BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Docket No. R-2017-2640058

UGI Utilities, Inc. - Electric Division

St. No. 7-R

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

Topics Addressed: **Depreciation**

Date: May 26, 2018

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JOHN F. WIEDMAYER

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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. - Electric Division ("UGI Electric" or the "Company")?

A. Yes. I submitted my direct testimony, UGI Electric St. No. 7, on January 26, 2018.

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.

Q. Will you be sponsoring any exhibits with your rebuttal testimony?

A. Yes. Attached to my testimony as UGI Electric Exhibit JFW-1 are revised Tables 1 through 4 originally presented in Book VI, UGI Electric Exhibit C (Fully Projected). The Company has agreed with the change set forth in the Direct Testimony of OCA witness Morgan regarding excluding the feeder lines to be installed related with the Loomis substation project. As a result, $600,000 of 2019 plant additions and its associated depreciation expense were excluded. Additionally, the Company is revising its 2019 construction cost estimate related to the new Electric Division Headquarter Office and Service Center. The new construction cost estimate for the building including land is $17.286 million, an increase of $7.286 million. Also attached to my testimony as UGI Electric Exhibit JFW-2 is a summary schedule that presents the changes described above in further detail. The Company does not agree with the proposals made by OCA and I&E to use an average reflection of accumulated depreciation rather than the Fully Projected Future Test Year, for the reasons stated in UGI Electric witness Ms. Mattern's testimony. Therefore, I have not reflected any adjustment for annualized depreciation expense, such as the one proposed by OCA witness Morgan on pages 20 and 21 of his testimony.

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 St. No. 2. Specifically, Mr. Garren proposes to reduce the Company's claimed amount of depreciation expense of $5.760 million by $1.047 million. The entire reduction to depreciation expense proposed by Mr. Garren relates to Distribution Plant.[1] The $1.047 million reduction to depreciation expense represents a substantial 28.8% reduction related to distribution plant. Mr. Garren proposes the same depreciation expense as the Company for General Plant and Other Utility Plant Allocated to UGI Electric (i.e., Common Plant and Information Services).

Mr. Garren's recommendation to reduce depreciation expense is based on two primary changes to the Company's presentation as follows: 1) he

[1] Table 1, OCA St. No. 2, page 5.

recommends increasing the service lives for 4 of the company's largest distribution plant accounts even though the Company plans to accelerate replacements of its electric plant assets over the next 5 to 10 years or more 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 and Electric Divisions have been using the Equal Life Group procedure to calculate depreciation rates for over 30 years. UGI CPG has been using the ELG procedure for nearly 30 years. UGI PNG adopted the ELG procedure shortly after it had been acquired by UGI in 2006. Also, many other Pennsylvania utilities use ELG to calculate depreciation and have used ELG for many years.

Q. Please provide an overview of Mr. Garren's proposals.

A. Certainly. Mr. Garren is proposing that UGI Electric reduce overall depreciation expense by 18 percent or by approximately $1.047 million. Of the $1.047 million reduction, approximately 25 percent of the proposed reduction is related to the proposed increase in service lives and approximately 75 percent 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 substantial reduction in depreciation expense.

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

A. No. Mr. Garren's recommendations are without merit and should be rejected in their entirety. Mr. Garren's recommendations to increase service lives for 4 distribution plant accounts is incongruent with the Company's outlook and plans. UGI Electric has specific plans to significantly increase capital expenditures over the next 5 years related to asset replacements within their distribution system to ensure safe, reliable and efficient delivery of electric service to their customers. UGI Electric plans to expend $7.968 million, on average, each year of the LTIIP from 2018 through 2022 for asset replacement. These planned expenditures represent over a 100 percent increase compared with the expenditures experienced during the years 2012-2015. These capital expenditures are to replace and modernize electric plant serving existing customers and are referred to as DSIC (Distribution System Improvement Charge) eligible projects in the LTIIP. The LTIP and DSIC are intended to provide a mechanism for utilities in Pennsylvania to accelerate their infrastructure replacement programs by supporting more timely recovery of approved infrastructure investments aimed at modernizing and improving the distribution system. The $7.968 million average capital expenditure for the years 2018-2022 is more than double the amounts previously spent during the years 2012-2015 and will focus on the replacement of key system components such as wood poles, overhead and underground conductors, line transformers, service lines and substation equipment. In all 4 accounts in which Mr. Garren is recommending a significant service life increase, UGI Electric has plans set forth in the 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. Therefore, it is highly unlikely that the service lives for distribution plant will increase given the asset replacement programs set forth in the Company's LTIIP.

Q. Are there any major technical problems with Mr. Garren's recommendations?

A. Yes. There are a number of issues with Mr. Garren's approach to estimating service lives and, as I will discuss in detail, his approach to focus almost entirely on statistical results of the historical life analyses while excluding other relevant factors is not consistent with standard industry depreciation practices.

II. GENERAL DEPRECIATION ISSUES

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 St. No. 2 and makes suggestions that utilities have an incentive to "overcharge" for depreciation expense.[2] Mr. Garren's explanation of depreciation

[2] OCA St. No. 2, p. 3 lines 5-7.

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 Electric'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 Electric for nearly 30 years (and UGI Gas and UGI CPG for nearly 30 years; UGI PNG for 10 years), have made field visits to observe UGI Electric's property in 3 Pennsylvania counties (28 counties for all three gas divisions) on numerous occasions, have prepared their annual depreciation reports for the past 28 years (and I have prepared these reports for UGI Gas and UGI CPG for nearly 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 Company plans as stated in the Company's LTIIIP and instead he calculates depreciation amounts that are too low and are based on life estimates that are too long and inconsistent with well-known Company plans.

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

A. On pages 2 and 3 of OCA St. No. 2, 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."[3] 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 in which the assets will be in service. The costs of these assets have already been incurred by the Company. That is, UGI Electric has already spent money to install assets such as poles, conductors, line transformers, services, meters, power transformers, circuit breakers, etc., that are used to provide electric 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 representation made by Mr. Garren that these funds will generally be used for "non-utility" purposes. Indeed, UGI Electric typically spends more on capital

[3] OCA St. No. 2, p. 2 line 12-14.

additions to plant in service than it records in depreciation expense. For example, as can be seen in UGI Electric's most recent Annual Depreciation Report, UGI Electric recorded $3.3 million in depreciation expense in 2017 related to distribution and general plant. However, the Company added $9.734 million in plant in the same year, and incurred an additional $0.549 million in costs to remove assets that were retired. UGI Electric therefore spent more than 3.1 times as much as it recovered in depreciation expense. Mr. Garren's implication that UGI Electric 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."[4] I have already explained that a Company such as UGI Electric typically spends more annually on capital investments than it recovers in depreciation, and so Mr. Garren's implication of "free cash" flow is inaccurate.

[4] OCA St. No. 2, p. 3, lines 4-7.

Mr. Garren's statement that a Company has an incentive to "overcharge" for depreciation is also incorrect because 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[5] is also an offset to rate base. A higher level of accumulated depreciation results in a lower rate base, 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 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 suggestion that a utility has an incentive to "overcharge" for depreciation expense is therefore incorrect.

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

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 for nearly thirty years. Additionally, my firm, Gannett Fleming Valuation and Rate Consultants, LLC, has been providing depreciation consulting services to UGI for over 50 years. As a result, the recommended depreciation rates in my study are based on all relevant factors that impact future service lives and provide far more reasonable and appropriate return of UGI's investments.

III. SERVICE LIFE ESTIMATES

A. Introduction

Q. What topics 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 is flawed. 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 professional engineering judgment, they set forth the best representation of future service life expectations for UGI Electric related to electric plant in service. In contrast, the process employed by Mr. Garren is inappropriate and produces results that are unreasonable and unrealistic for electric plant in service.

Q. Please 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 4 distribution plant accounts where Mr. Garren and I have different service life estimates. In all 4 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 4 distribution plant accounts.

TABLE 1: COMPARISON OF UGI ELECTRIC AND OCA PROPOSED SURVIVOR CURVE ESTIMATES

ACCOUNT		UGI ELECTRIC	OCA	ASL INDUSTRY RANGE
DISTRIBUTION PLANT				
364	POLES, TOWERS AND FIXTURES	56 - R2.5	62 - S1	40-60
365	OVERHEAD CONDUCTORS AND DEVICES	55 - R1	70 - O1	45-60
368.1	TRANSFORMERS	43 - S1	49 - L1.5	35-45
369	SERVICES	50 - R2	61 - R1.5	40-55

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 2017 with Docket Number M-111100-ADR-2017. For example, Mr. Garren has recommended increasing the service life by 6 years for Account 364 and 368.1 and over 10 years for Accounts 365 and 369. These are larger increases than are typically expected in a single depreciation study given that the Company performed a service life study just one year ago. Also, his proposed life estimates would be: 1) outside the typical range of service life estimates used by other Pennsylvania electric utilities; 2) among the longest service lives estimated for electric plant in the country; and 3) inconsistent with Company plans and outlook of engineering management.

B. <u>Estimating Service Lives and Informed Judgment</u>

1. Estimating Service Lives Requires Informed Judgment

Q. Please explain the processes for estimating service lives.

A. The processes for estimating service lives is based on informed judgment that incorporates several factors, including the statistical analyses of available plant accounting data, information obtained from field trips and discussions with Company personnel, and general knowledge of the property studied. The statistical analyses of historical data are but one of the factors that need to be considered in order to develop reasonable estimates. A depreciation study requires the estimation of events that will happen many years in the future. For example, the average service lives ("ASLs") for the Company's assets such as overhead conductors are 55 years or more. Many individual assets, i.e., property units, will live longer than the average. Thus, the depreciation study must predict what will occur over the next 80 years or more. While tools available to aid in forecasting service lives and net salvage, such as the statistical analyses of historical data, the Commission should not lose sight of the fact that depreciation is necessarily a forward-looking process in which uncertain events are being forecast many years into the future.

It is also important to understand that the statistical tools available consist of imperfect information, because the Company's assets have only lived for a fraction of their lives. Further, the available data may not be perfect and requires proper interpretation. Given these considerations, estimation therefore necessarily requires extrapolation and judgment, which must incorporate the knowledge and experience of the depreciation professional performing the study. For example, the curve fitting process for life analysis may (and typically does) result in a range of ASL estimates that could be supported by the data alone. The judgment of the depreciation professional making the estimate is required to differentiate between these possible estimates.

As I will detail in subsequent sections of my testimony, the estimates I have made incorporate the proper combination of professional judgment and statistical data, and therefore produce the most reasonable estimates of UGI Electric's future service lives. My approach is consistent with the recommendations of authoritative deprecation texts, such as that published by NARUC. Further, unlike Mr. Garren, I have physically observed the Company's property in the field and have met with Company personnel who are knowledgeable of the Company's distribution and general plant assets. I have also conducted numerous service life studies for other electric utilities, which provides me an understanding of the typical service lives of the property studied. Mr. Garren's does not incorporate the proper judgment and as a result proposes unreasonably long service lives for the 4 largest distribution plant accounts which results in a substantial reduction in depreciation expense. OCA witness Garren's estimates will therefore result in future customers having to pay the costs of assets that do not provide them service since his estimates will likely lead to an under-recovery of the company's capital investment through depreciation expense which will be borne by future ratepayers on assets no longer serving them.

Q. Is it widely understood that informed judgment is necessary in a depreciation study?

A. Yes. As one example, consider the widely used definition of depreciation from the Federal Regulatory Energy Commission's ("FERC") Uniform System of Accounts:

> Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities.[6]

Properly considering these factors necessarily requires judgment. Exclusive reliance on mechanical results from statistical analyses fails to fully incorporate these factors in Mr. Garren's proposed estimates, not only because historical data is necessarily incomplete (since many assets have not experienced their full service lives), but also because reliance only on history implies an inherent assumption that the future will precisely mirror the past. Thus, the definition of depreciation directs the depreciation professional to incorporate proper (and informed) judgment into the service life estimates.

Q. Do any authoritative sources recognize the necessity of judgment in a depreciation study?

A. Yes. For example, the National Association of Regulatory Utility Commissioners ("NARUC") 1996 publication *Public Utility Depreciation Practices* (referred to as the "NARUC Manual") is a well-regarded, authoritative depreciation text. The NARUC Manual has an entire section dedicated to "informed judgment." NARUC defines "informed judgment" as:

> [A] term used to define the subjective portion of the depreciation study process. It is based on a combination of general experience, knowledge of the properties and a physical inspection, information gathered throughout the industry, and other factors which assist the analyst in making a knowledgeable estimate.[7]

[6] 18 C.F.R. § 101, Definition 12.
[7] *Public Utility Depreciation Practices*, National Association of Regulatory Utility Commissioners, 1996 at 128.

NARUC also notes that "the use of informed judgment can be a major factor in forecasting"[8] and explains that "[t]he analyst's judgment, comprised of a combination of experience and knowledge, will determine the most reasonable estimate."[9]

2. Life Estimation and Life Analysis

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, transfers and ending plant balances. Plant accounting data for the years 1960 through 2016 were available to study for most plant accounts based on available technology in 1960. That is, AMR meters and other type of electronic equipment hadn't been invented as of 1960 so their respective accounting history starts years after 1960. The life analyses were performed using Gannett Fleming's depreciation software programs. The curve-fitting

[8] *Id.*
[9] *Id.* at 129.

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 which 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 professional judgment in making sound estimates of service lives and retirement dispersions. Life estimation incorporates known historical experience, estimated historical trends, an understanding of the functional characteristics of electric plant 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 <u>one</u> 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 Electric's property accounting data; current

Company policies, plans and outlook as determined during conversations with engineering management and other technical subject matters experts; and the survivor curve estimates from previous studies of this Company and other electric 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 Electric Exhibit C (Fully Projected). The statistical support for the survivor curve estimates is presented in the section of the UGI Electric Exhibit C (Future) entitled "Service Life Statistics," and set forth on pages VI-2 through VI-53.

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 flaws with his analysis. The first flaw is that he bases his estimates entirely on the statistical analysis, mechanically selecting best fit curves in almost all cases and ignoring relevant information about the future. As I will explain, Mr. Garren's approach is explicitly rejected by authoritative depreciation texts, which are clear that professional 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. The second flaw is that his analysis is based on experience bands starting in 1916 or 44 years before UGI started to maintain aged retirement data. The result is that Mr. Garren recommends inappropriate life estimates that not only are unreasonable, but in many cases, defy common sense.

C. <u>OCA'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 Electric's property and Company plans that I have acquired over the past nearly 30 years of performing depreciation studies for UGI Utilities, Inc. and its subsidiaries including the preparation and submittal of annual depreciation reports and service life study reports to the PUC over that time frame.

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 4 distribution plant accounts that he is recommending an increase in the service life, he simply selects the survivor curve that mathematically best fits the historical retirement data he used in his analysis. 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 Electric 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 electric 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."[10] 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
2. Potential changes in the type of property installed
3. Changes in the physical environment,
4. Changes in management requirements,

[10] NARUC Manual, p. 126

5. Changes in government requirements, and

6. Obsolescence due to the introduction of new technologies."[11]

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

A. No, he has not. All the factors in the NARUC manual cited above require judgment based on future conditions that are likely to be encountered. Mr. Garren has recommended 4 changes to the service lives estimated for distribution plant based strictly on the curves 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-2 of UGI Electric 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 what is known about a particular situation and modifies and refines the data to reflect the actual circumstances. The analyst's role in performing

[11] NARUC Manual, page 129

> 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. It is clear from his testimony and results that he did not incorporate the proper process of incorporating judgment into his estimates. There is little consideration in his testimony of factors other than the statistical results of the historical life analysis that he performed.

D. Issues with Mr. Garren's Service Life Analysis and Estimates

Q. Please explain the problems with OCA's life analysis.

A. In the previous section I discussed that the lack of judgement in the process used by Mr. Garren effectively means that they ignored the estimation phase of the process of determining service lives. However, there are also problems with the actual statistical life analysis performed by Mr. Garren.

1. Mr. Garren's Approach to Life Analysis is Flawed and Inconsistent with Accepted Depreciation Practices

Q. What problems are associated with OCA's life analysis?

A. There are several problems with Mr. Garren's analysis. He relies only on mathematical curve matching, and does not appear to consider visual curve fitting at all. That is, Mr. Garren has not visually compared various survivor curves to the Company's data in order to determine the reasonableness of his estimates.[12] This can produce unusual results for some accounts that are poor fits of the historical data. Mr. Garren also inappropriately gives equal considerations to all (or almost all) of the data points of the original life tables, regardless of whether these data points are based on sufficient data. Finally, the estimation phase is not the only time where judgment is required - the statistical analysis phase of estimating service life must also incorporate judgment. As I explain, relatively minor differences in curve fitting results can often produce differences in ASLs that are relatively large. For this reason, judgment must be used to select among survivor curves that are possible candidates based upon the goodness of their mathematical "fits." Mr. Garren has not done so, and instead has, without the requisite judgment, accepted the mathematical results of Mr. Garren's curve fitting routine.

Q. Mr. Garren provides an example on pages 21 and 22 of his testimony that he believes demonstrates that "mathematical curve fitting is superior to visual curve fitting." Please explain the problems with his example.

A. Mr. Garren provides an example of counting the number of M&M's in a jar to attempt to demonstrate the superiority of mathematical curve matching. He

[12] While Mr. Garren does provide a graphical depiction of his estimated survivor curve, he makes clear that he favors mathematical curve matching on page 21 of his testimony.

argues that “selecting the best curve for a given set of data is not unlike determining the number of M&M’s in a glass jar,” and concludes that an accurate result would only come from counting the M&M’s in the jar (which he equates to mathematical curve matching). The problem with Mr. Garren’s example is that it presents a fundamental misunderstanding of the purpose of statistical life analysis. Selecting a survivor curve estimate is not a purely mathematical exercise, as Mr. Garren appears to believe. Instead, it is a process of estimating the future that necessarily requires judgment. Estimating the future service lives of electric plant currently in service will occur several years and decades into the future and thus this circumstance is not analogous to counting M&M’s in a glass jar. As noted above, NARUC strongly disagrees with Mr. Garren’s opinion that estimating service lives is nothing more than a mathematical exercise similar to counting M&Ms.

Q. What is a type of issue that arises from relying only on mathematical curve matching?

A. One conceptual problem with only using mathematical curve matching is that it does not incorporate judgment to determine whether the mathematical results are reasonable and representative of the underlying assets. One of the first issues a depreciation engineer or analyst needs to reconcile is: will future causes of plant retirements be similar, to the same degree and magnitude, as past causes of plant retirements? If the answer is no, then the historical life analysis is mostly meaningless. If the answer is yes, then a higher confidence level can be attributed to the life analysis assuming the data underlying the analysis is robust and significant. As an example, as metering technology has changed over time, the service life characteristics of electric meters have also changed. Older style electromechanical meters had lives more in the 30 to 40 year range, whereas newer style electronic meters have more digital components and typically only have lives in the 15 to 20 year range. A statistical life analysis of older style meters would not be meaningful in terms of forecasting the lives of newer style meters – no matter how good of a mathematical fit one could develop from this life analysis. Even a perfectly fitting curve would be incorrect, as the future service lives will be different from past service lives.

Another problem is that Mr. Garren's mathematical algorithm weights every data point equally.[13] In most cases, it is not appropriate to do so. Older ages of data are often based on a much smaller sample size, i.e., number of assets, and therefore are less reliable (and as will be explained, in many cases some of the older data points are meaningless). Further, significantly older assets (and their related data points on the life table) may not be representative of the assets currently in service. By using only mathematical curve matching, Mr. Garren is not able to properly consider these types of factors.

Q. Do any authoritative depreciation texts explain that visual curve matching should be used as well as mathematical curve matching?

[13] I note that this is true of most mathematical algorithms, which is one reason consideration of which data points to include in the curve matching routine is important.

A. Yes. For example, Wolf and Fitch's *Depreciation Systems* is another highly regarded depreciation textbook. The authors 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[14] 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 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.[15]

Thus, Wolf and Fitch express a clear preference for my approach over that of Mr. Garren.

Q. Please explain the conceptual problems with the selection of data points incorporated into Mr. Garren's analyses.

A. When performing life analysis, the selection of which data points to include in a curve fitting procedure, as well as which ranges of data points to emphasize or give more consideration, can have an impact on the results of the analysis. Mr. Garren even acknowledges this fact in his testimony stating the following: "The results of the mathematical curve fitting would certainly change if Mr.

[14] Sum of squares is a mathematical method of assessing goodness of fit.
[15] *Depreciation Systems*, W. C. Fitch and Frank K. Wolf, 1994, pages 47-48.

Wiedmayer's proposed T-cuts were adopted".[16] This demonstrates that Mr. Garren's life estimates are quite erratic and highly dependent on the range of data points from the life table that he included in his analysis. This is not a sound and reliable process on which to make a service life estimate. For example, if data points that are based on small levels of data are given too much emphasis, this can skew the results of the mathematical curve-fitting and produce unrealistically long service lives.

Q. Please explain what you mean by small levels of data?

A. Each data point in an original life table is based on the dollars of plant investment exposed to retirement, a.k.a., "exposures" and retirements at a given age. The exposures are effectively the balance of plant that was in service at a given age (i.e., the balance in the data that has reached that age), and the retirements are the amount of plant removed from service in each age interval. If the dollar level of exposures is relatively small for a given age, then the data point based on the exposures for that age is based on a relatively small number of property units, i.e., electric plant assets. Generally, a data point based on a smaller number of assets is more subject to randomness and unusual activity than a data point with a larger number of assets. For this reason, older data points are often less reliable than younger data points. Additionally, I note that older data points are typically based on a smaller number of vintages and can be less reliable given the overall number of years since they have been placed in service, both of

[16] OCA St. No. 2, p.23, lines 16-17.

which add to the uncertainty for older data points. Older data points may also be based on types of assets or materials that are no longer used (or that comprise a smaller proportion of the Company's current asset base), in which case older data points are not representative of the Company's current assets.

Q. Does Mr. Garren seem to agree with this concept of selecting the significant data points from the life table for the life analysis?

A. Yes, he does seem agree with this concept as he states:

> In some cases, it is appropriate to disregard some or even many of the oldest aged data. This is because actuarial data that the company keeps often is tied to long-lived assets that represent so small a percentage of the total plant as to not be statistically significant or represent accounting anomalies, such as retirements that were never recorded.[17]

Q. Does Garren recognize the need to select appropriate ranges of data points for the statistical analysis?

A. Generally, no. Although Mr. Garren discusses this concept of considering different ranges of data points in his testimony (for example, he discusses the concept of a T-Cut[18] at length on pages 13 and 14 of his testimony), Mr. Garren has not actually incorporated any reasonable consideration of the appropriate ranges of data when performing life analysis. His simply fits all (or mostly all) of the data points listed on the life tables even those that contain few assets and exhibit erratic retirement rates. I note that Mr. Garren states:

> While there is no hard and fast rule for where a T-cut is appropriate, it is generally appropriate to make a T-cut where the remaining

[17] OCA St. No. 2, p.13, lines 12-15.

[18] "T-Cut" is a term that refers to the age through which mathematical curve fitting is performed. Data points beyond this age are excluded from the mathematical curve fitting results.

> retirement data diverges materially from the established pattern of retirements seen to that point.[19]

I do not necessarily disagree with this statement as a general concept (although it is often not appropriate to give equal weighting to all points prior to the T-Cut). However, Mr. Garren does no such thing. When one reviews his actual life analysis, his T-Cuts occur at later ages than they should and incorporate data that is based on small levels of data. He therefore has given equal weighting to almost every data point. This is inappropriate and his actions, i.e., his life analysis approach, contradicts his own testimony. Mr. Garren's approach artificially extends the lives of his "best-fit" curves since he includes many insignificant data points in his life analysis.

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."[20] I will explain that Mr. Garren's recommendations demonstrate that he is not at all familiar with UGI Electric's property.

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[19] OCA St. No. 2, p.14, lines 1-4.
[20] OCA St. No. 2, p. 22, lines 20-22.

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 the data points – whether these data points are statistically 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, Majoros and Associates ("Snavely King"), proposed service life recommendations using the same inappropriate approach of solely relying on mathematical curve matching. Both cases were litigated before the Pa. 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' 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.[21]

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" curve fitting approach. [22]

Q. Are you aware of any other Pa. PUC decision rejecting mechanical use of 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 again 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.

[21] 219 PUR 4th at 300.
[22] 231 PUR 4th at 308-309.

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:

> 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.[23]

The PUC rejected Mr. Majoros' 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 proper 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. Generally, the survivor curves proposed by Mr. Garren are inconsistent with management plans and outlook, inconsistent with the previously approved survivor cure estimates and are outside of the typical range of service lives estimated for electric distribution plant accounts. Examples of some of the accounts studied provide clear evidence to demonstrate how unreasonable some of Mr. Garren's estimates are.

[23] 62 Pa. P.U.C. at 468

E. <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 the data points – whether meaningful 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.[24]

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 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.[25]

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 and NARUC 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.

[24] *Depreciation Systems*, Frank K. Wolf and W. Chester Fitch, 1994, pp. 46-47.
[25] Ibid, pp. 47-48.

Q. Are the specific plant accounts that you would like to discuss that highlight the differences between Mr. Garren's and your approach to estimating service lives?

A. Yes, there is. Account 364, Poles, Towers and Fixtures is an account where Mr. Garren and I have recommended different survivor curves. The primary asset class included in this account is wood poles of varying lengths. Wood poles are used as support structures for overhead conductors and various other electric equipment such as line transformers. The primary causes of poles retirements are due to third-party damage, relocations, storm damage, inadequacy (i.e., a taller or larger pole is required), woodpecker damage, rot and decay. Some of these causes of retirements are random and can occur at any age in equal proportion such as third-party damage while other retirement causes increase as the asset ages. Of these causes of retirements, I would classify third-party damage (i.e., a truck collides with a pole and snaps it in half) and relocations as random regarding its age while the other causes of retirement are primarily age related and the frequency of retirement increases as the asset get older. The most common reason to retire a wood pole is due to rot and decay which is a function of the age of the pole, i.e., age-related. Having identified the primary causes of retirements is important since the historical data may only be reliable up until a certain age, e.g., age 55 and the remaining unknown portion of the survivor curve must be extrapolated and estimated to form a complete survivor curve ending at zero percent surviving.

Q. What are the recommendations for this account?

A. I have recommended the 56-R2.5 survivor curve. The "56" related to 56-R2.5 survivor curve indicates the average service life while the "R-2.5" describes the dispersion pattern of service lives relative to the average and has a maximum life of approximately 104 years. OCA has recommended the 62-S1 which has an average service life of 62 years and a maximum life of 124 years.

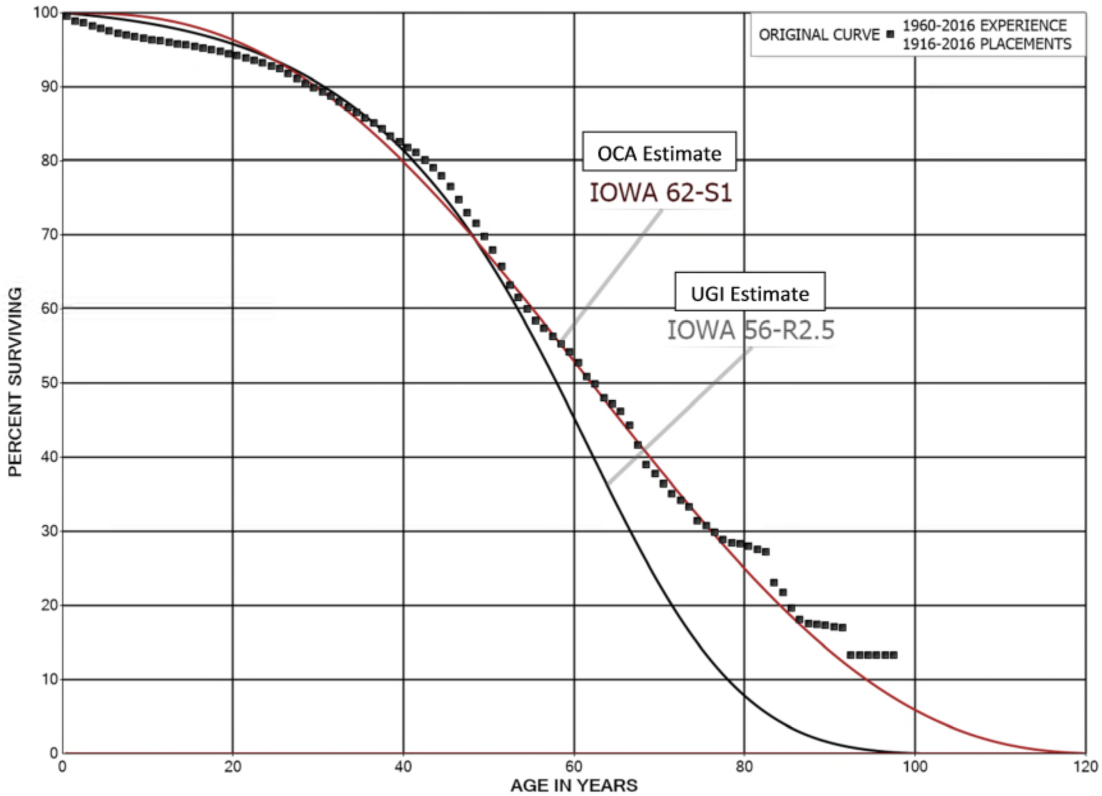
Q. What are the bases for OCA's recommendations for this account?

A. OCA simply selected the highest ranked survivor curve from OCA's mathematical curve-fitting algorithm that was based on fitting nearly all the data points, i.e., data points from ages 0 to 92, shown on the life table. As I have discussed, this is not an appropriate approach to estimating service lives and can results in unrealistic and unreasonable estimates.

Q. Please explain.

A. Figure 1 below provides a comparison of both survivor curve estimates to the original life table, a.k.a., original survivor curve, based on the overall experience band, 1960-2016. All the data points, i.e., percent surviving by age, are shown from the life table. As one can see, the 56-R2.5 is a better match of the data through age 56. This is true both visually and mathematically. OCA's proposed survivor curve is a better match for later ages. Thus, from a purely visual curve matching standpoint one of the more critical decisions from this account is which range of data should be given more emphasis in the analysis.

FIGURE 1



Q. Please explain why the data points before age 56 should be given the most consideration.

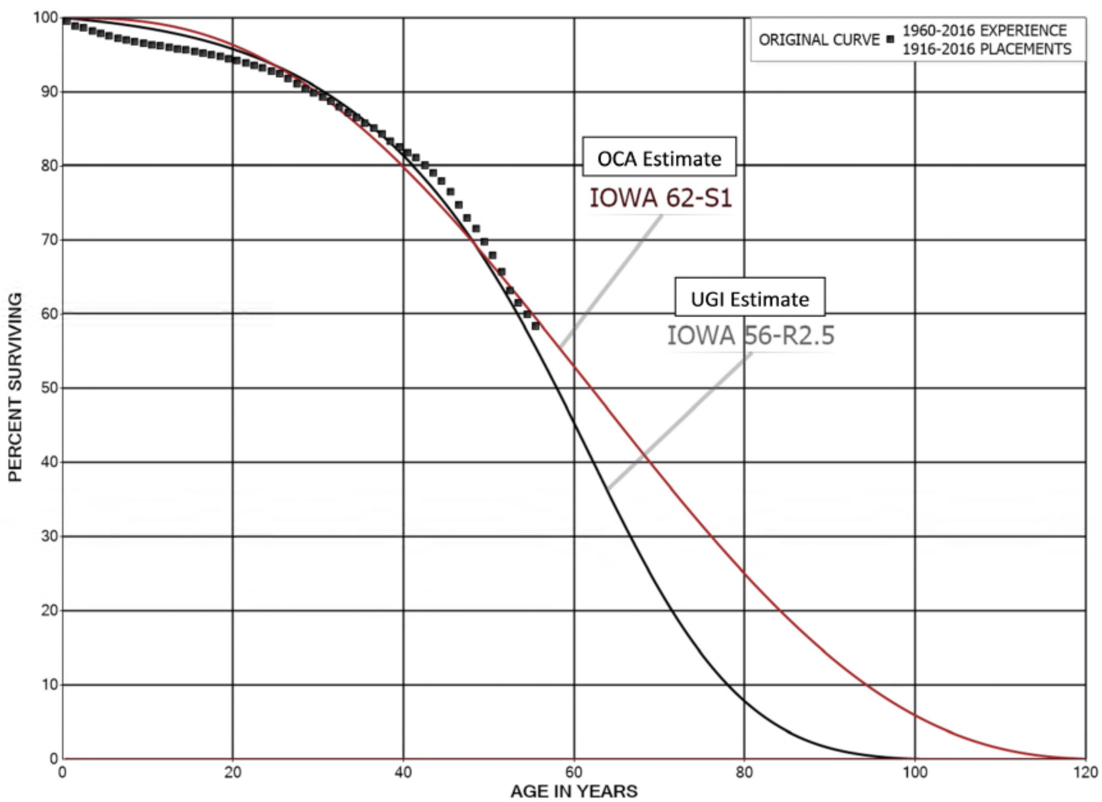
A. There are multiple reasons. The first is that these data points are based on a higher level of exposures, i.e., a larger sample size essentially. Most of the data points through age 55 are based on exposures of at least $1 million and ranging up to approximately $37 million. The later data points occurring after age 56 are based on smaller levels of exposures, ranging to less than $16,000. In my view, these later data points should not be given equal weighting in the analysis, which is exactly what OCA witness Garren does.

A second reason is that the overall trend in the data through age 56, which is consistent with a medium mode R curve which I have estimated, is more reasonable for the type of assets in this account. Nearly all the poles in this account are wood poles. As wood poles age, the probability of retirement tends to increase because wood poles deteriorate with age and eventually will need to be replaced before they fail. This means that the survivor curve should generally have a steeper slope as the age increases, particularly for the ages beyond age 56. This retirement pattern that I have described is consistent with the R2.5 curve I have selected, but not with the S1 estimated by OCA witness Garren. Professional judgment must be applied when selecting survivor curves particularly for ages that are beyond the known historical data or are beyond the historical data that is considered reliable. As one can see in Figure 1 both survivor curves fit the original curve through age 56 reasonably well as they are similar shaped curves through age 50. The divergence between the two survivor curves starts at age 50 and the difference continually gets larger as the age increases since my survivor curve estimate is steeper than the OCA's estimate. This is consistent with my expectations and the expectations of UGI engineering that retirement rates for poles will continually increase as property ages.

Q. How do the graphs compare if the most representative data points are considered?

A. I have presented only the data points through age 55.5 in the figure below. As the figure below shows, the 56-R2.5 is a slightly better match than the OCA's survivor curve estimate, the 62-S1.

FIGURE 2



Q. Do you have any other comments on this account?

A. Yes. This account is another example of the significant flaws in OCA's approach to estimating service lives. The OCA's 62-S1 survivor curve forecasts some poles to remain in service for 124 years, as can been seen in the figure above. Wood poles are a natural product susceptible to the natural process of rot and decay. Service lives beyond age 90 for wood poles would be extremely rare therefore OCA's proposed survivor curve estimate is not reasonable. An estimated maximum life of 124 years is too long and therefore Mr. Garren's 62-S1 survivor curve estimate is not appropriate for Account 364, Poles, Towers and Fixtures. "R" type dispersion curves are more common for this account as used in the electric industry. In addition, the company plans to substantially increase their capital expenditures related to asset replacements in the next 5 to 10 years or more and it is likely that the company generally will target the replacement of older assets first. This will lead to higher rates of retirements for plant at older ages, i.e., ages occurring after average service life, in the next 5 to 10 years or more in connection with the Company's LTIIP. These facts plus a more reasonable maximum life, i.e., 104 years, and increasing rates of retirement as the assets age supports my survivor curve estimate over OCA's survivor curve estimate.

Q. Should OCA's recommendation be adopted for this account?

A. No. For the reasons discussed above, OCA's estimate is not reasonable and are not consistent with the historical data, once the data is properly considered and interpreted.

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 22, starting on line 18 of OCA St. No. 2, 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 17, 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, expected maximum service life, 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 17, line 12 through page 18, line 4 of his direct testimony?

A. No, he did not. For the 4 distribution plant accounts that he recommends a change in service life, 3 of his proposed survivor curve estimates are the ones that best fits the historical data. The fourth account (Account 365) he selects the curve type that is the second best mathematical fit based on the data points he selected and deemed significant. He increases the service lives for 4 distribution plant even though UGI is embarking upon one of its largest and most aggressive asset replacement program in its history. Clearly, future retirement levels will be much different than those experienced by UGI Electric. Making service life forecasts based solely on past experience as Mr. Garren has proposed in this proceeding is inappropriate since future retirement rates and service lives will likely be different than those historically experienced.

Q. Mr. Garren discusses a "T-cut" in his testimony[26]. 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 older property that are at the tail end of the original curve.

Q. What is a more appropriate approach regarding the life analyses?

[26] OCA St. No. 2, p. 13-14.

A. A more appropriate approach would be to include only the data points that are significant, i.e., based on a sufficient level of exposures, consistent with expectations and reliable. Conversely, the depreciation analyst should exclude from the life analysis the data points that are based on low exposures, exhibit erratic retirement patterns or retirement patterns that are not consistent with expectations and exclude those data points that occur at older ages with insignificant exposures and retirements.

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

A. The T-Cuts that I have selected include the significant data points appropriate for selecting "candidate" survivor curves for use in connection with the life analysis. The T-Cuts that I have selected for the 4 accounts where the OCA has proposed a change in survivor curves are as follows: Account 364, Poles, Towers and Fixtures – 55.5 years; Account 365, Overhead Conductors and Devices – 56.5 years; Account 368.1 – Line Transformers; Account 369, Services – 48.5 years. The data points beyond these age intervals listed become less significant and less reliable due to: 1) relatively small exposures ($); 2) a change in retirement patterns or retirement patterns that are inconsistent with engineering expectations; 3) minimal or sparse retirement data or data that is missing some retirements related to plant at older ages; or, 4) a combination of these factors. Mr. Garren's T-Cuts are as follows: Account 364 – 91.5 years; Account 365, 91.5 years, Account 368.1, 90.5 years; and 369 – 83.5 years.

Q. Would you like to comment on the T-Cut selection used by Mr. Garren for a particular plant account?

A. Yes. Account 369, Services is a good example of where the retirement pattern clearly changes and the change occurs at ages where the level of exposures and retirements are relatively minor. The drastic change in the retirement pattern can be distinctly observed on the life table chart on page 27 of Mr. Garren's testimony. The change in retirement rates occurs around age 50 and continues to age 70 approximately. Between age 50 and 70, the data points shown on the life table chart flatten out, i.e., become less steep, compared with the retirement pattern observed from age 30 to 50. The exposures after age 50 fall below $100,000 and fall generally in the range between $55,000 and $65,000, relatively minor compared to exposures in the millions prior to age 44. Also, retirements are less than $1,000 for nearly every age interval between 50 and 70 and are relatively much smaller compared with earlier age intervals. The data for these ages contains few units and is a small sample size not to be relied upon. In addition, there is no logical reason to expect the retirement rates of service wire at age 51 to 70 to be significantly less than the retirement rates of service wire experienced at younger ages such as age 30 to 50. Engineering expectations for service wire would suggest that retirements will *increase* as the property ages. Based on this information, Mr. Garren should not have relied on data points after age 50 for this account yet he fit all points through age 83.5 years which led to an unreasonably long service life estimate for Account 369, Services.

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

A. Yes. Mr. Garren fit almost all of the data points on the life table for each of the four accounts so the same problem that I have highlighted in Account 369, Services above, applies to the other 3 accounts. This oversight or lack of applied judgment is particularly problematic when Mr. Garren has selected his survivor curve estimates almost directly from the results of his mathematical curve-fitting algorithm based on historical plant accounting data. Almost all 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."[27] The fact that his analysis is based on erroneous data only compounds the problem.

F. 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 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

[27] NARUC Manual, p. 128

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. <u>EQUAL LIFE GROUP DEPRECIATION</u>

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 <u>unit summation</u> 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. Many other Pennsylvania utilities have adopted ELG and used this procedure for many years. ELG was adopted for UGI Gas in 1984 at Docket No. R-832331. UGI Electric also has used ELG depreciation ever since UGI Gas received approval.[28] Every 5 years beginning in the mid-1980's, the company has been filing its service life study report to the Commission for approval. In 2017, UGI Electric submitted their updated 5-year service life study report to the Commission and all depreciation parameters and methods, including the use of the Equal Life Group procedure, were deemed approved. Additionally, UGI Electric submits annual depreciation reports to the Commission each year stating their revised depreciation accrual rates to be used for book purposes as well as identifying the underlying depreciation parameters and calculation methods and procedures used to determine depreciation expense. I would note that under the Commission's regulation at 52 Pa. Code §73.9(c), once such depreciation reports are filed and accepted "*[i]n subsequent ratemaking proceedings, the most recent annual depreciation report or service life study approved or deemed approved for accounting purposes only under this chapter, constitutes a rebuttable presumption as to the reasonableness of the accrued depreciation claimed for ratemaking purposes, and the burden of proving the unreasonableness of the accrued depreciation shall be on the challenging party*."

Q. Given that the use of ELG is the predominant and longstanding practice in

[28] 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.

Pennsylvania, has Mr. Garren provided evidence as to why UGI Electric should be required to deviate from this practice?

A. No. Mr. Garren has provided very little discussion of ELG. Apparently, he wants the Commission to overturn its longstanding precedent, but simply fails to provide a valid reason for the change even though he has the burden of doing so under 52 Pa. Code §73.9(c). 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 positions, 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. This is a characteristic deficiency of the ASL depreciation calculation procedure vis-à-vis the ELG procedure.

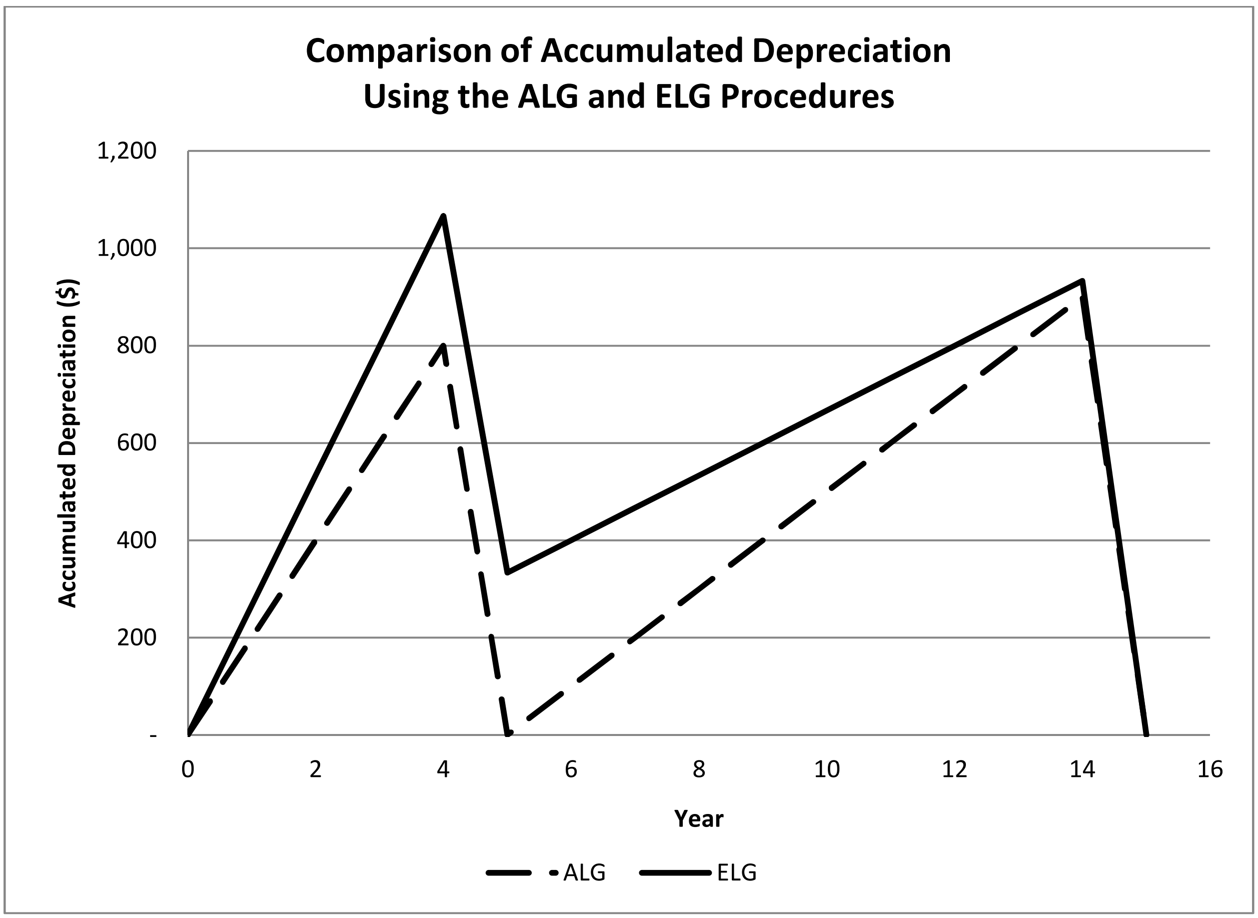
Q. How is depreciation determined using the ELG procedure?

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 3 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, even though the only unit remaining in service has consumed one third of its service life. Clearly, the ELG procedure provides a better match regarding the consumption of the service value for the two units. Additionally, rate base under ELG at the end of year 5 is $667 ($1,000-$333) versus $1,000 ($1,000 - $0) under ASL.

FIGURE 3



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

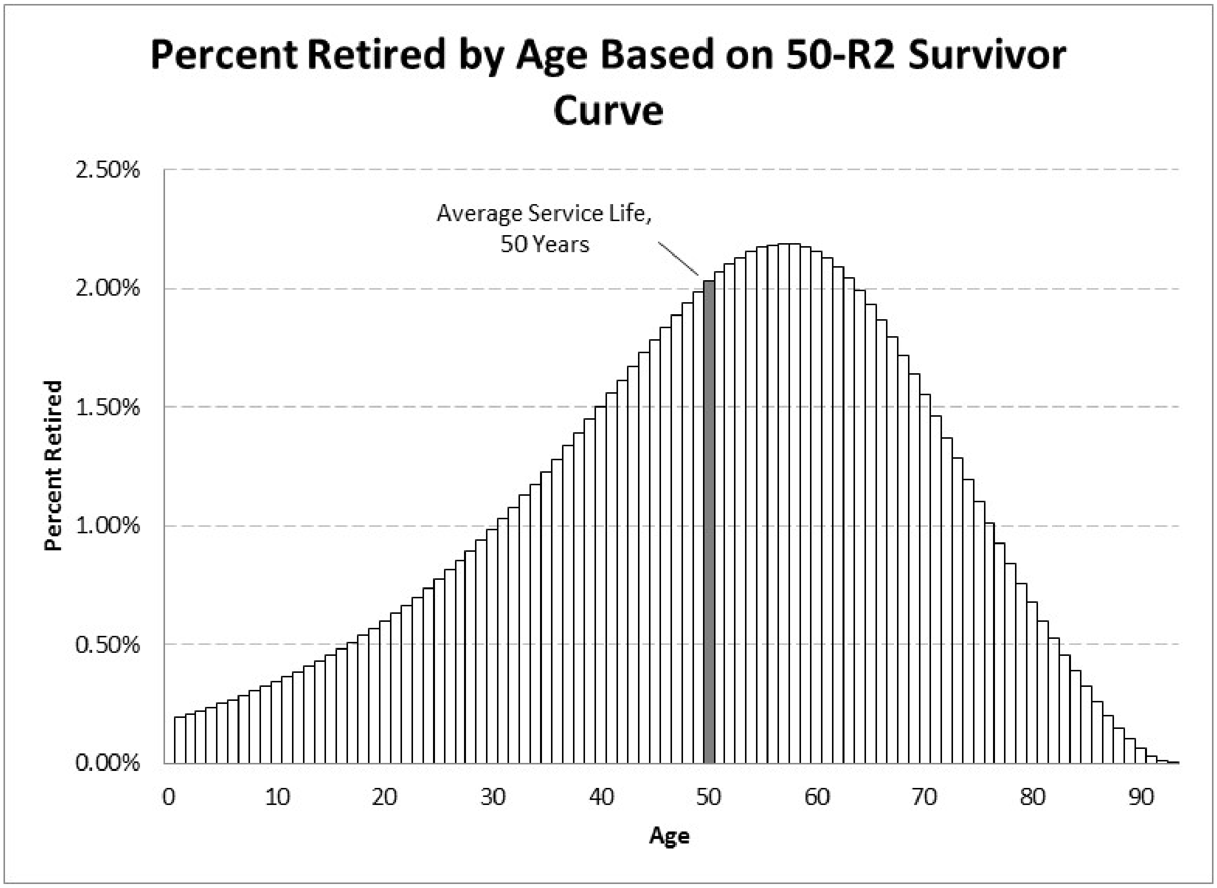
units?

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 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 4 below, is a chart of the frequency curve for the 50-R2 survivor curve used for Account 369, 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 4 represents the percentage of property that will have a life of 50 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 2.07% of the assets will be in service for exactly 50 years; conversely, 97.93% will have a different service life than 50 years. 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.

FIGURE 4



The ELG procedure recognizes this dispersion, and allocates costs for each equal life group over the expected life for that group. The service lives indicated by the 50-R2 survivor curves ranges from 1 year to 93 years. 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 4 shows, this average life will be incorrect most of the time – in this example, the average life will be the wrong life for 97.93% 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 generally regarded as the father of utility depreciation practices, referred to the ELG procedure as "the only mathematically correct procedure."[29]

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,"[30] 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 being less precise. Mr. Garren only states that:

> Due to this precision, ELG is much more susceptible to errors resulting from forecasting inaccuracies. Because of

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

[30] OCA St. No. 2, p. 28, lines 5-6.

> 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 UGI Electric only performs service life studies every five years, ELG is not a good fit for UGI Electric. Finally, ELG remaining life calculations tend to understate the remaining lives of recent vintages when not updated frequently. What this means is that the use of ELG effectively accelerates the collection of depreciation.[31]

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 Utilities, Inc. ("UGI", i.e., UGI Gas, UGI Electric, UGI Central Penn Gas and UGI PNG) for many years. Utilities in Pennsylvania file Annual Depreciation Reports ("ADR") each year, in which depreciation rates are calculated based on current plant balances. This has been the practice in Pennsylvania since 1984. 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

[31] OCA St. No. 2, p. 28, lines 10-16.

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

For these reasons, UGI'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 based on his failure to acknowledge the depreciation practices established in Pennsylvania by the Public Utility Commission over 30 years ago including the actual depreciation practices used by UGI Electric.

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,"[32] which he appears to believe is not in the best interest of ratepayers. 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 above, I explained that over time higher depreciation expense

[32] OCA St. No. 2, p. 28, lines 18-20 and p. 29, lines 1-3.

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 Utilities, Inc. and its subsidiaries has resulted in a lower rate base than had ASL been used. 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 and 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."[33] Please address this comment.

A. Mr. Garren's comment is misplaced for two reasons. Yes. First, as I have explained the depreciation rates for UGI 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

[33] OCA Statement No. 2, p. 28, lines 13-15.

only should occur in rare instances when there are compelling reasons to change. Mr. Garren has not presented any compelling 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 Electric and the other UGI divisions, as has been the case for over thirty years.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.

UGI Electric Exhibit JFW-1

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 1. ESTIMATED SURVIVOR CURVES, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT SEPTEMBER 30, 2019

ACCOUNT		PROBABLE RETIREMENT YEAR	SURVIVOR CURVE	ORIGINAL COST	BOOK RESERVE	FUTURE BOOK ACCRUALS	CALCULATED ANNUAL ACCRUAL RATE	CALCULATED ANNUAL ACCRUAL AMOUNT
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
ELECTRIC PLANT								
DISTRIBUTION PLANT								
361	STRUCTURES AND IMPROVEMENTS		50 - R3	11,459	7,925	3,534	2.35	269
362	STATION EQUIPMENT		40 - S1	8,289,972	(97,494)	8,387,466	3.34	276,863
364	POLES, TOWERS AND FIXTURES		56 - R2.5	43,096,392	13,262,479	29,833,913	2.00	861,174
365	OVERHEAD CONDUCTORS AND DEVICES		55 - R1	37,563,330	11,057,664	26,505,666	2.27	852,471
366	UNDERGROUND CONDUIT		65 - R3	6,752,480	1,897,136	4,855,344	1.56	105,283
367	UNDERGROUND CONDUCTORS AND DEVICES		40 - R2	9,801,217	2,840,097	6,961,120	3.09	302,432
368.1	TRANSFORMERS		43 - S1	14,580,402	7,322,471	7,257,931	2.08	303,154
368.2	TRANSFORMER INSTALLATIONS		35 - R2	10,405,365	5,263,306	5,142,059	2.56	266,168
369	SERVICES		50 - R2	14,942,852	6,762,045	8,180,807	1.87	279,668
370.1	METERS		33 - R1.5	2,762,014	1,991,811	770,203	2.12	58,659
370.2	METER INSTALLATIONS		70 - R5	1,907,009	737,710	1,169,299	1.33	25,270
370.3	ELECTRONIC METERS		20 - S3	4,948,183	3,619,025	1,329,158	3.20	158,314
371	INSTALLATIONS ON CUSTOMER PREMISES		30 - O1	1,951,306	899,167	1,052,139	3.44	67,143
371.5	INSTALLATIONS ON CUSTOMER PREMISES - DUSK TO DAWN LIGHTS		20 - R1.5	347,656	321,950	25,706	1.23	4,280
373	STREET LIGHTING AND SIGNAL SYSTEMS		34 - L0	1,635,228	715,138	920,090	3.38	55,277
TOTAL DISTRIBUTION PLANT				**158,994,865**	**56,600,430**	**102,394,435**	**2.27**	**3,616,425**
GENERAL PLANT								
390.1	STRUCTURES AND IMPROVEMENTS							
	PLYMOUTH	06-2023	SQUARE	15,111	15,111	0	-	0
	IDETOWN		FULLY ACCRUED	14,541	14,541	0	-	0
	ELECTRIC HQ BUILDING	09-2069	70 - R1	16,284,000	(408,220)	16,692,220	3.80	619,377
	SUBTOTAL ACCOUNT 390.1			*16,313,652*	*(378,568)*	*16,692,220*	*3.80*	*619,377*
390.2	IMPROVEMENTS TO LEASED PROPERTY							
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE		20 - SQ	169,677	24,319	145,358	5.01	8,502
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT		5 - SQ	115,614	41,942	73,672	19.59	22,649
391.92	OFFICE FURNITURE AND EQUIPMENT - OUTAGE MANAGEMENT SOFTWA		5 - SQ	750,000	174,952	575,048	21.91	164,299
393	STORES EQUIPMENT		10 - SQ	3,217	1,205	2,012	11.38	366
394	TOOLS, SHOP AND GARAGE EQUIPMENT		20 - SQ	1,022,878	396,578	626,300	5.00	51,183
395	LABORATORY EQUIPMENT		10 - SQ	158,670	105,454	53,216	10.10	16,023
397	COMMUNICATION EQUIPMENT		10 - SQ	771,319	473,101	298,218	9.71	74,891
398	MISCELLANEOUS EQUIPMENT		10 - SQ	40,872	25,243	15,629	11.11	4,539
TOTAL GENERAL PLANT				**19,345,899**	**864,226**	**18,481,673**	**4.97**	**961,829**
SPECIAL DEPRECIABLE PLANT								
396	POWER OPERATED EQUIPMENT		20 - S0	145,839	143,753	2,086	0.18	259
TOTAL SPECIAL DEPRECIABLE PLANT				**145,839**	**143,753**	**2,086**	**0.18**	**259**
TOTAL DEPRECIABLE PLANT				**178,486,603**	**57,608,409**	**120,878,194**	**2.57**	**4,578,513**
NONDEPRECIABLE PLANT								
301.1	ORGANIZATION			1,602				
302.1	FRANCHISES AND CONSENTS - PERPETUAL			6,436				
360.1	LAND AND LAND RIGHTS - LAND			83,832				

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 1. ESTIMATED SURVIVOR CURVES, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT SEPTEMBER 30, 2019

ACCOUNT	PROBABLE RETIREMENT YEAR	SURVIVOR CURVE	ORIGINAL COST	BOOK RESERVE	FUTURE BOOK ACCRUALS	CALCULATED ANNUAL ACCRUAL RATE	CALCULATED ANNUAL ACCRUAL AMOUNT
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
360.2 LAND AND LAND RIGHTS - LAND RIGHTS			14,336				
389.1 LAND AND LAND RIGHTS - LAND			1,091,222				
TOTAL NONDEPRECIABLE PLANT			**1,197,428**				
TOTAL ELECTRIC PLANT			**179,684,031**				
LESS GENERAL AND INTANGIBLE PLANT ALLOCATED TO TRANSMISSION - 22.5572%			4,644,753	227,372	4,169,418		217,020
TOTAL ELECTRIC PLANT RELATED TO DISTRIBUTION OPERATIONS			**175,039,278**	**57,381,037**	**116,708,776**		**4,361,493**
OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION							
COMMON PLANT							
301 ORGANIZATION (NONDEPRECIABLE)			138,964				
389.1 LAND AND LAND RIGHTS - LAND (NONDEPRECIABLE)			6,947,278				
390.1 STRUCTURES AND IMPROVEMENTS	01-2069	70 - R1	33,052,722	803,197	32,249,525	3.46	1,142,385
391 OFFICE FURNITURE AND EQUIPMENT - FURNITURE		20 - SQ	2,765,391	388,464	2,376,927	5.47	151,393
391.1 OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT		5 - SQ	2,045,377	666,190	1,379,187	15.57	318,519
392.1 TRANSPORTATION EQUIPMENT - CARS		7 - L2.5	71,637	68,155	3,482	2.16	1,548
TOTAL COMMON PLANT			**45,021,369**	**1,926,006**	**36,009,121**	**3.60**	**1,613,845**
TOTAL COMMON PLANT ALLOCATED TO ELECTRIC DIVISION - 5.66%			**2,548,209**	**109,012**	**2,038,116**		**91,344**
INFORMATION SERVICES (IS)							
391 OFFICE FURNITURE AND EQUIPMENT - FURNITURE		20 - SQ	40,606	33,035	7,571	5.44	2,208
391.1 OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT		5 - SQ	12,068,809	5,133,432	6,935,377	20.03	2,417,523
391.3 OFFICE FURNITURE AND EQUIPMENT - SYSTEM DEV. COSTS - 10 YEARS		10 - SQ	7,782,005	4,603,370	3,178,635	9.09	707,758
391.4 OFFICE FURNITURE AND EQUIPMENT - SYSTEM DEV. COSTS - 15 YEARS		15 - SQ	135,828,715	21,063,492	114,765,223	6.84	9,288,398
TOTAL INFORMATION SERVICES			**155,720,135**	**30,833,329**	**124,886,806**	**7.97**	**12,415,887**
TOTAL INFORMATION SERVICES ALLOCATED TO ELECTRIC DIVISION - 9.32%			**14,513,117**	**2,873,666**	**11,639,450**		**1,157,161**
READING SERVICE CENTER							
390 STRUCTURES AND IMPROVEMENTS	06-2030	100 - R1	1,970,709	1,321,933	648,776	3.15	61,986
TOTAL READING SERVICE CENTER ALLOCATED TO ELECTRIC DIVISION - 11.21%			**220,916**	**148,189**	**72,728**		**6,949**
TOTAL OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION			**17,282,242**	**3,130,867**	**13,750,294**		**1,255,454**
LESS OTHER UTILITY PLANT ALLOCATED TO ELECTRIC TRANSMISSION - 22.5572%			3,898,390	706,236	3,101,681		283,195
TOTAL OTHER PLANT ALLOCATED TO ELECTRIC RELATED TO DISTRIBUTION OPERATIONS			**13,383,852**	**2,424,631**	**10,648,613**		**972,259**
TOTAL PLANT IN SERVICE RELATED TO DISTRIBUTION OPERATIONS			**188,423,130**	**59,805,668**	**127,357,389**		**5,333,752**
AMORTIZATION OF NEGATIVE NET SALVAGE							*632,897*
GRAND TOTAL			**188,423,130**	**59,805,668**	**127,357,389**		**5,966,649**

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 1. ESTIMATED SURVIVOR CURVES, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT SEPTEMBER 30, 2019

ACCOUNT	PROBABLE RETIREMENT YEAR	SURVIVOR CURVE	ORIGINAL COST	BOOK RESERVE	FUTURE BOOK ACCRUALS	CALCULATED ANNUAL ACCRUAL RATE	CALCULATED ANNUAL ACCRUAL AMOUNT
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

* SURVIVOR CURVES FOR ACCOUNT 390 ARE INTERIM SURVIVOR CURVES. INDIVIDUAL BUILDINGS ARE LIFE SPANNED.

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 2. BOOK RESERVE AT SEPTEMBER 30, 2018 PROJECTED TO SEPTEMBER 30, 2019

ACCOUNT		BOOK RESERVE AT BEGINNING OF YEAR	ANNUAL ACCRUAL	AMORTIZATION OF NET SALVAGE	RETIREMENTS	GROSS SALVAGE	COST OF REMOVAL	TRANSFERS AND ADJUSTMENTS	BOOK RESERVE AT END OF YEAR	BOOK RESERVE AS A PERCENT OF ORIGINAL COST
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ELECTRIC PLANT										
DISTRIBUTION PLANT										
361	STRUCTURES AND IMPROVEMENTS	7,647	278	0	0	0	0	0	7,925	69.16
362	STATION EQUIPMENT	65,347	202,602	4,371	(336,194)	33,619	(67,239)	0	(97,494)	-1.18
364	POLES, TOWERS AND FIXTURES	12,836,360	829,145	330,599	(266,832)	0	(466,793)	0	13,262,479	30.77
365	OVERHEAD CONDUCTORS AND DEVICES	10,349,964	825,794	77,578	(117,096)	17,564	(96,140)	0	11,057,664	29.44
366	UNDERGROUND CONDUIT	1,849,398	99,872	6,054	(48,490)	0	(9,698)	0	1,897,136	28.10
367	UNDERGROUND CONDUCTORS AND DEVICES	2,751,761	290,121	10,634	(193,165)	0	(19,254)	0	2,840,097	28.98
368.1	TRANSFORMERS	7,213,446	288,476	(402)	(191,543)	19,154	(6,660)	0	7,322,471	50.22
368.2	TRANSFORMER INSTALLATIONS	5,106,927	251,079	22,151	(73,994)	0	(42,857)	0	5,263,306	50.58
369	SERVICES	6,505,019	268,363	59,526	(26,741)	2,674	(46,796)	0	6,762,045	45.25
370.1	METERS	1,949,884	61,927	0	(20,000)	0	0	0	1,991,811	72.11
370.2	METER INSTALLATIONS	711,001	25,269	2,680	(522)	0	(718)	0	737,710	38.68
370.3	ELECTRONIC METERS	3,468,920	162,105	0	(12,000)	0	0	0	3,619,025	73.14
371	INSTALLATIONS ON CUSTOMER PREMISES	820,517	73,062	13,941	(5,776)	0	(2,577)	0	899,167	46.08
371.5	INSTALLATIONS ON CUSTOMER PREMISES - DUSK TO DAWN LIGHTS	317,118	4,832	0	0	0	0	0	321,950	92.61
373	STREET LIGHTING AND SIGNAL SYSTEMS	768,258	50,428	17,039	(97,376)	0	(23,211)	0	715,138	43.73
TOTAL DISTRIBUTION PLANT		**54,721,567**	**3,433,353**	**544,171**	**(1,389,729)**	**73,011**	**(781,943)**	**0**	**56,600,430**	**35.60**
GENERAL PLANT										
390.1	STRUCTURES AND IMPROVEMENTS	813,557	29,551	18,994	(1,170,670)	0	(70,000)	0	(378,568)	-2.32
390.2	IMPROVEMENTS TO LEASED PROPERTY	0	0	0	0	0	0	0	0	0.00
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE	16,219	8,100	0	0	0	0	0	24,319	14.33
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT	20,263	21,679	0	0	0	0	0	41,942	36.28
391.92	OFFICE FURNITURE AND EQUIPMENT - OUTAGE MANAGEMENT SOFTWARE	10,627	164,325	0	0	0	0	0	174,952	23.33
392.2	TRANSPORTATION EQUIPMENT - TRUCKS	0	0	0	0	0	0	0	0	0.00
393	STORES EQUIPMENT	839	366	0	0	0	0	0	1,205	37.46
394	TOOLS, SHOP AND GARAGE EQUIPMENT	366,605	47,525	0	(17,552)	0	0	0	396,578	38.77
395	LABORATORY EQUIPMENT	100,361	15,716	0	(10,623)	0	0	0	105,454	66.46
396	POWER OPERATED EQUIPMENT	143,476	277	0	0	0	0	0	143,753	98.57
397	COMMUNICATION EQUIPMENT	736,111	83,765	0	(346,775)	0	0	0	473,101	61.34
398	MISCELLANEOUS EQUIPMENT	58,229	5,001	0	(37,987)	0	0	0	25,243	61.76
TOTAL GENERAL PLANT		**2,266,287**	**376,305**	**18,994**	**(1,583,607)**	**0**	**(70,000)**	**0**	**1,007,979**	**5.17**
TOTAL DEPRECIABLE PLANT		**56,987,854**	**3,809,658**	**563,165**	**(2,973,336)**	**73,011**	**(851,943)**	**0**	**57,608,409**	**32.28**
LESS GENERAL PLANT ALLOCATED TO TRANSMISSION - 22.5572%		511,211	84,884	4,285	(357,217)	0	(15,790)	0	227,372	
TOTAL DEPRECIABLE PLANT RELATED TO DISTRIBUTION OPERATIONS		**56,476,643**	**3,724,774**	**558,880**	**(2,616,119)**	**73,011**	**(836,153)**	**0**	**57,381,037**	

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 2. BOOK RESERVE AT SEPTEMBER 30, 2018 PROJECTED TO SEPTEMBER 30, 2019

ACCOUNT		BOOK RESERVE AT BEGINNING OF YEAR	ANNUAL ACCRUAL	AMORTIZATION OF NET SALVAGE	RETIREMENTS	GROSS SALVAGE	COST OF REMOVAL	TRANSFERS AND ADJUSTMENTS	BOOK RESERVE AT END OF YEAR	BOOK RESERVE AS A PERCENT OF ORIGINAL COST
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION										
COMMON PLANT										
390.1	STRUCTURES AND IMPROVEMENTS	0	817,504	0	0	0	0	(14,307)	803,197	2.43
390.2	STRUCTURES AND IMPROVEMENTS - LEASED PROPERTY	134,707	14,307	0	(163,321)	0	0	14,307	0	0.00
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE	232,426	156,038	0	0	0	0	0	388,464	14.05
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT	11,462	669,853	0	(15,125)	0	0	0	666,190	32.57
392.1	TRANSPORTATION EQUIPMENT - CARS	65,970	2,185	0	0	0	0	0	68,155	95.14
TOTAL COMMON PLANT		**444,565**	**1,659,887**	**0**	**(178,446)**	**0**	**0**	**0**	**1,926,006**	**5.08**
TOTAL COMMON PLANT ALLOCATED TO ELECTRIC DIVISION - 5.66%		**25,162**	**93,950**	**0**	**(10,100)**	**0**	**0**	**0**	**109,012**	
INFORMATION SERVICES (IS)										
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE	36,966	2,228	0	(6,159)	0	0	0	33,035	81.35
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT	4,061,171	2,092,784	0	(1,020,523)	0	0	0	5,133,432	42.53
391.3	OFFICE FURNITURE AND EQUIPMENT - SYSTEM DEV. COSTS - 10 YEARS	4,420,391	690,875	0	(507,896)	0	0	0	4,603,370	59.15
391.4	OFFICE FURNITURE & EQUIPMENT - SYSTEM DEV. COSTS - 15 YEARS	13,284,023	7,779,469	0	0	0	0	0	21,063,492	15.51
TOTAL INFORMATION SERVICES		**21,802,551**	**10,565,356**	**0**	**(1,534,578)**	**0**	**0**	**0**	**30,833,329**	**19.80**
TOTAL INFORMATION SERVICES ALLOCATED TO ELECTRIC DIVISION - 9.32%		**2,031,998**	**984,691**	**0**	**(143,023)**	**0**	**0**	**0**	**2,873,666**	
READING SERVICE CENTER										
390	STRUCTURES AND IMPROVEMENTS	1,259,462	62,471	0	0	0	0	0	1,321,933	
TOTAL READING SERVICE CENTER ALLOCATED TO ELECTRIC DIVISION - 11.21%		**141,186**	**7,003**	**0**	**0**	**0**	**0**	**0**	**148,189**	
TOTAL OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION		**2,198,346**	**1,085,644**	**0**	**(153,123)**	**0**	**0**	**0**	**3,130,867**	
LESS OTHER UTILITY PLANT ALLOCATED TO ELECTRIC TRANSMISSION - 22.5572%		495,885	244,891	0	(34,540)	0	0	0	706,236	
TOTAL OTHER PLANT ALLOCATED TO ELECTRIC RELATED TO DISTRIBUTION OPERATION		**1,702,461**	**840,753**	**0**	**(118,583)**	**0**	**0**	**0**	**2,424,631**	
TOTAL DEPRECIABLE PLANT IN SERVICE RELATED TO DISTRIBUTION OPERATIONS		**58,179,104**	**4,565,527**	**558,880**	**(2,734,702)**	**73,011**	**(836,153)**	**0**	**59,805,668**	

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 3. CALCULATION OF DEPRECIATION ACCRUALS FOR THE TWELVE MONTHS ENDED SEPTEMBER 30, 2019

ACCOUNT		BEGINNING OF YEAR BALANCE	ADDITIONS	RETIREMENTS	END OF YEAR BALANCE	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT*
(1)		(2)	(3)	(4)	(5)	(6)	(7)
ELECTRIC PLANT							
DISTRIBUTION PLANT							
361	STRUCTURES AND IMPROVEMENTS	11,459	0	0	11,459	2.43	278
362	STATION EQUIPMENT	4,771,246	3,854,920	(336,194)	8,289,972	3.51	202,602
364	POLES, TOWERS AND FIXTURES	40,691,964	2,671,260	(266,832)	43,096,392	1.98	829,145
365	OVERHEAD CONDUCTORS AND DEVICES	35,145,285	2,535,140	(117,096)	37,563,330	2.27	825,794
366	UNDERGROUND CONDUIT	6,316,070	484,900	(48,490)	6,752,480	1.54	99,872
367	UNDERGROUND CONDUCTORS AND DEVICES	8,979,682	1,014,700	(193,165)	9,801,217	3.07	290,121
368.1	TRANSFORMERS	13,880,645	891,300	(191,543)	14,580,402	2.04	288,476
368.2	TRANSFORMER INSTALLATIONS	9,767,058	712,300	(73,994)	10,405,365	2.49	251,079
369	SERVICES	14,124,193	845,400	(26,741)	14,942,852	1.85	268,363
370.1	METERS	2,782,014	0	(20,000)	2,762,014	2.23	61,927
370.2	METER INSTALLATIONS	1,897,531	10,000	(522)	1,907,009	1.33	25,269
370.3	ELECTRONIC METERS	4,920,183	40,000	(12,000)	4,948,183	3.29	162,105
371	INSTALLATIONS ON CUSTOMER PREMISES	1,933,832	23,250	(5,776)	1,951,306	3.76	73,062
371.5	INSTALLATIONS ON CUSTOMER PREMISES - DUSK TO DAWN LIGHTS	347,656	0	0	347,656	1.39	4,832
373	STREET LIGHTING AND SIGNAL SYSTEMS	1,600,853	131,750	(97,376)	1,635,228	3.12	50,428
TOTAL DISTRIBUTION PLANT		**147,169,672**	**13,214,920**	**(1,389,729)**	**158,994,865**		**3,433,353**
GENERAL PLANT							
390.1	STRUCTURES AND IMPROVEMENTS	1,200,322	16,284,000	(1,170,670)	16,313,652	2.46	29,551
390.2	IMPROVEMENTS TO LEASED PROPERTY	0	0	0	0	-	0
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE	154,677	15,000	0	169,677	5.01	8,100
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT	105,614	10,000	0	115,614	19.78	21,679
391.92	OFFICE FURNITURE AND EQUIPMENT - OUTAGE MANAGEMENT SOFTWARE	750,000	0	0	750,000	21.91	164,325
392.2	TRANSPORTATION EQUIPMENT - TRUCKS	0	0	0	0	-	0
393	STORES EQUIPMENT	3,217	0	0	3,217	11.38	366
394	TOOLS, SHOP AND GARAGE EQUIPMENT	952,931	87,500	(17,552)	1,022,878	4.92	47,525
395	LABORATORY EQUIPMENT	169,293	0	(10,623)	158,670	9.61	15,716
396	POWER OPERATED EQUIPMENT	145,839	0	0	145,839	0.19	277
397	COMMUNICATION EQUIPMENT	1,100,594	17,500	(346,775)	771,319	9.08	83,765
398	MISCELLANEOUS EQUIPMENT	78,859	0	(37,987)	40,872	8.58	5,001
TOTAL GENERAL PLANT		**4,661,346**	**16,414,000**	**(1,583,607)**	**19,491,738**		**376,305**
TOTAL DEPRECIABLE PLANT		**151,831,017**	**29,628,920**	**(2,973,336)**	**178,486,603**		**3,809,658**
NONDEPRECIABLE PLANT							
301.1	ORGANIZATION	1,602	0	0	1,602		
302.1	FRANCHISES AND CONSENTS - PERPETUAL	6,436	0	0	6,436		
360.1	LAND AND LAND RIGHTS - LAND	83,832	0	0	83,832		
360.2	LAND AND LAND RIGHTS - LAND RIGHTS	14,336	0	0	14,336		
389.1	LAND AND LAND RIGHTS - LAND	89,222	1,002,000	0	1,091,222		
TOTAL NONDEPRECIABLE PLANT		**195,428**	**1,002,000**	**0**	**1,197,428**		
TOTAL ELECTRIC PLANT		**152,026,445**	**30,630,920**	**(2,973,336)**	**179,684,031**		
LESS GENERAL AND INTANGIBLE PLANT ALLOCATED TO TRANSMISSION - 22.5572%		1,073,408	3,928,562	(357,217)	4,644,753		84,884

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 3. CALCULATION OF DEPRECIATION ACCRUALS FOR THE TWELVE MONTHS ENDED SEPTEMBER 30, 2019

ACCOUNT	BEGINNING OF YEAR BALANCE	ADDITIONS	RETIREMENTS	END OF YEAR BALANCE	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
TOTAL ELECTRIC PLANT RELATED TO DISTRIBUTION OPERATIONS	150,953,037	26,702,358	(2,616,119)	175,039,278		3,724,774

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 3. CALCULATION OF DEPRECIATION ACCRUALS FOR THE TWELVE MONTHS ENDED SEPTEMBER 30, 2019

ACCOUNT		BEGINNING OF YEAR BALANCE	ADDITIONS	RETIREMENTS	END OF YEAR BALANCE	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT*
(1)		(2)	(3)	(4)	(5)	(6)	(7)
OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION							
COMMON PLANT							
301	ORGANIZATION (NONDEPRECIABLE)	138,964	0	0	138,964		
389.1	LAND AND LAND RIGHTS - LAND (NONDEPRECIABLE)	6,947,278	0	0	6,947,278		
390.1	STRUCTURES AND IMPROVEMENTS	0	33,052,722	0	33,052,722	3.71	817,504
390.2	STRUCTURES AND IMPROVEMENTS - LEASED PROPERTY	163,321	0	(163,321)	0	17.52	14,307
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE	840,391	1,925,000	0	2,765,391	7.08	156,038
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT	60,502	2,000,000	(15,125)	2,045,377	45.60	669,853
392.1	TRANSPORTATION EQUIPMENT - CARS	71,637	0	0	71,637	3.05	2,185
TOTAL COMMON PLANT		**8,222,093**	**36,977,722**	**(178,446)**	**45,021,369**		**1,659,887**
TOTAL COMMON PLANT ALLOCATED TO ELECTRIC DIVISION - 5.66%		**465,370**	**2,092,939**	**(10,100)**	**2,548,209**		**93,950**
INFORMATION SERVICES (IS)							
391	OFFICE FURNITURE AND EQUIPMENT - FURNITURE	46,765	0	(6,159)	40,606	5.13	2,228
391.1	OFFICE FURNITURE AND EQUIPMENT - EQUIPMENT	9,389,332	3,700,000	(1,020,523)	12,068,809	19.87	2,092,784
391.3	OFFICE FURNITURE AND EQUIPMENT - SYSTEM DEV. COSTS - 10 YEARS	8,289,902	0	(507,896)	7,782,005	8.62	690,875
391.4	OFFICE FURNITURE & EQUIPMENT - SYSTEM DEV. COSTS - 15 YEARS	90,828,715	45,000,000	0	135,828,715	6.98	7,779,469
TOTAL INFORMATION SERVICES		**108,554,714**	**48,700,000**	**(1,534,578)**	**155,720,135**		**10,565,356**
TOTAL INFORMATION SERVICES ALLOCATED TO ELECTRIC DIVISION - 9.32%		**10,117,299**	**4,538,840**	**(143,023)**	**14,513,117**		**984,691**
READING SERVICE CENTER							
390	STRUCTURES AND IMPROVEMENTS	1,970,709	0	0	1,970,709	3.17	62,471
TOTAL READING SERVICE CENTER ALLOCATED TO ELECTRIC DIVISION - 11.21%		**220,916**	**0**	**0**	**220,916**		**7,003**
TOTAL OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION		**10,803,585**	**6,631,779**	**(153,123)**	**17,282,242**		**1,085,644**
LESS OTHER UTILITY PLANT ALLOCATED TO ELECTRIC TRANSMISSION - 22.5572%		2,436,986	1,495,944	(34,540)	3,898,390		244,891
TOTAL OTHER PLANT ALLOCATED TO ELECTRIC RELATED TO DISTRIBUTION OPERATIONS		**8,366,599**	**5,135,835**	**(118,583)**	**13,383,852**		**840,753**
TOTAL PLANT IN SERVICE RELATED TO DISTRIBUTION OPERATIONS		**159,319,636**	**31,838,193**	**(2,734,702)**	**188,423,130**		**4,565,527**

* TOTAL ACCRUALS SHOWN ARE BASED ON MONTHLY AVERAGES

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 4. AMORTIZATION OF EXPERIENCED AND ESTIMATED NET SALVAGE

ACCOUNT	2015 GROSS SALVAGE	2015 COST OF REMOVAL	2016 GROSS SALVAGE	2016 COST OF REMOVAL	2017 GROSS SALVAGE	2017 COST OF REMOVAL	2018 GROSS SALVAGE	2018 COST OF REMOVAL	2019 GROSS SALVAGE	2019 COST OF REMOVAL	FIVE YEAR NET SALVAGE TOTAL
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ELECTRIC PLANT											
DISTRIBUTION PLANT											
361	0	0	0	0	0	0	0	0	0	0	0
362	(2,000)	2,021	0	(34)	0	0	(21,866)	43,732	(33,619)	67,239	55,473
364	0	327,581	0	351,318	0	315,585	0	453,100	0	466,793	1,914,377
365	0	81,961	0	75,887	0	91,147	(16,955)	92,807	(17,564)	96,140	403,423
366	0	3,074	0	884	0	13,832	0	9,698	0	9,698	37,186
367	0	8,629	0	3,188	0	12,707	0	19,254	0	19,254	63,032
368.1	0	2,387	0	0	0	7,007	(18,569)	6,456	(19,154)	6,660	(15,213)
368.2	0	19,592	0	20,208	0	16,645	0	41,218	0	42,857	140,520
369	0	67,963	0	64,224	0	59,124	(2,572)	45,012	(2,674)	46,796	277,873
370.1	0	0	0	0	0	0	0	0	0	0	0
370.2	0	3,378	0	3,071	0	2,789	0	718	0	718	10,674
370.3	0	0	0	0	0	0	0	0	0	0	0
371	0	10,296	0	19,949	0	13,648	0	2,494	0	2,577	48,964
371.5	0	0	0	0	0	0	0	0	0	0	0
373	0	22,892	0	15,458	0	16,397	0	22,463	0	23,211	100,421
TOTAL	**(2,000)**	**549,774**	**0**	**554,153**	**0**	**548,881**	**(59,962)**	**736,952**	**(73,011)**	**781,943**	**3,036,730**
GENERAL PLANT											
390.1	0	93,483	0	1,488	0	0	0	0	0	70,000	164,971
390.2	0	0	0	0	0	0	0	0	0	0	0
391	0	0	0	0	0	0	0	0	0	0	0
391.1	0	0	0	0	0	0	0	0	0	0	0
391.92	0	0	0	0	0	0	0	0	0	0	0
392.2	0	0	0	0	0	0	0	0	0	0	0
393	0	0	0	0	0	0	0	0	0	0	0
394	0	0	0	0	0	0	0	0	0	0	0
395	0	0	0	0	0	0	0	0	0	0	0
396	0	0	0	0	0	0	0	0	0	0	0
397	0	0	0	0	0	0	0	0	0	0	0
398	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**93,483**	**0**	**1,488**	**0**	**0**	**0**	**0**	**0**	**70,000**	**164,971**
TOTAL ELECTRIC	**(2,000)**	**643,257**	**0**	**555,641**	**0**	**548,881**	**(59,962)**	**736,952**	**(73,011)**	**851,943**	**3,201,701**
LESS GENERAL PLANT ALLOCATED TO TRANSMISSION - 22.5572%	0	21,087	0	336	0	0	0	0	0	15,790	37,213
TOTAL	**(2,000)**	**622,170**	**0**	**555,305**	**0**	**548,881**	**(59,962)**	**736,952**	**(73,011)**	**836,153**	**3,164,488**

UGI UTILITIES, INC. - ELECTRIC DIVISION

TABLE 4. AMORTIZATION OF EXPERIENCED AND ESTIMATED NET SALVAGE

	2015		2016		2017		2018		2019		FIVE YEAR
ACCOUNT	GROSS SALVAGE	COST OF REMOVAL	GROSS SALVAGE	COST OF REMOVAL	GROSS SALVAGE	COST OF REMOVAL	GROSS SALVAGE	COST OF REMOVAL	GROSS SALVAGE	COST OF REMOVAL	NET SALVAGE TOTAL
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
OTHER UTILITY PLANT ALLOCATED TO ELECTRIC DIVISION											
COMMON PLANT											
390.1	0	0	0	0	0	0	0	0	0	0	0
390.2	0	0	0	0	0	0	0	0	0	0	0
391	0	0	0	0	0	0	0	0	0	0	0
391.1	0	0	0	0	0	0	0	0	0	0	0
392.1	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
INFORMATION SERVICES											
391	0	0	0	0	0	0	0	0	0	0	0
391.1	0	0	0	0	0	0	0	0	0	0	0
391.3	0	0	0	0	0	0	0	0	0	0	0
391.4	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
GRAND TOTAL	**(2,000)**	**622,170**	**0**	**555,305**	**0**	**548,881**	**(59,962)**	**736,952**	**(73,011)**	**836,153**	**3,164,488**

NET SALVAGE ACCRUAL (13)=(12)/5
0
11,095
382,875
80,685
7,437
12,606
(3,043)
28,104
55,575
0
2,135
0
9,793
0
20,084
607,346
32,994
0
0
0
0
0
0
0
0
0
0
0
32,994
640,340
7,443
632,897

NET SALVAGE ACCRUAL (13)=(12)/5
0
0
0
0
0
0
0
0
0
0
0
632,897

UGI Electric Exhibit JFW-2

UGI UTILITIES, INC. - ELECTRIC DIVISION

SUMMARY OF BUDGET REVISIONS

DESCRIPTION / ACCOUNT		ORIGINAL FILED AMOUNT	REVISED AMOUNT	DIFFERENCE
(1)		(2)	(3)	(4)=(3)-(2)
EXCLUSION OF LOOMIS SUBSTATION FEEDER LINE				
I. PLANT INVESTMENT				
A. ADDITIONS				
364	POLES, TOWERS AND FIXTURES	2,911,260	2,671,260	(240,000)
365	OVERHEAD CONDUCTORS AND DEVICES	2,805,140	2,535,140	(270,000)
368.1	TRANSFORMERS	921,300	891,300	(30,000)
368.2	TRANSFORMER INSTALLATIONS	742,300	712,300	(30,000)
369	SERVICES	875,400	845,400	(30,000)
TOTAL		*8,255,400*	*7,655,400*	*(600,000)*
B. RETIREMENTS				
364	POLES, TOWERS AND FIXTURES	(290,806)	(266,832)	23,974
365	OVERHEAD CONDUCTORS AND DEVICES	(129,567)	(117,096)	12,471
368.1	TRANSFORMERS	(197,990)	(191,543)	6,447
368.2	TRANSFORMER INSTALLATIONS	(77,110)	(73,994)	3,116
369	SERVICES	(27,690)	(26,741)	949
TOTAL		*(723,163)*	*(676,206)*	*46,957*
C. NET PLANT ACTIVITY				
364	POLES, TOWERS AND FIXTURES	2,620,454	2,404,428	(216,026)
365	OVERHEAD CONDUCTORS AND DEVICES	2,675,573	2,418,044	(257,529)
368.1	TRANSFORMERS	723,310	699,757	(23,553)
368.2	TRANSFORMER INSTALLATIONS	665,190	638,306	(26,884)
369	SERVICES	847,710	818,659	(29,051)
TOTAL		*7,532,237*	*6,979,194*	*(553,043)*
D. PLANT BALANCES AT 9/30/2019				
364	POLES, TOWERS AND FIXTURES	43,312,419	43,096,392	(216,027)
365	OVERHEAD CONDUCTORS AND DEVICES	37,820,859	37,563,330	(257,529)
368.1	TRANSFORMERS	14,603,955	14,580,402	(23,553)
368.2	TRANSFORMER INSTALLATIONS	10,432,248	10,405,365	(26,883)
369	SERVICES	14,971,903	14,942,852	(29,051)
TOTAL		*121,141,384*	*120,588,341*	*(553,043)*
II. BOOK RESERVE				
A. ANNUAL ACCRUAL FOR THE YEAR 2019				
364	POLES, TOWERS AND FIXTURES	831,252	829,145	(2,107)
365	OVERHEAD CONDUCTORS AND DEVICES	828,776	825,794	(2,982)
368.1	TRANSFORMERS	288,655	288,476	(179)
368.2	TRANSFORMER INSTALLATIONS	251,411	251,079	(332)
369	SERVICES	268,613	268,363	(250)
TOTAL		*2,468,707*	*2,462,857*	*(5,850)*
B. AMORTIZATION OF NET SALVAGE				
364	POLES, TOWERS AND FIXTURES	330,599	330,599	0
365	OVERHEAD CONDUCTORS AND DEVICES	77,578	77,578	0
368.1	TRANSFORMERS	(402)	(402)	0
368.2	TRANSFORMER INSTALLATIONS	22,151	22,151	0
369	SERVICES	59,526	59,526	0
TOTAL		*489,452*	*489,452*	*0*
C. RETIREMENTS				
364	POLES, TOWERS AND FIXTURES	(290,806)	(266,832)	23,974
365	OVERHEAD CONDUCTORS AND DEVICES	(129,567)	(117,096)	12,471
368.1	TRANSFORMERS	(197,990)	(191,543)	6,447
368.2	TRANSFORMER INSTALLATIONS	(77,110)	(73,994)	3,116
369	SERVICES	(27,690)	(26,741)	949
TOTAL		*(723,163)*	*(676,206)*	*46,957*

UGI UTILITIES, INC. - ELECTRIC DIVISION

SUMMARY OF BUDGET REVISIONS

DESCRIPTION / ACCOUNT		ORIGINAL FILED AMOUNT	REVISED AMOUNT	DIFFERENCE
(1)		(2)	(3)	(4)=(3)-(2)
D. GROSS SALVAGE				
364	POLES, TOWERS AND FIXTURES	0	0	0
365	OVERHEAD CONDUCTORS AND DEVICES	19,435	17,564	(1,871)
368.1	TRANSFORMERS	19,799	19,154	(645)
368.2	TRANSFORMER INSTALLATIONS	0	0	0
369	SERVICES	2,769	2,674	(95)
TOTAL		*42,003*	*39,392*	*(2,611)*
E. COST OF REMOVAL				
364	POLES, TOWERS AND FIXTURES	(508,732)	(466,793)	41,939
365	OVERHEAD CONDUCTORS AND DEVICES	(106,379)	(96,140)	10,239
368.1	TRANSFORMERS	(6,884)	(6,660)	224
368.2	TRANSFORMER INSTALLATIONS	(44,662)	(42,857)	1,805
369	SERVICES	(48,457)	(46,796)	1,661
TOTAL		*(715,114)*	*(659,246)*	*55,868*
F. NET RESERVE ACTIVITY				
364	POLES, TOWERS AND FIXTURES	362,313	426,119	63,806
365	OVERHEAD CONDUCTORS AND DEVICES	689,843	707,700	17,857
368.1	TRANSFORMERS	103,178	109,025	5,847
368.2	TRANSFORMER INSTALLATIONS	151,790	156,379	4,589
369	SERVICES	254,761	257,026	2,265
TOTAL		*1,561,885*	*1,656,249*	*94,364*
G. RESERVE BALANCES AT 9/30/2019				
364	POLES, TOWERS AND FIXTURES	13,198,673	13,262,479	63,806
365	OVERHEAD CONDUCTORS AND DEVICES	11,039,807	11,057,664	17,857
368.1	TRANSFORMERS	7,316,624	7,322,471	5,847
368.2	TRANSFORMER INSTALLATIONS	5,258,717	5,263,306	4,589
369	SERVICES	6,759,780	6,762,045	2,265
TOTAL		*43,573,601*	*43,667,965*	*94,364*
III. CALCULATED ANNUAL ACCRUAL AT 9/30/2019				
A. ANNUAL ACCRUAL				
364	POLES, TOWERS AND FIXTURES	868,526	861,174	(7,352)
365	OVERHEAD CONDUCTORS AND DEVICES	863,094	852,471	(10,623)
368.1	TRANSFORMERS	304,037	303,154	(883)
368.2	TRANSFORMER INSTALLATIONS	267,598	266,168	(1,430)
369	SERVICES	280,653	279,668	(985)
TOTAL		*2,583,908*	*2,562,635*	*(21,273)*
B. AMORTIZATION OF NEGATIVE NET SALVAGE				
364	POLES, TOWERS AND FIXTURES	391,263	382,875	(8,388)
365	OVERHEAD CONDUCTORS AND DEVICES	82,358	80,685	(1,673)
368.1	TRANSFORMERS	(3,127)	(3,043)	84
368.2	TRANSFORMER INSTALLATIONS	28,465	28,104	(361)
369	SERVICES	55,888	55,575	(313)
TOTAL		*554,847*	*544,196*	*(10,651)*
C. TOTAL ANNUAL IMPACT				
364	POLES, TOWERS AND FIXTURES	1,259,789	1,244,049	(15,740)
365	OVERHEAD CONDUCTORS AND DEVICES	945,452	933,156	(12,296)
368.1	TRANSFORMERS	300,910	300,111	(799)
368.2	TRANSFORMER INSTALLATIONS	296,063	294,272	(1,791)
369	SERVICES	336,541	335,243	(1,298)
TOTAL		*3,138,755*	*3,106,831*	*(31,924)*

UGI UTILITIES, INC. - ELECTRIC DIVISION

SUMMARY OF BUDGET REVISIONS

DESCRIPTION / ACCOUNT	ORIGINAL FILED AMOUNT	REVISED AMOUNT	DIFFERENCE
(1)	(2)	(3)	(4)=(3)-(2)
REVISION TO THE ELECTRIC HEADQUARTERS OFFICE			
I. PLANT INVESTMENT			
A. ADDITIONS			
389.1 LAND AND LAND RIGHTS - LAND	2,000,000	1,002,000	(998,000)
390.1 STRUCTURES AND IMPROVEMENTS	8,000,000	16,284,000	8,284,000
TOTAL	*10,000,000*	*17,286,000*	*7,286,000*
B. RETIREMENTS			
389.1 LAND AND LAND RIGHTS - LAND	0	0	0
390.1 STRUCTURES AND IMPROVEMENTS	(1,170,670)	(1,170,670)	0
TOTAL	*(1,170,670)*	*(1,170,670)*	*0*
C. NET PLANT ACTIVITY			
389.1 LAND AND LAND RIGHTS - LAND	2,000,000	1,002,000	(998,000)
390.1 STRUCTURES AND IMPROVEMENTS	6,829,330	15,113,330	8,284,000
TOTAL	*8,829,330*	*16,115,330*	*7,286,000*
D. PLANT BALANCES AT 9/30/2019			
389.1 LAND AND LAND RIGHTS - LAND	2,089,222	1,091,222	(998,000)
390.1 STRUCTURES AND IMPROVEMENTS	8,029,652	16,313,652	8,284,000
TOTAL	*10,118,874*	*17,404,874*	*7,286,000*
LESS PLANT ALLOCATED TO TRANSMISSION - 22.5572%	2,282,535	3,926,052	1,643,517
TOTAL BALANCE RELATED TO DISTRIBUTION OPERATIONS	*7,836,339*	*13,478,822*	*5,642,483*
II. CALCULATED ANNUAL ACCRUAL AT 9/30/2019			
389.1 LAND AND LAND RIGHTS - LAND	0	0	0
390.1 STRUCTURES AND IMPROVEMENTS	311,993	619,377	307,384
TOTAL	*311,993*	*619,377*	*307,384*
LESS PLANT ALLOCATED TO TRANSMISSION - 22.5572%	70,377	139,714	69,337
TOTAL ACCRUALS RELATED TO DISTRIBUTION OPERATIONS	*241,616*	*479,663*	*238,047*