on the average service life for the entire group.

The ELG procedure recognizes the reality of dispersion. Specifically, it recognizes that in actual utility operations only a very small percentage of the account will actually be retired at the average service life. Figure 6 below, is a chart of the frequency curve for the 47-R2 survivor curve used for Account 380, Services. The frequency curve shows the percentage of property in this account that will be retired at each age, based on the estimated survivor curve. This percentage is also the size of each equal life group.

The shaded bar in Figure 6 represents the percentage of property that will have a life of 47 years. In other words, this shows the percentage of property that is expected to be in service for the average service life. As the chart shows, only 2.16% of the assets will be in service for 48 years; conversely, 97.84% will have a different service life. Some service lines will be damaged or have to be relocated and therefore will be retired much earlier than the average, while others will be in service much longer than the average. Most will fall somewhere in between these extremes.

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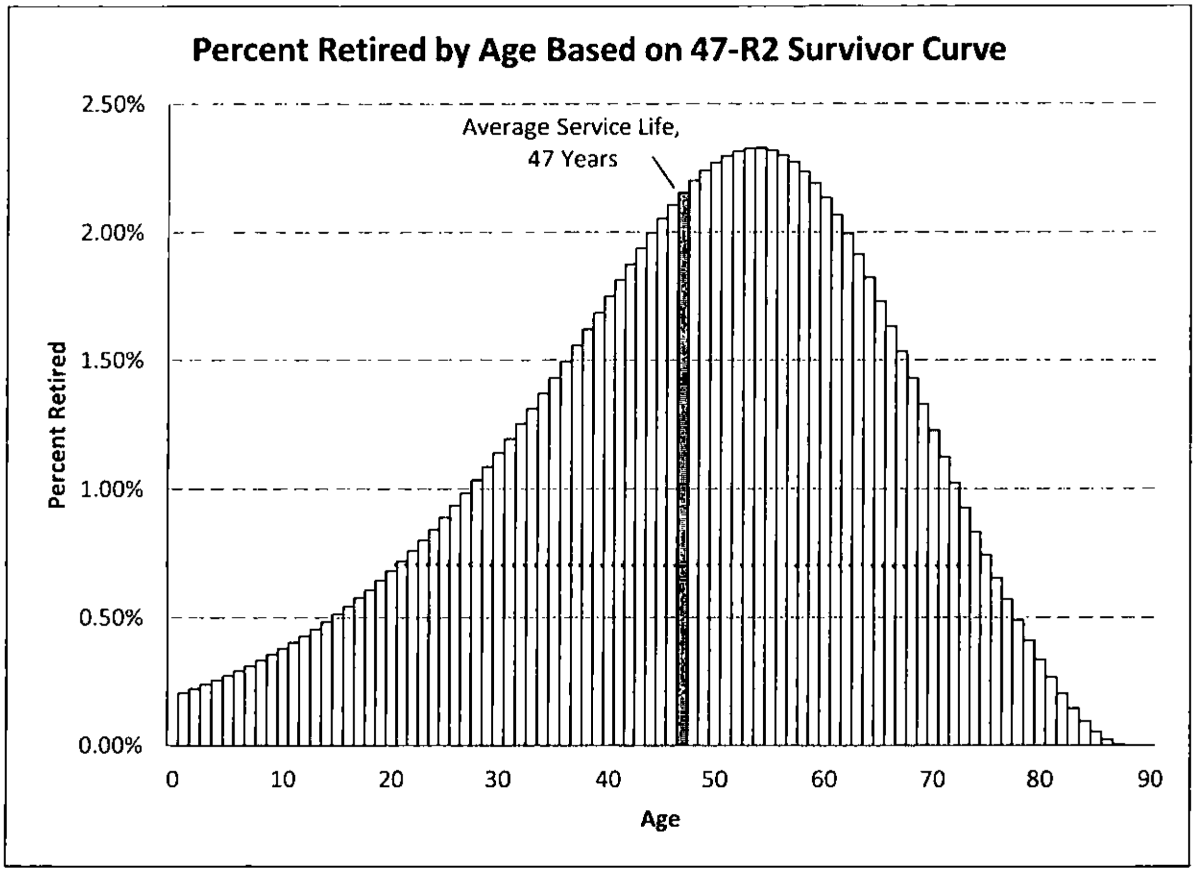
Figure 6



The ELG procedure recognizes this dispersion, and allocates costs for each equal life group over the expected life for that group. As a result, the ELG procedure allocates cost in a manner that approximates the result of each asset being depreciated over its actual life. Conversely, the ASL procedure depreciates every unit of property within an account over the same life, that is, the average life. As Figure 6 shows, this average life will be incorrect the majority of the time – in this example, the average life will be the wrong life for 97.84% of the assets.

Thus, just as was the case for the two unit example provided above, the

ELG procedure better matches capital recovery with the actual lives forecast by the estimated survivor curve.

Q. You have explained above that ELG has been used in Pennsylvania for many years. Is the ELG procedure also supported by other depreciation authorities?

A. Yes. ELG is discussed and supported in authoritative depreciation texts and academic literature. For example, Robley Winfrey, who developed the Iowa survivor curves at Iowa State University and is generally regarded as the father of utility depreciation practices, referred to the ELG procedure as "the only mathematically correct procedure."[18]

Q. What are Mr. Garren's arguments against the use of the ELG procedure?

A. While Mr. Garren acknowledges that ELG is "a more precise application of the same life and retirement pattern assumed in the ASL procedure,"[19] he provides very little reason as to why he believes the Commission should reverse its longstanding precedent in order to use a procedure he admits to be less precise. Mr. Garren only states that:

> Due to this precision, ELG is much more susceptible to errors resulting from forecasting inaccuracies. Because of this, ELG makes it necessary for the Company to file for annual updates to its average service lives in order to remain accurate. Given that

[18] Robley Winfrey, Depreciation of Group Properties, Bulletin 155 (Ames, IA: Iowa State University Press, 1942, reprinted 1969); p. 71

[19] OCA Statement No. 5, p. 18, lines 10-11

> UGI only performs service life studies every five years, ELG is not a good fit for UGI. Finally, ELG remaining life calculations tend to understate the remaining lives of recent vintages when not updated frequently. As a result, the practical effect of this disaggregation is higher depreciation rates.[20]

Mr. Garren is incorrect that ELG is more subject to "errors." However, his statements also demonstrate that he does not understand depreciation practices for Pennsylvania utilities.

Q. Please explain.

A. Mr. Garren argues that ELG requires depreciation rates to be "updated frequently." This is the exact practice in Pennsylvania, which has been followed by UGI Gas for many years. Utilities in Pennsylvania file Annual Depreciation Reports ("ADR") each year, in which depreciation rates are calculated based on current plant balances. These updated depreciation rates are then used by the utility on its books for that year. Further, when the ADR is prepared, the plant and accumulated depreciation activity for the previous year is reviewed in order to determine if any changes in service lives may be necessary. In most cases, updates to service lives are not necessary because service life estimates for utility property typically do not change significantly from year to year. However, although utilities file service life studies every five years, because the data is reviewed each year when the ADR is prepared,

[20] OCA Statement No. 5, p. 18, line 15 to p. 19, line 2.

service lives can be modified in the interim period between service life studies if needed.

For these reasons, UGI Gas's current practice already satisfies Mr. Garren's statement that a utility "file for annual updates to its average service lives in order to remain accurate." His only argument against ELG is therefore already refuted by the depreciation practices established in Pennsylvania by the Public Utility Commission over 30 years ago including the actual depreciation practices used by UGI Gas.

Q. Are there any other statements made by Mr. Garren related to ELG you would like to address?

A. Yes. Mr. Garren posits that the result of ELG is "higher depreciation rates," which he appears to believe is not in the "best interest of ratepayers."[21] In making this claim, not only does Mr. Garren ignore the impact of depreciation expense on rate base, but he fails to note that any benefit to current customers of his proposal to use ASL depreciation rates only results from the change from ELG to ASL – not from the overall use of the ASL procedure itself.

Q. Please explain this concept further.

A. In Section II, I explained that over time higher depreciation expense results in a lower rate base, because accumulated depreciation is a reduction to rate base. As a result, the longstanding use of ELG depreciation rates for UGI Gas

[21] OCA Statement No. 5, p. 19, lines 1-5.

has resulted in a lower rate base than had ASL been used for the past thirty years. Customers today therefore pay lower customer rates than had ASL been used for all of these years. As a result, it has in fact been in the customers' interest to use ELG for this time – at least in terms of the fact that customer rates are lower than they would be had ASL been used.

Again, over time ASL will actually result in higher customer rates than ELG. However, if the Company were to switch from ELG to ASL there would be a short term benefit to current customers. However, this is not because ASL is in the customers' best interest in the long term, but instead only because current customers would benefit from both lower ASL depreciation rates <u>and</u> from the lower rate base that exists due to the longstanding use of ELG.

Mr. Garren's proposal is therefore not a recommendation that is in the long term interest of lower customer rates. It is instead a short term subsidy only to current customers who benefit from higher ELG depreciation rates paid by a previous generation of customers. The costs of a higher rate base will be paid for by future customers who will have to pay higher overall customer rates.

Mr. Garren's proposal is therefore not in "the best interest of customers." Instead, it is better thought of as an intergenerational subsidy to current customers at the expense of other generations of customers.

Q. Mr. Garren also states that "ELG remaining life calculations tend to understate the remaining lives of recent vintages when not updated

frequently."[22] Can you address this comment?

A. Yes. First, as I have explained the depreciation rates for UGI Gas are updated annually, and therefore the remaining lives are "updated frequently." Second, I should be clear that ELG does not understate remaining lives of recent vintages. Instead, as I have explained, ELG properly recognizes that a portion of assets in recent vintages will have service lives much shorter than the average. ELG therefore results in the correct remaining lives of recent vintages. ASL, by depreciating all plant over the average life rather than the unit life (or its proxy known as the equal life group), actually overstates the remaining lives of recent vintages.

Q. Do you have any further comments regarding the selection of the Equal Life Group depreciation calculation procedure?

A. Yes. The selection of the depreciation calculation is one of several decisions that a depreciation professional needs to make when defining a depreciation system used to calculate depreciation expense. There are options that need to be selected regarding the methods of depreciation (*i.e.*, straight-line vs. accelerated or decelerated methods), depreciation techniques (*i.e.*, whole-life vs. remaining life) and depreciation procedures (*i.e.*, ELG vs. ASL). A *consistent* approach using the same depreciation methods, techniques and procedures is best from an accounting and ratemaking perspective. The use of an alternative procedure should only occur in rare instances when there are compelling reasons to change. Mr. Garren has not presented any compelling

[22] OCA Statement No. 5, p. 18, line 19 to p. 19, line 1.

reasons to change depreciation calculation procedures. The American Institute of Certified Public Accountants' definition of depreciation accounting reflects the concept of depreciation as a cost of operation as such:

> Depreciation accounting is a system of accounting that aims to distribute cost or other basic value of tangible capital assets, less salvage (if any), over the estimated useful life of the unit (which may be a group of assets) in a *systematic* and *rational* manner.

The key phrase regarding the definition of depreciation accounting is that the depreciation calculations should be determined "in a systematic and rational manner." Changing the depreciation calculation procedures to suit a particular current circumstance is inconsistent with the approach encompassed by the AICPA's definition of depreciation accounting.

Q. What do you conclude regarding the ELG issue?

A. ELG is the longstanding and predominant practice in Pennsylvania, and has been used by most utilities in the state for many years. Mr. Garren has provided minimal evidence in support of his proposal to reverse this longstanding precedent. Further, what little evidence he provides is incorrect and demonstrates a lack of understanding of the actual practices used by Pennsylvania utilities. ELG should therefore continue to be used by UGI Gas, as has been the case for over thirty years.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.