BEFORE THE
MARYLAND PUBLIC SERVICE COMMISSION

IN THE MATTER OF THE APPLICATION OF WASHINGTON GAS LIGHT COMPANY FOR AUTHORITY TO INCREASE EXISTING RATES AND CHARGES AND THE REVISE ITS TERMS AND CONDITIONS FOR GAS SERVICE	)))))))	CASE NO. 9481

DIRECT TESTIMONY OF

DAVID J. GARRETT

SUBMITTED ON BEHALF OF THE
MARYLAND OFFICE OF PEOPLE'S COUNSEL

AUGUST 21, 2018

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I. INTRODUCTION

Q. STATE YOUR NAME AND OCCUPATION.

A. My name is David J. Garrett. I am a consultant specializing in public utility regulation. I am the managing member of Resolve Utility Consulting, PLLC. I focus my practice on the primary capital recovery mechanisms for public utility companies: cost of capital and depreciation.

Q. SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I received a B.B.A. degree with a major in Finance, an M.B.A. degree, and a Juris Doctor degree from the University of Oklahoma. I worked in private legal practice for several years before accepting a position as assistant general counsel at the Oklahoma Corporation Commission in 2011, where I worked in the Office of General Counsel in regulatory proceedings. In 2012, I began working for the Public Utility Division as a regulatory analyst providing testimony in regulatory proceedings. In 2016 I formed Resolve Utility Consulting, PLLC, where I have represented various consumer groups and state agencies in utility regulatory proceedings, primarily in the areas of cost of capital and depreciation. I am a Certified Depreciation Professional with the Society of Depreciation Professionals. I am also a Certified Rate of Return Analyst with the Society of Utility and Regulatory Financial Analysts. A more complete description of my qualifications and regulatory experience is included in my curriculum vitae.[1]

[1] Exhibit DJG-1.

Q. DESCRIBE THE PURPOSE AND SCOPE OF YOUR TESTIMONY IN THIS PROCEEDING.

A. I am testifying on behalf of the Maryland Office of People's Counsel ("OPC") regarding the depreciation study and proposed depreciation rates of Washington Gas Light Company ("WGL" or the "Company"). I am responding to the Direct Testimony of Dr. Ronald E. White, who conducted the depreciation study.

II. EXECUTIVE SUMMARY

Q. SUMMARIZE THE KEY POINTS OF YOUR TESTIMONY.

A. In the context of utility ratemaking, "depreciation" refers to a cost allocation system designed to measure the rate by which a utility may recover its capital investments. Depreciation systems are designed to develop rates that allocate those costs in a systematic and rational manner – specifically, over the service lives of the utility's assets. If depreciation rates are overestimated (i.e., service lives are underestimated), it could lead to economic inefficiency by incentivizing the utility to retire assets before the end of their economic useful lives. Thus, ensuring that depreciation rates are reasonable, and not excessive, is a public policy issue.

Q. PLEASE DESCRIBE HOW YOU ASSESSED THE REASONABLENESS OF WGL'S PROPOSED DEPRECIATION RATES.

A. Developing depreciation rates requires estimates of service life and net salvage. To estimate the service life of WGL's assets, I analyzed the Company's historical plant data as part of a well-established depreciation system, and I used actuarial analysis and survivor curve-fitting techniques to develop objective estimates of average service life. As discussed in my testimony, I propose service life adjustments to several accounts. These adjustments are based on objective, mathematical analyses. In my opinion, the Company has underestimated the service lives for these accounts and has failed to make a convincing showing that its proposed depreciation rates for these accounts is not excessive. I also recommend adjustments to the Company's proposed net salvage rates. Pursuant to Commission precedent, the net salvage rates I propose were developed under the Present Value Method. The following figure compares the proposed depreciation rates and accruals.

Figure 1:
Depreciation Expense Comparison by Plant Function

Plant Function	Plant Balance 12/31/2016	WGL Position		OPC Position		OPC Adjustment	
		Rate	Accrual	Rate	Accrual	Rate	Accrual
Storage and Processing	24,986,853	2.64%	660,091	1.47%	366,150	-1.18%	(293,941)
Transmission	132,103,039	1.91%	2,522,220	1.38%	1,825,885	-0.53%	(696,335)
Distribution	1,325,516,741	1.65%	21,933,639	1.52%	20,155,337	-0.13%	(1,778,302)
General	178,027,566	8.45%	15,044,987	8.37%	14,904,289	-0.08%	(140,698)
Total	$ 1,660,634,199	2.42%	$ 40,160,937	2.24%	$ 37,251,661	-0.18%	**$ (2,909,276)**

The original cost and accrual amounts correspond to plant balances as of the study date, which is December 31, 2016. Applying my proposed depreciation rates to these plant balances would result in an adjustment decreasing WGL's proposed annual depreciation accrual by $2.9 million.[2]

Q. DESCRIBE WHY IT IS IMPORTANT NOT TO OVERESTIMATE DEPRECIATION RATES.

A. Under the rate base rate of return model, the utility is allowed to recover the original cost of its prudent investments required to provide service. Unlike competitive firms, regulated

[2] *See* Exhibit DJG-2.

utility companies are not always incentivized by natural market forces to make the most economically efficient decisions. For example, competitive firms are incentivized through natural market forces to operate with minimal capital costs, whereas regulated utilities are not. If a utility is allowed to recover the cost of an asset before the end of its useful life, this could incentivize the utility to unnecessarily replace the asset in order to increase rate base, which results in economic waste. Thus, from a public policy perspective, it is preferable for regulators to ensure that assets are not depreciated before the end of their economic useful lives. Through objective statistical analyses of WGL's historical plant data, I have developed reasonable service life estimates for the Company's depreciable assets, which are discussed later in my testimony.[3]

III. LEGAL STANDARDS

Q. DISCUSS THE STANDARD BY WHICH REGULATED UTILITIES ARE ALLOWED TO RECOVER DEPRECIATION EXPENSE.

A. In *Lindheimer v. Illinois Bell Telephone Co.*, the U.S. Supreme Court stated that "depreciation is the loss, not restored by current maintenance, which is due to all the factors causing the ultimate retirement of the property. These factors embrace wear and tear, decay, inadequacy, and obsolescence."[4] The *Lindheimer* Court also recognized that the original cost of plant assets, rather than present value or some other measure, is the proper basis for calculating depreciation expense.[5] Moreover, the *Lindheimer* Court found:

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[3] *See* Section V.

[4] *Lindheimer v. Illinois Bell Tel. Co.*, 292 U.S. 151, 167 (1934).

[5] *Id*. (Referring to the straight-line method, the *Lindheimer* Court stated that "[a]ccording to the principle of this accounting practice, the loss is computed upon the actual cost of the property as entered upon the books, less the expected salvage, and the amount charged each year is one year's pro rata share of the total amount."). The original

[T]he company has the burden of making a convincing showing that the amounts it has charged to operating expenses for depreciation have not been excessive. That burden is not sustained by proof that its general accounting system has been correct. The calculations are mathematical, but the predictions underlying them are essentially matters of opinion.[6]

Thus, the Commission must ultimately determine if the Company has met its burden of proof by making a convincing showing that its proposed depreciation rates are not excessive.

Q. SHOULD DEPRECIATION REPRESENT AN ALLOCATED COST OF CAPITAL TO OPERATION, RATHER THAN A MECHANISM TO DETERMINE LOSS OF VALUE?

A. Yes. While the *Lindheimer* case and other early literature recognized depreciation as a necessary expense, the language indicated that depreciation was primarily a mechanism to determine loss of value.[7] Adoption of this "value concept" would require annual appraisals of extensive utility plant and is thus not practical in this context. Rather, the "cost allocation concept" recognizes that depreciation is a cost of providing service, and that in addition to receiving a "return on" invested capital through the allowed rate of return, a utility should also receive a "return of" its invested capital in the form of recovered depreciation expense. The cost allocation concept also satisfies several fundamental accounting principles, including verifiability, neutrality, and the matching principle.[8] The

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cost standard was reaffirmed by the Court in *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591, 606 (1944). The *Hope* Court stated: "Moreover, this Court recognized in [*Lindheimer*], supra, the propriety of basing annual depreciation on cost. By such a procedure the utility is made whole and the integrity of its investment maintained. No more is required."

[6] *Id*. at 169 (emphasis added).

[7] *See* Frank K. Wolf & W. Chester Fitch, *Depreciation Systems* 71 (Iowa State University Press 1994).

[8] National Association of Regulatory Utility Commissioners, *Public Utility Depreciation Practices* 12 (NARUC 1996).

definition of "depreciation accounting" published by the American Institute of Certified Public Accountants ("AICPA") properly reflects the cost allocation concept:

> 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. It is a process of allocation, not of valuation.[9]

Thus, the concept of depreciation as "the allocation of cost has proven to be the most useful and most widely used concept."[10]

IV. ANALYTIC METHODS

Q. DISCUSS YOUR APPROACH TO ANALYZING THE COMPANY'S DEPRECIABLE PROPERTY IN THIS CASE.

A. The depreciation rates proposed by Dr. White were developed based on depreciable property recorded as of December 31, 2016. I obtained and reviewed the same historical property data that was used to conduct WGL's depreciation study, including plant retirement and net salvage data. I analyzed the data and calculated my proposed rates under a depreciation system designed to conform to the legal and technical standards discussed above.

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[9] American Institute of Accountants, *Accounting Terminology Bulletins Number 1: Review and Résumé* 25 (American Institute of Accountants 1953).

[10] Wolf *supra* n. 7, at 73.

Q. DISCUSS THE DEFINITION AND PURPOSE OF A DEPRECIATION SYSTEM, AS WELL AS THE DEPRECIATION SYSTEM YOU EMPLOYED FOR THIS PROJECT.

A. The legal standards set forth above do not mandate a specific procedure for conducting depreciation analysis. These standards, however, direct that analysts use a system for estimating depreciation rates that will result in the "systematic and rational" allocation of capital recovery for the utility. Depreciation analysts have developed various "depreciation systems" designed to analyze grouped property in accordance with this standard. A depreciation system may be defined by several primary parameters: 1) a <u>method</u> of allocation; 2) a <u>procedure</u> for applying the method of allocation; 3) a <u>technique</u> of applying the depreciation rate; and 4) a <u>model</u> for analyzing the characteristics of vintage property groups.[11] In this case, I used the straight line method, the average life procedure, the remaining life technique, and the broad group model to analyze the Company's actuarial data; this system would be denoted as an "SL-AL-RL-BG" system. This depreciation system conforms to the legal standards set forth above and is the system most commonly used by depreciation analysts in regulatory proceedings. I provide a more detailed discussion of depreciation system parameters, theories, and equations in Appendix A.

Q. PLEASE DESCRIBE HOW YOU DEVELOPED AND CALCULATED YOUR PROPOSED DEPRECIATION RATES.

A. Consistent with Commission precedent, I developed my proposed depreciation rates in two separate components – the investment (or "plant") rate and the net salvage rate. I combined these two components to calculate the total depreciation rate for each account. The

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[11] *See* Wolf *supra* n. 7, at 70, 140.

analytical process is different for these two components, and I will discuss each component in separate sections below.

V. PLANT RATE ANALYSIS

Q. DESCRIBE THE PROCESS YOU USED TO DEVELOP THE INVESTMENT PORTION OF YOUR PROPOSED DEPRECIATION RATES.

A. To calculate the "plant-only" portion of the depreciation accrual for each account, three factors must be considered: (1) the book reserve; (2) estimated average life; and (4) the remaining life. The depreciation accrual is divided by the plant balance to determine the depreciation rate. As discussed above, I employed the remaining life technique as part of my overall depreciation system, which is the most commonly used technique and consistent with Commission precedent.[12] I will discuss the three main components of my proposed plant-only depreciation rates below.

A. Book Reserve Rebalancing and Allocations

Q. DESCRIBE HOW THE BOOK RESERVE IS INCORPORATED INTO THE REMAINING LIFE DEPRECIATION RATE CALCULATION.

A. Under the remaining life technique, the book reserve is subtracted from the gross plant balance of each account and allocated over the remaining life of plant, as estimated through Iowa curve analysis. This feature of the remaining life technique is important because it highlights the purpose for which the remaining life technique was created. Over time,

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[12] *See e.g.* In the Matter of the Application of Potomac Electric Power Company for Authority to Increase its Rates and Charges for Electric Distribution Service, Order No. 85028, Issued July 20, 2012, p. 79 (The Commission adopted the proposed depreciation rates of OPC witness Charles King, which were developed under the remaining life technique).

imbalances between the book reserve and the "theoretical reserve" can develop. Essentially, the theoretical reserve is the balance the book reserve "should be" if the current depreciation parameters (i.e., life and net salvage estimates) had been applied to the account from the beginning. If the "whole life" technique is used instead of the remaining life technique, then a manual rebalancing of the depreciation reserve should be conducted, which adds complexities to a regulatory proceeding. For this reason, the majority of depreciation analysts and regulatory jurisdictions rely on the remaining life technique in depreciation rate development. Under the remaining life technique, there is no need to make a separate adjustment to rebalance or reallocate the theoretical reserve to bring it closer to the book reserve.

The authoritative texts are clear that when using the remaining life technique, no separate reallocation of the theoretical reserve (or "Calculated Accumulated Depreciation" or "CAD") is required or even necessary. According to Wolf:

> Users of remaining life depreciation often do not explicitly calculate the CAD. As previously discussed, calculation of the CAD is implicit in the use of the remaining life method of adjustment, because the variation between the CAD and the accumulated provision for depreciation is <u>automatically</u> amortized over the remaining life.[13]

The NARUC manual also agrees that no separate reallocation of the theoretical reserve is required when using the remaining life technique:

[13] Wolf *supra* n. 7, at 178 (emphasis added).

> The desirability of using the remaining life technique is that any necessary adjustments of depreciation reserves, because of changes to the estimates of life on net salvage, are accrued automatically over the remaining life of the property.[14]

Thus, the primary purpose of the remaining life technique is the fact that a separate adjustment to the theoretical reserve is not required.

Q. DESPITE THE AUTOMATIC REBALANCING FEATURE INHERENT IN THE REMAINING LIFE TECHNIQUE, DID DR. WHITE PROPOSE A MANUAL REBALANCING OF THE DEPRECIATION RESERVE?

A. Yes. According to Dr. White, the recorded reserves for allocated plant categories were distributed within each primary plant account to obtain the portion of an allocated reserve attributable to plant physically located within each pooled jurisdiction.[15]

Q. IS ANOTHER PROBLEM CAUSED BY DR. WHITE'S MANUAL RESERVE REBALANCING?

A. Yes, I believe there is. Dr. White's manual rebalancing of the reserve has also impacted his proposed net salvage rates under the "Present Value Method." Based on my review of net savage rates approved by the Commission under the Present Value Method, neither the book reserve nor theoretical reserve should impact those net salvage rates.[16] The Present Value Method is discussed in detail in the net salvage rate section later in the testimony.

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[14] NARUC *supra* n. 8, at 65 (emphasis added).

[15] Direct Testimony of Dr. Ronald E. White, p. 12, lines 7-9.

[16] *See e.g.* In the Matter of the Application of Potomac Electric Power Company for Authority to Increase its Rates and Charges for Electric Distribution Service, Order No. 85028, Issued July 20, 2012, p. 79 (The Commission adopted the proposed depreciation rates of OPC witness Charles King. Mr. King's proposed net salvage rates were not impacted by the depreciation reserve).

Q. IN DEVELOPING YOUR PLANT DEPRECIATION RATES, WAS IT NECESSARY TO REALLOCATE PARTS OF THE BOOK RESERVE?

A. Yes. First, it is important to distinguish between reserve rebalancing and reserve reallocation. A rebalancing of the reserve is based upon a theoretical reserve calculation that is influenced by varying estimates of the most appropriate service life and net salvage under current conditions. A reserve rebalancing will necessarily change the amount of the total reserved used to calculate depreciation rates. In contrast, a reserve reallocation will use the same amount of the recorded book reserve. Under normal circumstances, it would not be necessary to reallocate the book reserve (i.e., one could simply subtract the book reserve from the gross plant balance in each account to arrive at the net plant balance). In WGL's case, however, there were several accounts that had accrued more depreciation reserve than the gross plant in the account. This resulted in a negative net plant balance. Mathematically, allocating a negative balance over the remaining life in the account would result in a negative depreciation rate. To correct for these negative plant balances, I distributed the negative balances among the other undepreciated accounts within the same plant function (in this case, only the distribution plant function contained negative net plant balances).[17]

Q. DID YOUR REALLOCATION OF THE NEGATIVE NET PLANT BALANCES HAVE A MATERIAL IMPACT ON YOUR ADJUSTMENTS?

A. No. I isolated the impact of the reserve reallocation, and it impacts my adjustment by about $66,000.

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[17] *See* Exhibit DJG-5.

Q. IS A RESERVE REALLOCATION IN THE MANNER IN WHICH YOU DESCRIBE CONSISTENT WITH PLANT RATES APPROVED BY THE COMMISSION IN PRIOR CASES?

A. Yes. In PEPCO's recent rate case, the Commission adopted the depreciation rates proposed by OPC witness Charles King. In that case, Mr. King reallocated negative net plant balances in the same way that I did in this case.[18]

B. Average Service Life Analysis

Q. DESCRIBE HOW THE AVERAGE SERVICE LIFE ANALYSIS IMPACTS YOUR PLANT DEPRECIATION RATE PROPOSALS.

A. As discussed above, I am proposing depreciation rates calculated under the remaining life technique as opposed to the "average life" technique. However, we must still determine the average life of the grouped assets within each account, even when using the remaining life technique. This is because the average life will determine the average annual accrual for each vintage group to be allocated over the remaining life for the that particular vintage.[19] Moreover, when dealing with a group of assets instead of a single asset, the average life of the group must be considered (as opposed to the individual life of each asset in the group).

Q. DESCRIBE THE ACTUARIAL PROCESS YOU USED TO ANALYZE THE COMPANY'S GROUPED PROPERTY.

A. The study of retirement patterns of industrial property is derived from the actuarial process used to study human mortality. Just as actuarial analysts study historical human mortality

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[18] Case No. 9286, Direct Testimony of Charles W. King, Exhibit CWK-1, Sch. 3.

[19] *See* Exhibit DJG-13 for detailed remaining life calculations.

data to predict how long a group of people will live, depreciation analysts study historical plant data to estimate the average lives of property groups. The most common actuarial method used by depreciation analysts is called the "retirement rate method." In the retirement rate method, original property data, including additions, retirements, transfers, and other transactions, are organized by vintage and transaction year.[20] The retirement rate method is ultimately used to develop an "observed life table," ("OLT") which shows the percentage of property surviving at each age interval. This pattern of property retirement is described as a "survivor curve." The survivor curve derived from the observed life table, however, must be fitted and smoothed with a complete curve in order to determine the ultimate average life of the group.[21] The most widely used survivor curves for this curve fitting process were developed at Iowa State University in the early 1900s and are commonly known as the "Iowa curves."[22] A more detailed explanation of how the Iowa curves are used in the actuarial analysis of depreciable property is set forth in Appendix C.

I used the aged property data provided by the Company to create an observed life table for each account. The data points on the OLT can be plotted to form a curve (the "OLT curve"). The OLT curve is not a theoretical curve, rather, it is actual observed data from the Company's records that indicate the rate of retirement for each property group. An OLT curve by itself, however, is rarely a smooth curve, and is often not a "complete"

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[20] The "vintage" year refers to the year that a group of property was placed in service (a.k.a. "placement" year). The "transaction" year refers to the accounting year in which a property transaction occurred, such as an addition, retirement, or transfer (a.k.a. "experience" year).

[21] *See* Appendix C for a more detailed discussion of the actuarial analysis used to determine the average lives of grouped industrial property.

[22] *See* Appendix B for a more detailed discussion of the Iowa curves.

curve (i.e., it does not end at zero percent surviving). In order to calculate average life (the area under a curve), a complete survivor curve is required. The Iowa curves are empirically-derived curves based on the extensive studies of the actual mortality patterns of many different types of industrial property. The curve-fitting process involves selecting the best Iowa curve to fit the OLT curve. This can be accomplished through a combination of visual and mathematical curve-fitting techniques, as well as professional judgment. The first step of my approach to curve-fitting involves visually inspecting the OLT curve for any irregularities. For example, if the "tail" end of the curve is erratic and shows a sharp decline over a short period of time, it may indicate that this portion of the data is less reliable, as further discussed below. After inspecting the OLT curve, I use a mathematical curve-fitting technique which essentially involves measuring the distance between the OLT curve and the selected Iowa curve to get an objective, mathematical assessment of how well the curve fits. After selecting an Iowa curve, I observe the OLT curve along with the Iowa curve on the same graph to determine how well the curve fits. I may repeat this process several times for any given account to ensure that the most reasonable Iowa curve is selected.

Q. DO YOU ALWAYS SELECT THE MATHEMATICALLY BEST-FITTING CURVE?

A. Not necessarily. Mathematical fitting is an important part of the curve-fitting process because it promotes objective, unbiased results. While mathematical curve fitting is important, however, it may not always yield the optimum result. For example, if there is insufficient historical data in a particular account and OLT curve derived from that data is relatively short and flat, the mathematically "best" curve may be one with a very long average life. However, when there are sufficient data available, mathematical curve fitting can be used as part of an objective service life analysis.

Q. SHOULD EVERY PORTION OF THE OLT CURVE BE GIVEN EQUAL WEIGHT?

A. Not necessarily. Many analysts have observed that the points comprising the "tail end" of the OLT curve may often have less analytical value than other portions of the curve. In fact, "[p]oints 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 the exposures."[23] In accordance with this standard, an analyst may decide to truncate the tail end of the OLT curve at a certain percent of initial exposures, such as one percent. Using this approach puts a greater emphasis on the most valuable portions of the curve. For my analysis in this case, I not only considered the entirety of the OLT curve, but also conducted further analyses that involved fitting Iowa curves to the most significant part of the OLT curve for certain accounts. In other words, to verify the accuracy of my curve selection, I narrowed the focus of my additional calculation to consider the top 99% of the "exposures" (i.e., dollars exposed to retirement) and to eliminate the tail end of the curve representing the bottom 1% of exposures for some accounts, if necessary.

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[23] Wolf *supra* n. 7, at 46.

Q. GENERALLY, DESCRIBE THE DIFFERENCES BETWEEN THE COMPANY'S SERVICE LIFE PROPOSALS AND YOUR SERVICE LIFE PROPOSALS.

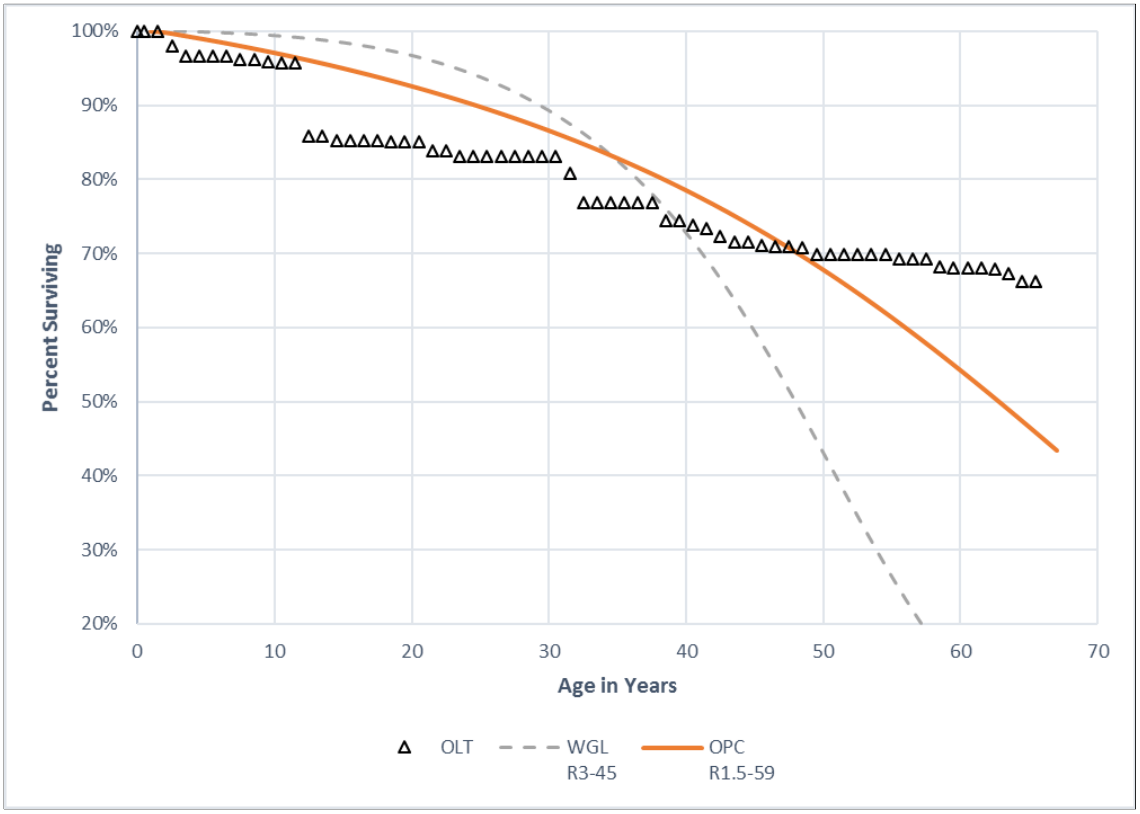
A. I am proposing service life adjustments through Iowa curve fitting analysis to five accounts: 361, 362, 363.5, 380.2, and 390. For each of these accounts, the Company's proposed service life, as estimated through an Iowa curve, is too short to accurately describe the mortality characteristics of the account in my opinion. All else held constant, shorter service life estimates result in higher depreciation rates and expense for customers. In my opinion, the Company has not made a "convincing showing" that its proposed depreciation rates for these accounts are not excessive. I will discuss my adjustments to these five accounts in more detail below.

1. <u>Account 361 – Structures and Improvements</u>

Q. DESCRIBE YOUR SERVICE LIFE ESTIMATE FOR THIS ACCOUNT AND COMPARE IT WITH THE COMPANY'S ESTIMATE.

A. The OLT curve shown below is derived from the Company's historical plant data. The Iowa curve fitting process involves selecting an Iowa curve that provides a good fit to the OLT curve. The graph below also shows the Iowa curves Dr. White and I selected. Dr. White selected the R3-45 curve for this account, and I selected the R1.5-59 curve.

Figure 2:
Account 361 – Structures and Improvements



A visual inspection reveals that Dr. White's curve does not appear to track very well with the observed data. The R1.5 curve shape is too "steep" to accurately describe the historical data, and the 45-year average life estimate is too short. In contrast, the R3-59 curve shape I selected is in the same modal family of curves as the R1.5, but it has a flatter trajectory and a longer average service life.

Q. IS YOUR SELECTED IOWA CURVE A BETTER MATHEMATICAL FIT TO THE RELEVANT PORTION OF THE OLT CURVE?

A. Yes. Although it is clear from a mere visual inspection that the R1.5-59 curve provides the superior fit for this account, it is generally useful to conduct mathematical curve fitting in addition to visual curve fitting. Mathematical curve fitting essentially involves measuring the distance between the OLT curve and the selected Iowa curve. The best mathematically-fitted curve is the one that minimizes the distance between the OLT curve and the Iowa curve, thus providing the closest fit. The "distance" between the curves is calculated using the "sum-of-squared differences" ("SSD") technique. In Account 361, the total SSD, or "distance" between the Company's curve and the OLT curve is 5.1243, while the total SSD between the R1.5-59 curve and the OLT curve is only 0.4715.[24] Thus, the R1.5-59 curve is a better mathematical fit and provides a more reasonable service life estimate and depreciation rate for this account.

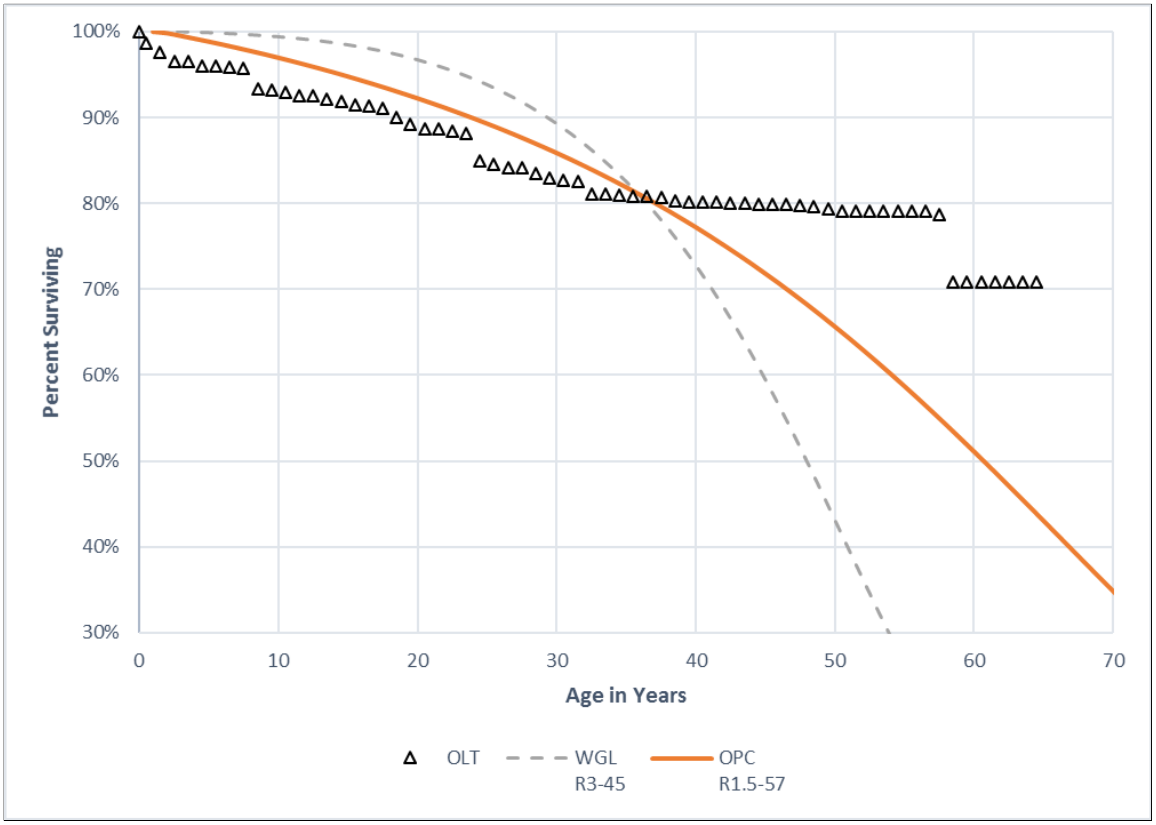
2. <u>Account 362 – Gas Holders</u>

Q. DESCRIBE YOUR SERVICE LIFE ESTIMATE FOR THIS ACCOUNT AND COMPARE IT WITH THE COMPANY'S ESTIMATE.

A. For this account, Dr. White selected the R3-45 curve, and I selected the R1.5-57 curve. The graph below shows these two Iowa curves juxtaposed with the OLT curve.

[24] Exhibit DJG-7.

Figure 3:
Account 362 – Gas Holders



As with the account discussed above, Dr. White's curve does not appear to track well with the observed data, even from a visual inspection. Likewise, Dr. White's curve does not appear to give enough weight to relevant statistical data from age intervals 40 – 60, which is a significant 20-year period.

Q. IS YOUR SELECTED IOWA CURVE A BETTER MATHEMATICAL FIT TO THE RELEVANT PORTION OF THE OLT CURVE?

A. Yes. Although it is clear from a mere visual inspection that the R1.5-57 curve provides the superior fit for this account, we can confirm the result mathematically. Specifically, the

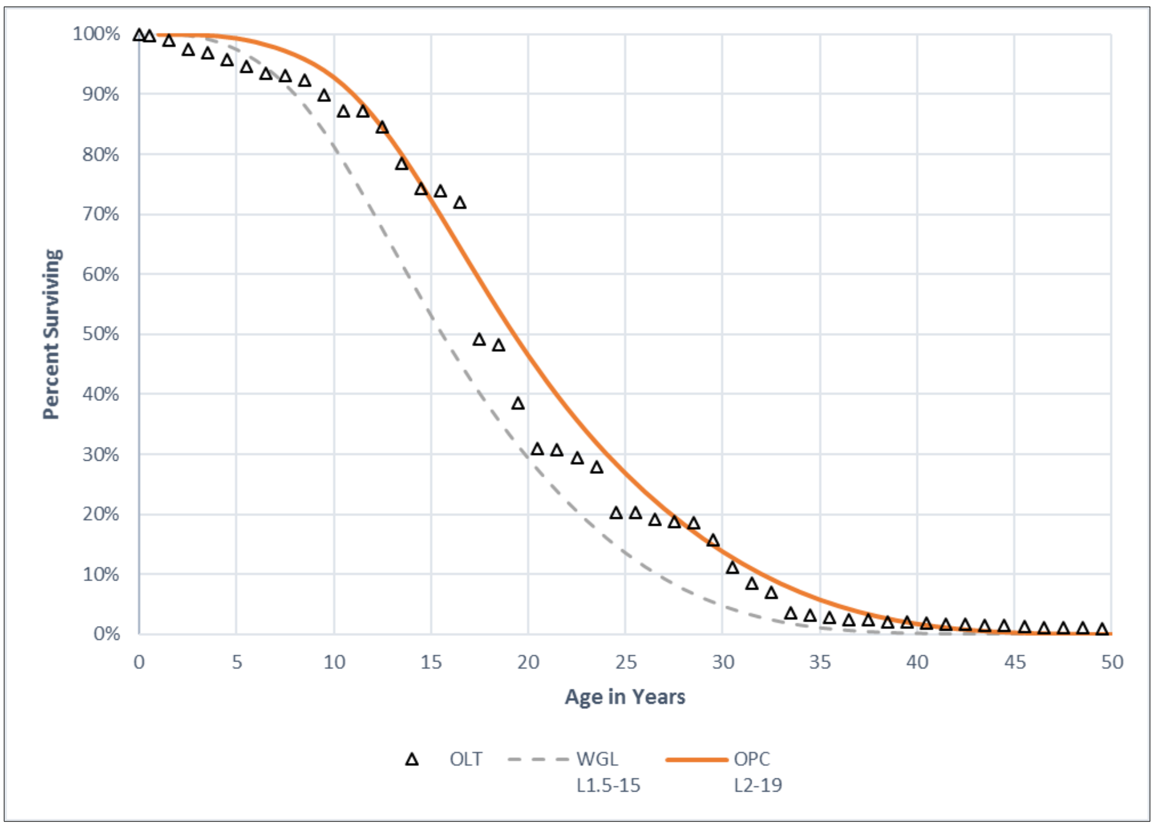
SSD for the Company's curve is 6.0004 and the SSD for the R1.5-57 curve I selected is only 1.9346, which means it provides a better fit to the historical data for this account.[25]

3. Account 363.5 – Other Equipment

Q. DESCRIBE YOUR SERVICE LIFE ESTIMATE FOR THIS ACCOUNT AND COMPARE IT WITH THE COMPANY'S ESTIMATE.

A. For Account 363.5, I selected the L2-19 curve and Dr. White selected the L1.5-15 curve. Both Iowa curves are shown in the graph below along with the OLT curve.

Figure 4:
Account 363.5 – Other Equipment



[25] Exhibit DJG-8.

The OLT curve derived from the Company's data for this account is very well suited for conventional Iowa curve fitting techniques. The primary purposes of the Iowa curve fitting process are to smooth the observed data and obtain a complete curve so that average life may be calculated. For this account, the observed data by itself is relatively smooth and complete (i.e., the OLT curve declines to zero percent surviving). The Company's proposed curve is similar to the L2-19 in shape and length, but it appears that the curve is not quite long enough to most accurately reflect the historical retirement rate in this account. We can confirm this premise mathematically.

Q. IS YOUR SELECTED IOWA CURVE A BETTER MATHEMATICAL FIT TO THE RELEVANT PORTION OF THE OLT CURVE?

A. Yes. In depreciation analysis, some accounts will yield OLT curves that are either very short, or do not have enough retirement rate history to aid in the curve-fitting process. In contrast to those scenarios, the OLT curve for the Company's account 363.5 is essentially complete, making it ideal for mathematical curve fitting techniques. The Iowa curve I selected provides a closer mathematical fit to the OLT curve throughout nearly all portions of the OLT curve. Specifically, the SSD for the Company's curve is 0.7872, while the SSD for the better-fitting L2-19 curve is only 0.0764.[26]

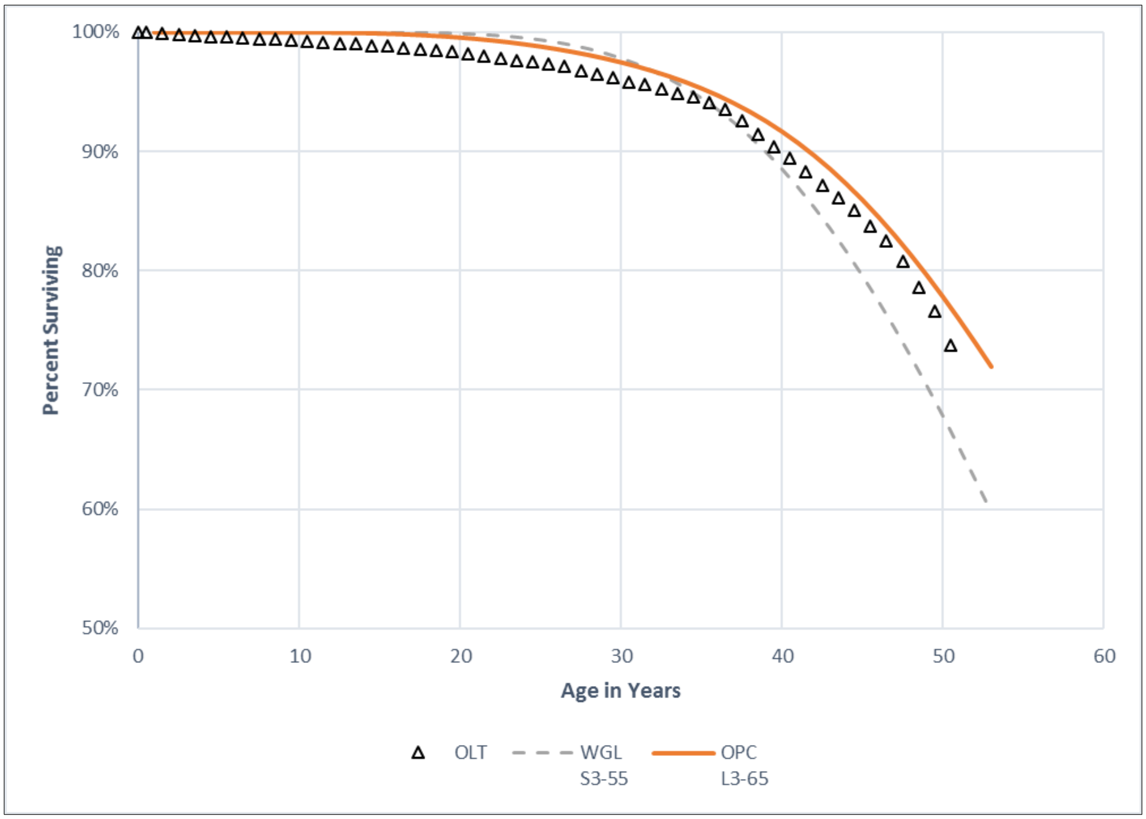
[26] Exhibit DJG-9.

4. <u>Account 380.2 – Services – Plastic</u>

Q. DESCRIBE YOUR SERVICE LIFE ESTIMATE FOR THIS ACCOUNT AND COMPARE IT WITH THE COMPANY'S ESTIMATE.

A. For this account, I selected the Iowa L3-65 curve and Dr. White selected the S3-55 curve. The two curves are shown in the graph below along with the historical OLT curve.

Figure 5:
Account 380.2 – Services – Plastic



As shown in the graph, the retirement pattern in this account indicates an increasing rate of retirement as the group's age becomes closer to its average life. Both selected Iowa curves appear to reflect this fact, however, the S3-55 curve selected by Dr. White, as with several accounts discussed above, appears to be too steep and short to provide the most accurate description of the historical retirement pattern in this account. Another telling statistic in the data is the fact that at the 50-year age interval, there are still more than 73% of the assets in this account surviving. For Dr. White's prediction of a 55-year average life in this account to be accurate, there would need to be a highly accelerated rate of retirement in the next few years, beyond that which has been observed thus far.

Q. DOES THE IOWA CURVE YOU SELECTED PROVIDE A BETTER MATHEMATICAL FIT TO THE OBSERVED DATA THAN THE COMPANY'S CURVE?

A. Yes. The SSD for the Company's curve is 0.0888, while the SSD for the better-fitting L3-65 curve is only 0.0030, making it the better fit.[27]

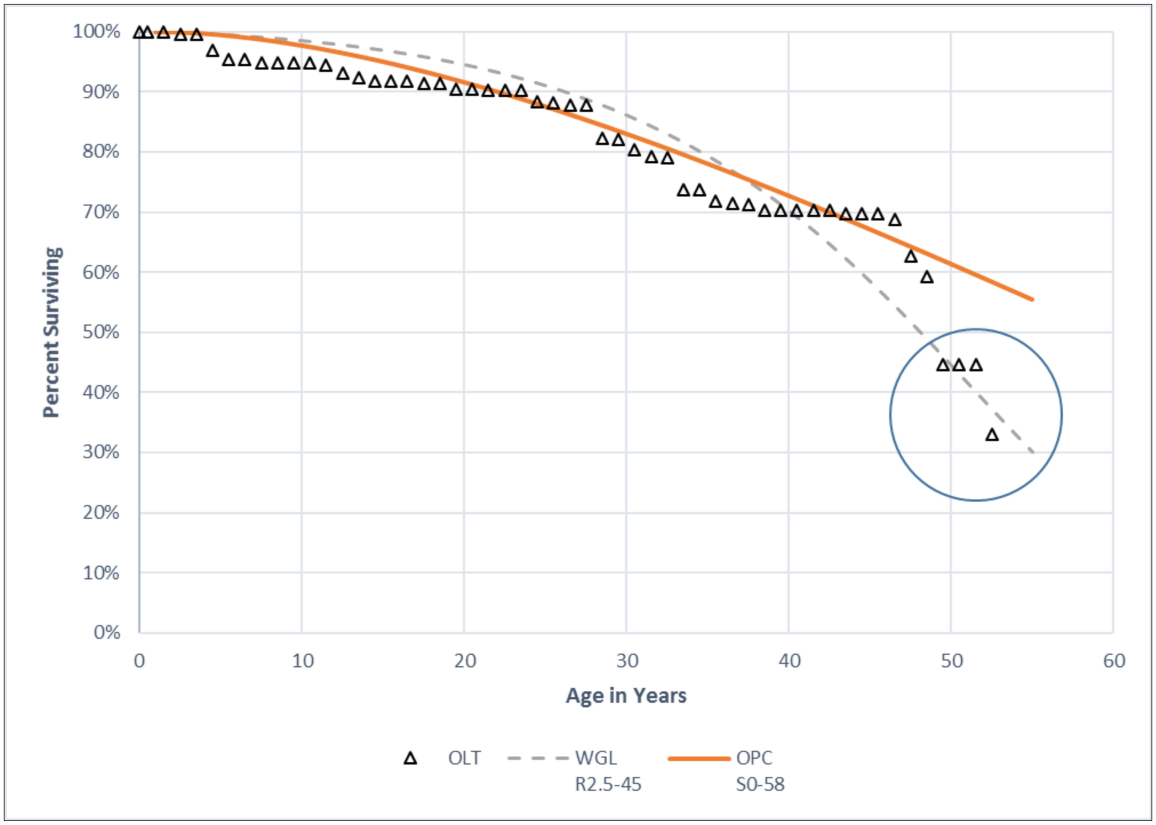
5. <u>Account 390 – General Structures and Improvements</u>

Q. DESCRIBE YOUR SERVICE LIFE ESTIMATE FOR THIS ACCOUNT AND COMPARE IT WITH THE COMPANY'S ESTIMATE.

A. The OLT curve derived from the Company's data for this account is relatively well suited for conventional Iowa curve fitting techniques and has adequate retirement history. Dr. White selected the R2.5-45 curve for this account and I selected the S0-58 curve. Both curves are shown in the graph below along with the OLT curve.

[27] Exhibit DJG-10.

Figure 6:
Account 390 – General Structures and Improvements



This account provides an example of why it is important to consider the numbers comprising the OLT curve in order to assess the appropriate weight given to each portion of the curve. At first glance, it appears the Company's R2.5-45 curve provides a relatively good fit to the OLT curve. However, further examination of the actual numbers comprising the OLT curve reveals that the data at the end of this OLT curve is statistically insignificant. As discussed above, not every point on the OLT curve should necessarily be given the same statistical weight. According to Wolf:

> The analyst also must decide which points or sections of the curve should be given the most weight. 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 the exposures.[28]

Here, "exposures" means the dollars exposed to, or available for, retirement at a given age interval. As discussed above, it is prudent to eliminate the tail end of the curve corresponding to dollars exposed to retirement that are less than 1% of the beginning dollars exposed to retirement. In the graph above, the data points at the end of this OLT curve (circled in the graph) are statistically insignificant. However, it appears Dr. White's Iowa curve selection was influenced by these data points (i.e., the R2.5-45 curve he selected passes directly through them).

Q. PLEASE ILLUSTRATE WHY THE TAIL END OF THE OLT CURVE FOR ACCOUNT 390 IS STATISTICALLY INSIGNIFICANT.

A. In Account 390, the beginning dollars exposed to retirement is $16.2 million.[29] Following the 1% guideline discussed above, we would truncate the OLT curve and eliminate data points corresponding to less than $162,671 of exposures. The figure below shows the top and bottom portions of the OLT curve for Account 390.[30]

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[28] Wolf *supra* n. 7, at 46.

[29] Exhibit DJG-11.

[30] *See id*.

Figure 7:
Account 390 – Portion of Observed Life Table

Age (Years)	Exposures (Dollars)	Observed Life Table (OLT)
0.0	16,267,129	100.00%
0.5	15,974,269	100.00%
1.5	12,185,195	100.00%
2.5	10,278,266	99.66%
3.5	10,154,845	99.66%
…	…	…
46.5	235,375	68.78%
47.5	213,229	62.71%
48.5	201,526	59.26%
49.5	151,526	44.56%
50.5	151,526	44.56%
51.5	151,526	44.56%
52.5	112,101	32.97%

As shown in the chart, the bottom four data points could be eliminated under the 1% guideline. Another noteworthy point in this chart is the fact that the percent surviving in the OLT column experiences a significant drop from 59.25% to 44.56 percent in just one age interval. This is illustrated by the noticeable gap in the Iowa curve graph above at age interval 48.5.

Q. DOES THE IOWA CURVE YOU SELECTED FOR THIS ACCOUNT PROVIDE A BETTER FIT TO THE OBSERVED DATA REGARDLESS OF WHETHER THE 15 GUIDELINE IS IMPLEMENTED?

A. Yes, although it is important to consider the relative statistical weight of the data points comprising the OLT curve, as presented in the discussion for this account, the S0-58 curve I selected for this account provides a better mathematical fit to the observed data than the Company's curve, regardless of whether the final four points of the OLT curve are included in the calculation. Specifically, the SSD for the Company's curve is 0.2046 and the SSD for the better-fitting S0-58 curve is 0.1466.[31]

C. Remaining Life Development

Q. DESCRIBE HOW YOU CALCULATED THE REMAINING LIFE FOR EACH ACCOUNT.

A. I calculated the remaining life for each account by applying the Iowa curve and average life estimated for each account to the surviving vintage balances provided by the Company.[32] I applied the composite remaining lives for each account to the net plant balances to calculate my proposed plant depreciation rates.[33]

D. Jurisdictional Allocations

Q. DESCRIBE THE JURISDICTIONAL ALLOCATION OF DEPRECIATION RATES PROPOSED BY DR. WHITE.

A. According to Dr. White, the depreciation study was conducted on assets physically located in Maryland, but a portion of these assets is used to provide utility service to customers in Virginia and the District of Columbia.[34] Likewise, a portion of the assets located in these other jurisdictions directly benefits customers in Maryland and is allocated to Maryland operations. According to Dr. White, absent an agreement among these jurisdictions to

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[31] Exhibit DJG-11.

[32] *See* Exhibit DJG-13 for detailed remaining life calculations. The original cost in each vintage is divided by the average service life to arrive at the average annual accrual for each vintage in the fourth column. The average annual accrual is then multiplied by the average remaining life for each vintage to arrive at the future annual accrual in the sixth column. The total future accruals in the sixth column are divided by the total average annual accruals in the fourth column to arrive at the composite remaining life for the account.

[33] Exhibit DJG-5.

[34] *See* Direct Testimony of Dr. Ronald E. White, pp. 8-9.

allocate depreciation expense derived from the rates approved by the jurisdiction in which the plant is physically located, each jurisdiction would need to approve depreciation rates applied to plant allocated from the other jurisdictions.[35] Thus, Dr. White proposes different depreciation rates and parameters for accounts allocated between jurisdictions. For example, for Account 369 (Measuring and Regulating Equipment) Dr. White proposes average service lives of 50 years, 45 years, and 60 years for the District of Columbia, Maryland, and Virginia respectively.[36] These estimates also result in different proposed depreciation rates for each jurisdiction. According to Dr. White, the scope of his engagement in this case included a 2017 technical update of plant subject to the jurisdiction of the Virginia State Corporation Commission and a technical update of plant subject to the jurisdiction of the Public Service Commission of the District of Columbia.[37] However, the purpose of his direct testimony in this case is to sponsor the study conducted for the Maryland jurisdiction.[38]

Q. DID YOU REVIEW THE HISTORICAL PLANT DATA USED TO ESTIMATE THE PROPOSED DEPRECIATION PARAMETERS AS PART OF THE TECHNICAL UPDATES FOR VIRGINIA AND THE DISTRICT OF COLUMBIA?

A. No. In discovery, OPC requested the historical plant data that was used in the depreciation study, and the Company provided that data.[39] However, the Company did not provide the data that was used in the technical update of plant subject to the jurisdictions of Virginia

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[35] *Id*.

[36] *See* Exhibit REW-1 (2017 Depreciation Rate Study), Statement E (p. 30).

[37] Direct Testimony of Dr. Ronald E. White, p. 3, lines 1-11.

[38] *Id*.

[39] Response to OPC Data Request No. 1-63.

and the District of Columbia. The data provided in this case applies only to the depreciation study that Dr. White conducted for the Maryland jurisdiction. However, I was able to examine the parameters proposed by Dr. White for the allocated property and evaluate the impact of those recommendations. If we were to apply the depreciation parameters estimated for the Maryland jurisdiction to the property allocated from the other jurisdictions, the difference in the proposed depreciation accrual would be immaterial in this case. Thus, in my opinion, a detailed review of the technical updates, including independent development of observed life tables and Iowa curve fitting, would not have been practical in this particular case due to the relatively immaterial impact on the depreciation accrual.

Q. ARE YOU PROPOSING ADJUSTMENTS TO THE SERVICE LIVES PROPOSED BY DR. WHITE FOR PROPERTY ALLOCATED TO THE DISTRICT OF COLUMBIA AND VIRGINIA?

A. No. My depreciation rate calculations include the average and remaining service lives proposed by Dr. White for property allocated from jurisdictions outside of Maryland. I accepted Dr. White's proposed parameters for the allocated property due to the materiality scope discussed above and because, based on my experience, it does not appear Dr. White's service life estimates for the property allocated from other jurisdictions fall outside the scope of reasonableness.

VI. NET SALVAGE RATE ANALYSIS

Q. DESCRIBE THE CONCEPT OF NET SALVAGE.

A. If an asset has any value left when it is retired from service, a utility might decide to sell the asset. The proceeds from this transaction are called "gross salvage." The corresponding expense associated with the removal of the asset from service is called the "cost of removal." The term "net salvage" equates to gross salvage less the cost of removal. Often, the net salvage for utility assets is a negative number (or percentage) because the cost of removing the assets from service exceeds any proceeds received from selling the assets. When a negative net salvage rate is applied to an account to calculate the depreciation rate, it results in increasing the total depreciable base to be recovered over a particular period of time and increases the depreciation rate.

Q. DESCRIBE THE PRESENT VALUE METHOD USED TO CALCULATE NET SALVAGE RATES, WHICH HAS BEEN ADOPTED BY THE COMMISSION.

A. In Case No. 9092, the Commission adopted the Present Value ("PV") Method for determining net salvage rates. Essentially, the PV Method discounts estimated future net salvage back to present value. The Commission's reasoning behind the PV Method is that "a dollar is worth substantially more today than it will be 20 to 40 years from now" and present ratepayers should pay "only their fair share of recovery in 'real' dollars." The Commission concluded that the PV Method "strikes an appropriate balance between the interest of current and future ratepayers."

Q. DO YOU AGREE WITH THE COMMISSION'S REASONING BEHIND THE PV METHOD?

A. Yes. In fact, I have made substantially similar arguments in several cases in other jurisdictions regarding the proposed dismantlement cost of electric generating units.[40] In

[40] *See e.g.*, Direct Testimony of David J. Garrett pp. 25-26 (Part II – Depreciation), filed September 21, 2017 Before the Oklahoma Corporation Commission in Cause No. PUD 201700151 (Application of Public Service Company of Oklahoma).

many cases, electric utilities will present dismantlement studies showing the present value to dismantle their generating units, which often results in substantial amounts of negative net salvage. Utility witnesses typically propose that those dismantlement cost (i.e., removal cost) estimates be "escalated" by an annual growth rate to the future estimated retirement date of the plant. In those cases, I have argued that only the present value of the removal costs should be charged to ratepayers. In Oklahoma, the regulatory commission has consistently agreed with that position.

Q. HAVE THERE BEEN DISCREPANCIES AMONG EXPERTS AS TO THE PROPER WAY TO IMPLEMENT THE PV METHOD?

A. In reviewing prior testimony and orders regarding the PV Method, it appears various witnesses have had different opinions as to the most appropriate way to calculate net salvage rates under the PV Method.

Q. PLEASE DESCRIBE NET SALVAGE RATES APPROVED BY THE COMMISSION IN PRIOR CASES.

A. As part of my review of the PV Method, I reviewed the testimony and workpapers of Charles King from PEPCO's prior rate case (Case No. 9286). In that case, the Commission adopted the depreciation rates proposed by Mr. King.[41] According to Mr. King, the PV Method "conforms to the principles embodied in SFAS 143."[42] Under FAS 143, the future value of the removal cost for an asset is discounted to present value, and a liability is

[41] Case No. 9286, In the Matter of the Application of Potomac Electric Power Company for Authority to Increase its Rates and Charges for Electric Distribution Service, Order No. 85028, Issued July 20, 2012, p. 79.

[42] Case No. 9286, Direct Testimony of Charles W. King, p. 7, lines 1-3.

recorded by the company. In addition, an asset is added to the balance sheet in the same amount and is depreciated over the life of the asset. According to Mr. King:

> The annual expense associated with this liability consists of two parts. One is the depreciation of the liability, which is the initial present value of the liability divided by the life of the asset. The second expense is the annual accretion in the present value of the liability, similar to interest expense.[43]

In that case, the Commission said regarding the PV Method: "we have focused our analysis on balancing cost responsibilities between current and future ratepayers based upon the timing of capital cost recovery. . . . Only OPC witness King's depreciation rate recommendation reflects this balancing of responsibility and Commission precedent."[44] Thus, while there might be more than one appropriate way to implement the PV Method in accordance with the Commission's standards, I calculated my proposed net salvage rates in the same manner in which Mr. King calculated his proposed rates in Case No. 9286.[45] In that regard, I believe the net salvage rates I propose in this case reflect the balancing of cost responsibilities among generations of ratepayers the Commission is seeking to achieve.

Q. PLEASE SPECIFICALLY DESCRIBE HOW YOU CALCULATED YOUR PROPOSED NET SALVAGE RATES UNDER THE PV METHOD.

A. As discussed above, there are essentially two components to the net salvage rate under the PV Method: the depreciation component and the accretion component. To calculate the depreciation component, I took the future net salvage rates proposed by the Company and

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[43] *Id*. at lines14-17.

[44] Case No. 9286, In the Matter of the Application of Potomac Electric Power Company for Authority to Increase its Rates and Charges for Electric Distribution Service, Order No. 85028, Issued July 20, 2012, p. 79.

[45] *See* Exhibit DJG-6; *see also* Case No. 9286, Direct Testimony of Charles W. King, Exhibit CWK-1, Sch. 4.

applied them to the plant balances in each account to calculate future removal costs.[46] Next, I discounted the future removal cost using the estimated average life as the discount period and WGL's weighted average cost of capital of 7.15%, as estimated by OPC witness David C. Parcell and discussed in his direct testimony. Finally, I divided the discounted removal cost by the estimated average life of each account. To calculate the accretion component of the net salvage rate, I first determined the increment factor for each account based on the remaining life and discount rate. Next, I multiplied the increment factor by the future removal cost to calculate the accretion component of the removal cost. Finally, I added the depreciation cost component and the accretion cost component and divided the sum by the plant balance in each account to calculate the total PV Method net salvage rate for each account.[47]

Q. DID DR. WHITE CALCULATE HIS PROPOSED NET SALVAGE RATES IN A SIMILAR MANNER?

A. No, apparently not. In my review of Dr. White's workpapers, I could not specifically determine how his proposed net salvage rates were developed. However, it appears his net salvage rates were influenced in part by his rebalancing of the depreciation reserve based upon his theoretical reserve estimation (the specifics of which are also not ascertainable from his workpapers). In discovery, I asked if Dr. White believes the Present Value Method approved by the Commission contemplates a rebalancing of the reserve. In response, Dr. White stated: "The motivation for rebalancing depreciation reserves is the

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[46] *See* Exhibit DJG-6.

[47] *Id.*

same for a "Present Value Method" of accruing for net salvage as for a straight-line method."[48] While this may be Dr. White's motivation for conducting a manual reserve rebalancing as part of the PV Method, it is apparently not at all related to the Commission's reasoning or approval of the PV Method. In fact, the net salvage rates approved under the PV Method in the PEPCO case were not at all impacted by the reserve or a rebalancing of the reserve. Again, the PV Method approved by the Commission for calculating net salvage rates is based upon, and reflective of calculations approved in FAS 143 regarding the accounting of asset retirement obligations. No part of FAS 143 considers depreciation reserves in its calculation. In my opinion, it would be bad precedent for the Commission to adopt net salvage rates that are impacted in any way by the reserve, and especially, a manual rebalancing of the reserve. Doing so would comingle two unrelated procedures and add unnecessary complexity and confusion to net salvage estimates.

VII. CONCLUSION AND RECOMMENDATION

Q. SUMMARIZE THE KEY POINTS OF YOUR TESTIMONY.

A. Consistent with Commission precedent, I developed my proposed depreciation rates in two components: plant rates and net salvage rates. I recommend several adjustments to WGL's proposed plant rates based on objective mathematical curve fitting and the use of book reserve balances instead of theoretical balances. My proposed plant rates were calculated under the remaining life technique, which consistently and automatically rebalances any discrepancies between the book reserve and theoretical reserve. In developing my

[48] Response to OPC Data Request No. 10.

proposed net salvage rates, I used the PV Method, which is consistent with Commission precedent. I precisely based my calculations on the net salvage rates approved by the Commission in prior cases. In my opinion, it is not possible to determine precisely how Dr. White calculated his proposed plant rates or net salvage rates. While Dr. White may be very knowledgeable of his own methods and procedures, however, in my experience, his methods for determining depreciation rates differ from every other practitioner in the industry. This does not necessarily mean that his methods are inappropriate, however, more problematic is the lack of transparency in his methods.

Q. WHAT IS YOUR RECOMMENDATION TO THE COMMISSION REGARDING DEPRECIATION RATES AND EXPENSE?

A. I recommend the Commission adopt the depreciation rates presented in this testimony and Exhibit DJG-3. I would also recommend the Commission clarify that reserve rebalancing based on theoretical reserve calculations should not impact net salvage rates under the PV Method.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

APPENDIX A:

THE DEPRECIATION SYSTEM

A depreciation accounting system may be thought of as a dynamic system in which estimates of life and salvage are inputs to the system, and the accumulated depreciation account is a measure of the state of the system at any given time.[49] The primary objective of the depreciation system is the timely recovery of capital. The process for calculating the annual accruals is determined by the factors required to define the system. A depreciation system should be defined by four primary factors: 1) a method of allocation; 2) a procedure for applying the method of allocation to a group of property; 3) a technique for applying the depreciation rate; and 4) a model for analyzing the characteristics of vintage groups comprising a continuous property group.[50] The figure below illustrates the basic concept of a depreciation system and includes some of the available parameters.[51]

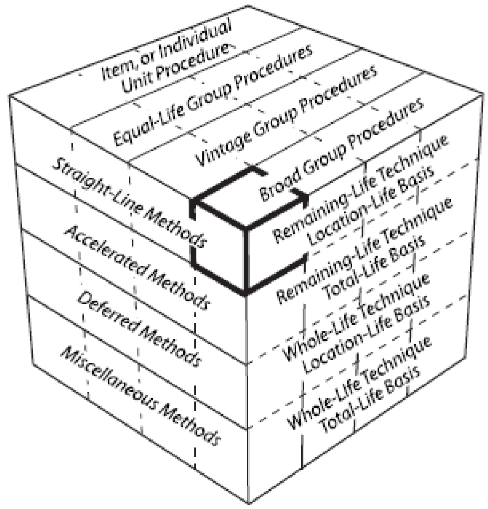
There are hundreds of potential combinations of methods, procedures, techniques, and models, but in practice, analysts use only a few combinations. Ultimately, the system selected must result in the systematic and rational allocation of capital recovery for the utility. Each of the four primary factors defining the parameters of a depreciation system is discussed further below.

[49] Wolf *supra* n. 7, at 69-70.

[50] *Id.* at 70, 139-40.

[51] Edison Electric Institute, *Introduction to Depreciation* (inside cover) (EEI April 2013). Some definitions of the terms shown in this diagram are not consistent among depreciation practitioners and literature due to the fact that depreciation analysis is a relatively small and fragmented field. This diagram simply illustrates some of the available parameters of a depreciation system.

Figure 8:
The Depreciation System Cube



1. <u>Allocation Methods</u>

The "method" refers to the pattern of depreciation in relation to the accounting periods. The method most commonly used in the regulatory context is the "straight-line method" – a type of age-life method in which the depreciable cost of plant is charged in equal amounts to each accounting period over the service life of plant.[52] Because group depreciation rates and plant balances often change, the amount of the annual accrual rarely remains the same, even when the straight-line method is employed.[53] The basic formula for the straight-line method is as follows:[54]

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[52] NARUC *supra* n. 8, at 56.

[53] *Id*.

[54] *Id*.

Equation 1:
Straight-Line Accrual

$$Annual\ Accrual = \frac{Gross\ Plant - Net\ Salvage}{Service\ Life}$$

Gross plant is a known amount from the utility's records, while both net salvage and service life must be estimated to calculate the annual accrual. The straight-line method differs from accelerated methods of recovery, such as the "sum-of-the-years-digits" method and the "declining balance" method. Accelerated methods are primarily used for tax purposes and are rarely used in the regulatory context for determining annual accruals.[55] In practice, the annual accrual is expressed as a rate which is applied to the original cost of plant to determine the annual accrual in dollars. The formula for determining the straight-line rate is as follows:[56]

Equation 2:
Straight-Line Rate

$$Depreciation\ Rate\ \% = \frac{100 - Net\ Salvage\ \%}{Service\ Life}$$

2. Grouping Procedures

The "procedure" refers to the way the allocation method is applied through subdividing the total property into groups.[57] While single units may be analyzed for depreciation, a group plan of depreciation is particularly adaptable to utility property. Employing a grouping procedure allows for a composite application of depreciation rates to groups of similar property, rather than

[55] *Id*. at 57.

[56] *Id*. at 56.

[57] Wolf *supra* n. 7, at 74-75.

conducting calculations for each unit. Whereas an individual unit of property has a single life, a group of property displays a dispersion of lives and the life characteristics of the group must be described statistically.[58] When analyzing mass property categories, it is important that each group contains homogenous units of plant that are used in the same general manner throughout the plant and operated under the same general conditions.[59]

The "average life" and "equal life" grouping procedures are the two most common. In the average life procedure, a constant annual accrual rate based on the average life of all property in the group is applied to the surviving property. While property having shorter lives than the group average will not be fully depreciated, and likewise, property having longer lives than the group average will be over-depreciated, the ultimate result is that the group will be fully depreciated by the time of the final retirement.[60] Thus, the average life procedure treats each unit as though its life is equal to the average life of the group. In contrast, the equal life procedure treats each unit in the group as though its life was known.[61] Under the equal life procedure the property is divided into subgroups that each has a common life.[62]

3. <u>Application Techniques</u>

The third factor of a depreciation system is the "technique" for applying the depreciation rate. There are two commonly used techniques: "whole life" and "remaining life." The whole life

[58] *Id*. at 74.

[59] NARUC *supra* n. 8, at 61-62.

[60] *See* Wolf *supr*a n. 7, at 74-75.

[61] *Id*. at 75.

[62] *Id*.

technique applies the depreciation rate on the estimated average service life of a group, while the remaining life technique seeks to recover undepreciated costs over the remaining life of the plant.[63]

In choosing the application technique, consideration should be given to the proper level of the accumulated depreciation account. Depreciation accrual rates are calculated using estimates of service life and salvage. Periodically these estimates must be revised due to changing conditions, which cause the accumulated depreciation account to be higher or lower than necessary. Unless some corrective action is taken, the annual accruals will not equal the original cost of the plant at the time of final retirement.[64] Analysts can calculate the level of imbalance in the accumulated depreciation account by determining the "calculated accumulated depreciation," (a.k.a. "theoretical reserve" and referred to in these appendices as "CAD"). The CAD is the calculated balance that would be in the accumulated depreciation account at a point in time using current depreciation parameters.[65] An imbalance exists when the actual accumulated depreciation account does not equal the CAD. The choice of application technique will affect how the imbalance is dealt with.

Use of the whole life technique requires that an adjustment be made to accumulated depreciation after calculation of the CAD. The adjustment can be made in a lump sum or over a period of time. With use of the remaining life technique, however, adjustments to accumulated depreciation are amortized over the remaining life of the property and are automatically included

[63] NARUC *supra* n. 8, at 63-64.

[64] Wolf *supra* n. 7, at 83.

[65] NARUC *supra* n. 8, at 325.

in the annual accrual.[66] This is one reason that the remaining life technique is popular among practitioners and regulators. The basic formula for the remaining life technique is as follows:[67]

Equation 3:
Remaining Life Accrual

$$Annual\ Accrual = \frac{Gross\ Plant - Accumulated\ Depreciation - Net\ Salvage}{Average\ Remaining\ Life}$$

The remaining life accrual formula is similar to the basic straight-line accrual formula above with two notable exceptions. First, the numerator has an additional factor in the remaining life formula: the accumulated depreciation. Second, the denominator is "average remaining life" instead of "average life." Essentially, the future accrual of plant (gross plant less accumulated depreciation) is allocated over the remaining life of plant. Thus, the adjustment to accumulated depreciation is "automatic" in the sense that it is built into the remaining life calculation.[68]

4. Analysis Model

The fourth parameter of a depreciation system, the "model," relates to the way of viewing the life and salvage characteristics of the vintage groups that have been combined to form a continuous property group for depreciation purposes.[69] A continuous property group is created when vintage groups are combined to form a common group. Over time, the characteristics of the property may change, but the continuous property group will continue. The two analysis models

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[66] NARUC *supra* n. 8, at 65 ("The desirability of using the remaining life technique is that any necessary adjustments of [accumulated depreciation] . . . are accrued automatically over the remaining life of the property. Once commenced, adjustments to the depreciation reserve, outside of those inherent in the remaining life rate would require regulatory approval.").

[67] *Id*. at 64.

[68] Wolf *supra* n. 7, at 178.

[69] *See* Wolf *supra* n. 7, at 139 (I added the term "model" to distinguish this fourth depreciation system parameter from the other three parameters).

used among practitioners, the “broad group” and the “vintage group,” are two ways of viewing the life and salvage characteristics of the vintage groups that have been combined to form a continuous property group.

The broad group model views the continuous property group as a collection of vintage groups that each have the same life and salvage characteristics. Thus, a single survivor curve and a single salvage schedule are chosen to describe all the vintages in the continuous property group. In contrast, the vintage group model views the continuous property group as a collection of vintage groups that may have different life and salvage characteristics. Typically, there is not a significant difference between vintage group and broad group results unless vintages within the applicable property group experienced dramatically different retirement levels than anticipated in the overall estimated life for the group. For this reason, many analysts utilize the broad group procedure because it is more efficient.

APPENDIX B:

IOWA CURVES

Early work in the analysis of the service life of industrial property was based on models that described the life characteristics of human populations.[70] This explains why the word "mortality" is often used in the context of depreciation analysis. In fact, a group of property installed during the same accounting period is analogous to a group of humans born during the same calendar year. Each period the group will incur a certain fraction of deaths / retirements until there are no survivors. Describing this pattern of mortality is part of actuarial analysis and is regularly used by insurance companies to determine life insurance premiums. The pattern of mortality may be described by several mathematical functions, particularly the survivor curve and frequency curve. Each curve may be derived from the other so that if one curve is known, the other may be obtained. A survivor curve is a graph of the percent of units remaining in service expressed as a function of age.[71] A frequency curve is a graph of the frequency of retirements as a function of age. Several types of survivor and frequency curves are illustrated in the figures below.

1. <u>Development</u>

The survivor curves used by analysts today were developed over several decades from extensive analysis of utility and industrial property. In 1931, Edwin Kurtz and Robley Winfrey used extensive data from a range of 65 industrial property groups to create survivor curves representing the life characteristics of each group of property.[72] They generalized the 65 curves

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[70] Wolf *supra* n. 7, at 276.

[71] *Id*. at 23.

[72] *Id*. at 34.

into 13 survivor curve types and published their results in *Bulletin 103: Life Characteristics of Physical Property*. The 13 type curves were designed to be used as valuable aids in forecasting probable future service lives of industrial property. Over the next few years, Winfrey continued gathering additional data, particularly from public utility property, and expanded the examined property groups from 65 to 176.[73] This resulted in 5 additional survivor curve types for a total of 18 curves. In 1935, Winfrey published *Bulletin 125: Statistical Analysis of Industrial Property Retirements*. According to Winfrey, "[t]he 18 type curves are expected to represent quite well all survivor curves commonly encountered in utility and industrial practices."[74] These curves are known as the "Iowa curves" and are used extensively in depreciation analysis to obtain the average service lives of property groups. (Use of Iowa curves in actuarial analysis is further discussed in Appendix C.)

In 1942, Winfrey published *Bulletin 155: Depreciation of Group Properties*. In Bulletin 155, Winfrey made some slight revisions to a few of the 18 curve types, and published the equations, tables of the percent surviving, and probable life of each curve at five-percent intervals.[75] Rather than using the original formulas, analysts typically rely on the published tables containing the percentages surviving. This is because absent knowledge of the integration technique applied to each age interval, it is not possible to recreate the exact original published table values. In the 1970s, John Russo collected data from over 2,000 property accounts reflecting

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[73] *Id*.

[74] Robley Winfrey, *Bulletin 125: Statistical Analyses of Industrial Property Retirements* 85, Vol. XXXIV, No. 23 (Iowa State College of Agriculture and Mechanic Arts 1935).

[75] Robley Winfrey, Bulletin 155: Depreciation of Group Properties 121-28, Vol XLI, No. 1 (The Iowa State College Bulletin 1942); see also Wolf supra n. 7, at 305-38 (publishing the percent surviving for each Iowa curve, including "O" type curve, at one percent intervals).

observations during the period 1965 – 1975 as part of his Ph.D. dissertation at Iowa State. Russo essentially repeated Winfrey's data collection, testing, and analysis methods used to develop the original Iowa curves, except that Russo studied industrial property in service several decades after Winfrey published the original Iowa curves. Russo drew three major conclusions from his research:[76]

1. No evidence was found to conclude that the Iowa curve set, as it stands, is not a valid system of standard curves;
2. No evidence was found to conclude that new curve shapes could be produced at this time that would add to the validity of the Iowa curve set; and
3. No evidence was found to suggest that the number of curves within the Iowa curve set should be reduced.

Prior to Russo's study, some had criticized the Iowa curves as being potentially obsolete because their development was rooted in the study of industrial property in existence during the early 1900s. Russo's research, however, negated this criticism by confirming that the Iowa curves represent a sufficiently wide range of life patterns, and that though technology will change over time, the underlying patterns of retirements remain constant and can be adequately described by the Iowa curves.[77]

Over the years, several more curve types have been added to Winfrey's 18 Iowa curves. In 1967, Harold Cowles added four origin-modal curves. In addition, a square curve is sometimes used to depict retirements which are all planned to occur at a given age. Finally, analysts

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[76] *See* Wolf *supra* n. 7, at 37.

[77] *Id*.

commonly rely on several “half curves” derived from the original Iowa curves. Thus, the term “Iowa curves” could be said to describe up to 31 standardized survivor curves.

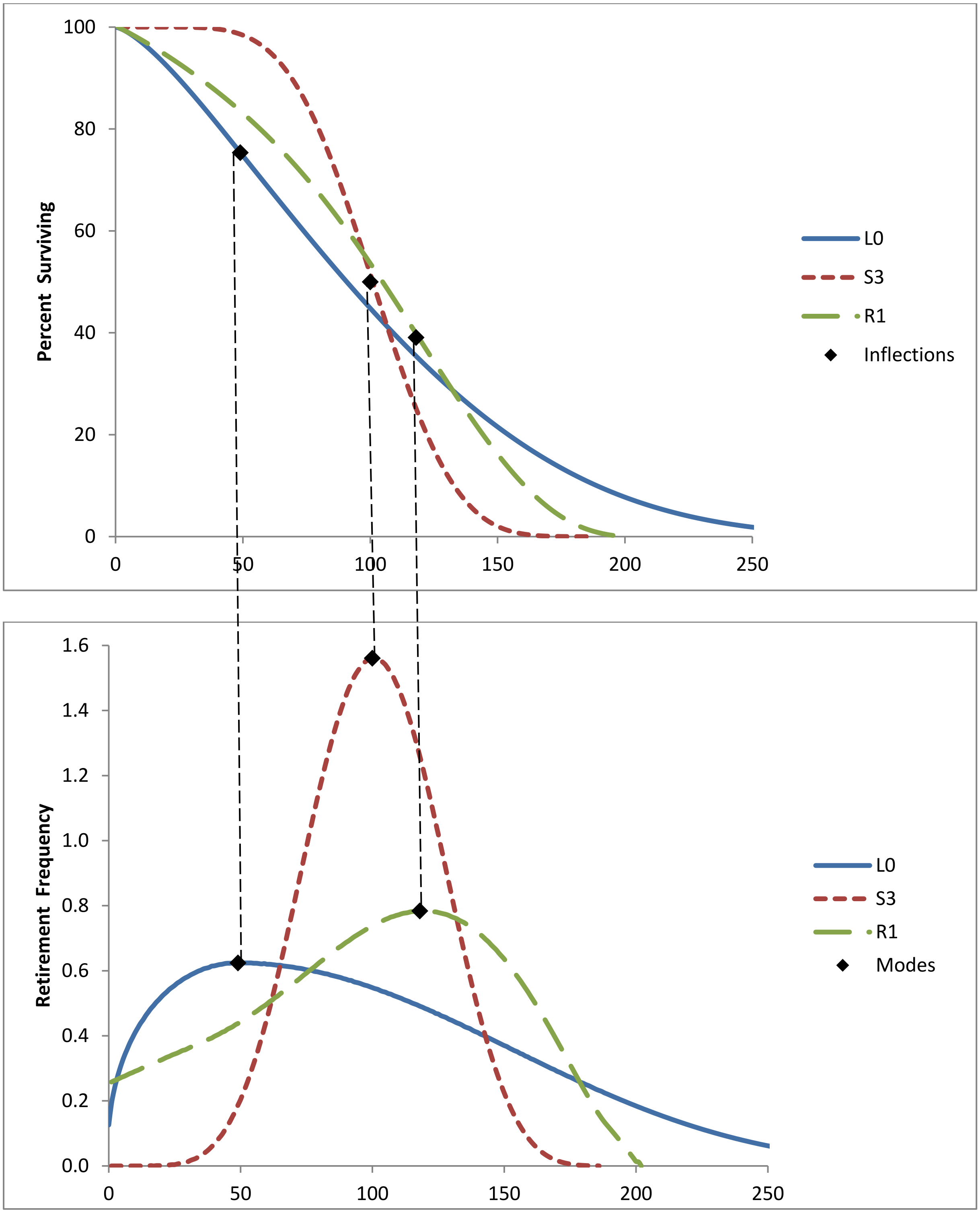
2. Classification

The Iowa curves are classified by three variables: modal location, average life, and variation of life. First, the mode is the percent life that results in the highest point of the frequency curve and the “inflection point” on the survivor curve. The modal age is the age at which the greatest rate of retirement occurs. As illustrated in the figure below, the modes appear at the steepest point of each survivor curve in the top graph, as well as the highest point of each corresponding frequency curve in the bottom graph.

The classification of the survivor curves was made according to whether the mode of the retirement frequency curves was to the left, to the right, or coincident with average service life. There are three modal “families” of curves: six left modal curves (L0, L1, L2, L3, L4, L5); five right modal curves (R1, R2, R3, R4, R5); and seven symmetrical curves (S0, S1, S2, S3, S4, S5, S6).[78] In the figure below, one curve from each family is shown: L0, S3 and R1, with average life at 100 on the x-axis. It is clear from the graphs that the modes for the L0 and R1 curves appear to the left and right of average life respectively, while the S3 mode is coincident with average life.

[78] In 1967, Harold A. Cowles added four origin-modal curves known as “O type” curves. There are also several “half” curves and a square curve, so the total amount of survivor curves commonly called “Iowa” curves is about 31 (see NARUC supra n. 8, at 68).

Figure 9:
Modal Age Illustration



The second Iowa curve classification variable is average life. The Iowa curves were designed using a single parameter of age expressed as a percent of average life instead of actual age. This was necessary for the curves to be of practical value. As Winfrey notes:

> Since the location of a particular survivor on a graph is affected by both its span in years and the shape of the curve, it is difficult to classify a group of curves unless one of these variables can be controlled. This is easily done by expressing the age in percent of average life."[79]

Because age is expressed in terms of percent of average life, any particular Iowa curve type can be modified to forecast property groups with various average lives.

The third variable, variation of life, is represented by the numbers next to each letter. A lower number (e.g., L1) indicates a relatively low mode, large variation, and large maximum life; a higher number (e.g., L5) indicates a relatively high mode, small variation, and small maximum life. All three classification variables – modal location, average life, and variation of life – are used to describe each Iowa curve. For example, a 13-L1 Iowa curve describes a group of property with a 13-year average life, with the greatest number of retirements occurring before (or to the left of) the average life, and a relatively low mode. The graphs below show these 18 survivor curves, organized by modal family.

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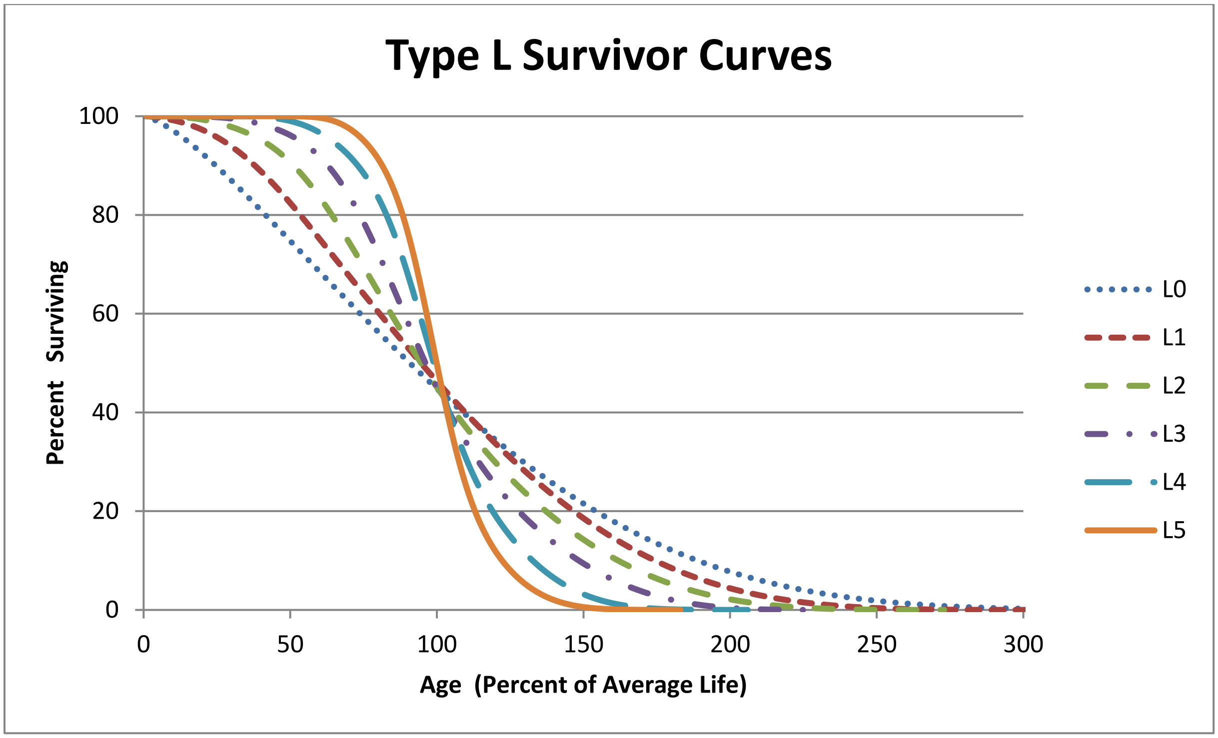
[79] Winfrey *supra* n. 75, at 60.

Figure 10:
Type L Survivor and Frequency Curves



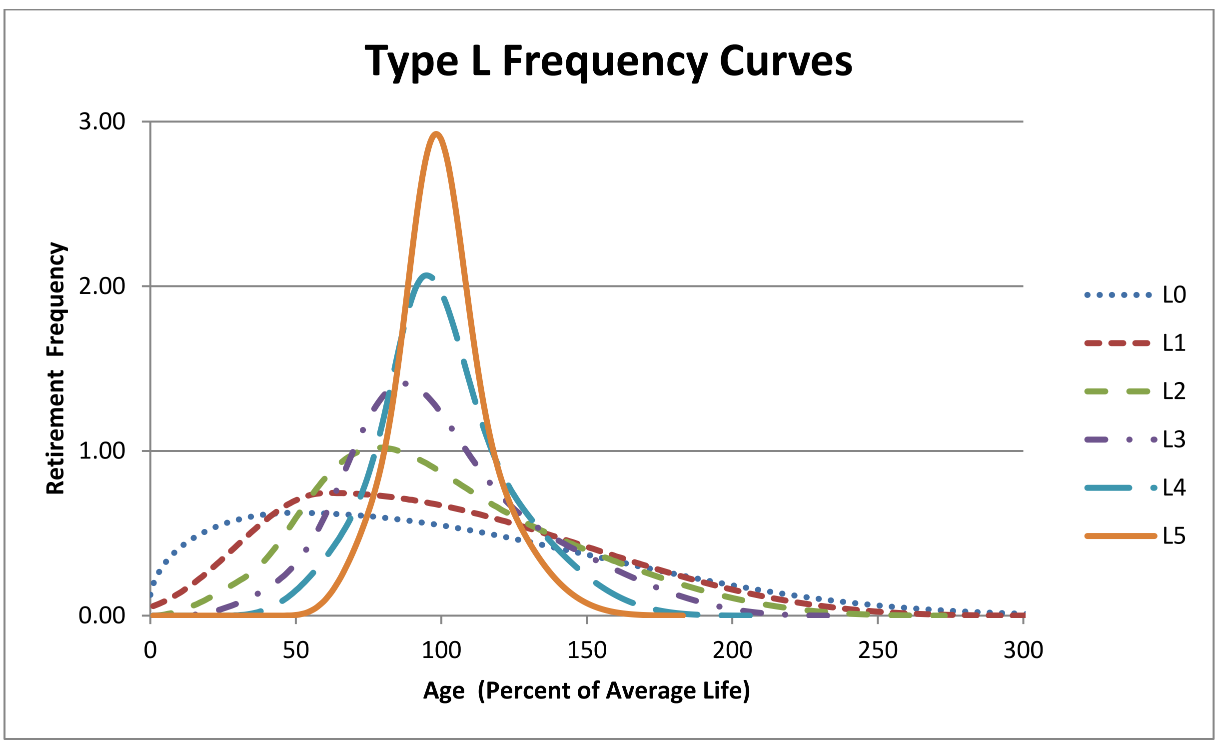
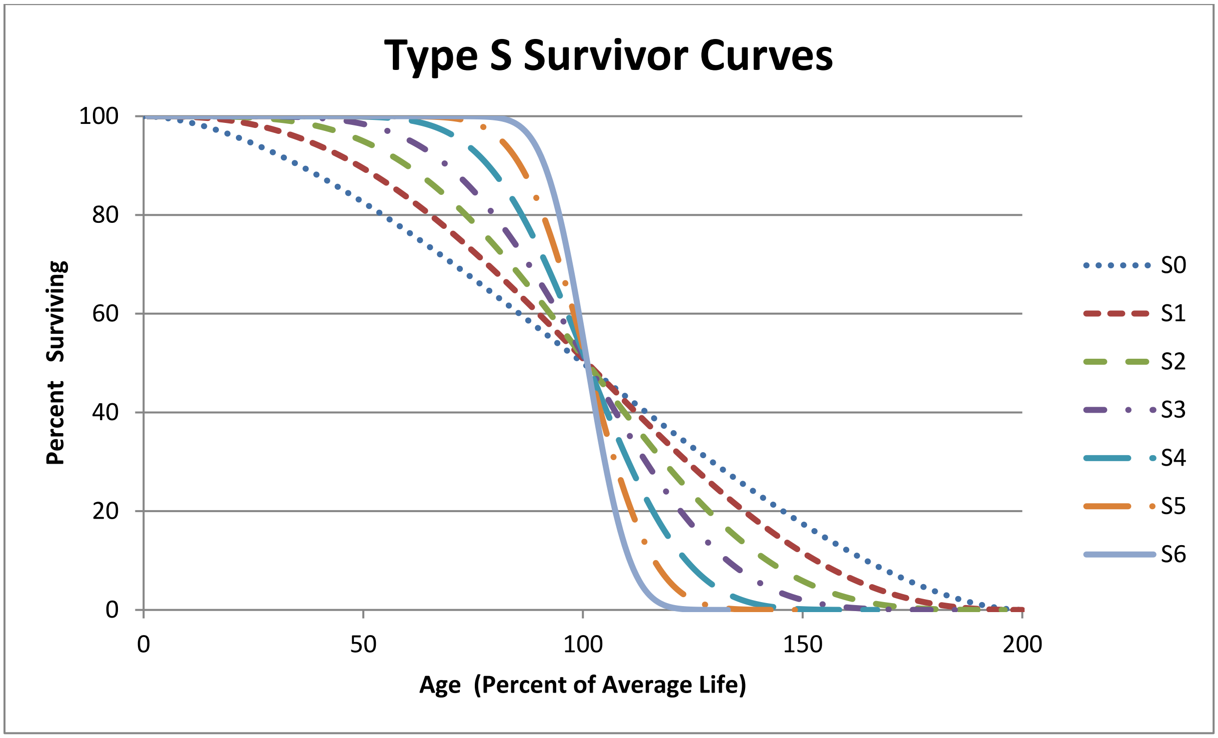


Figure 11:
Type S Survivor and Frequency Curves



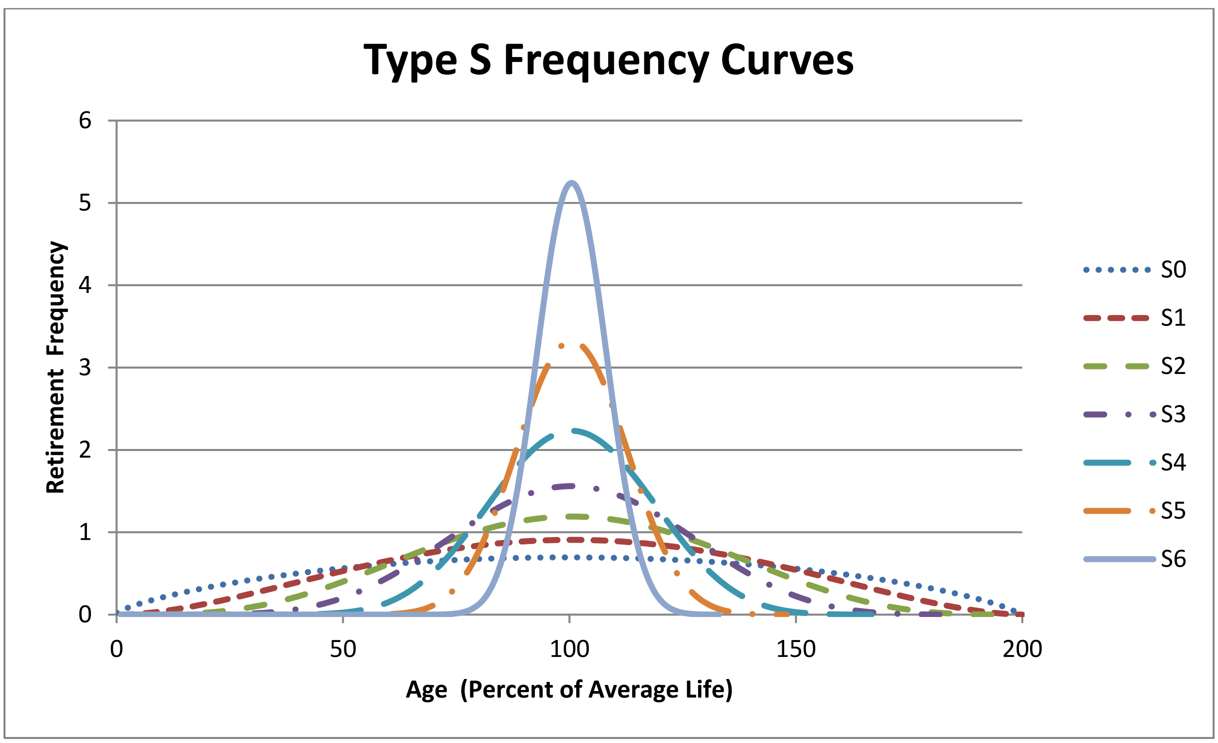
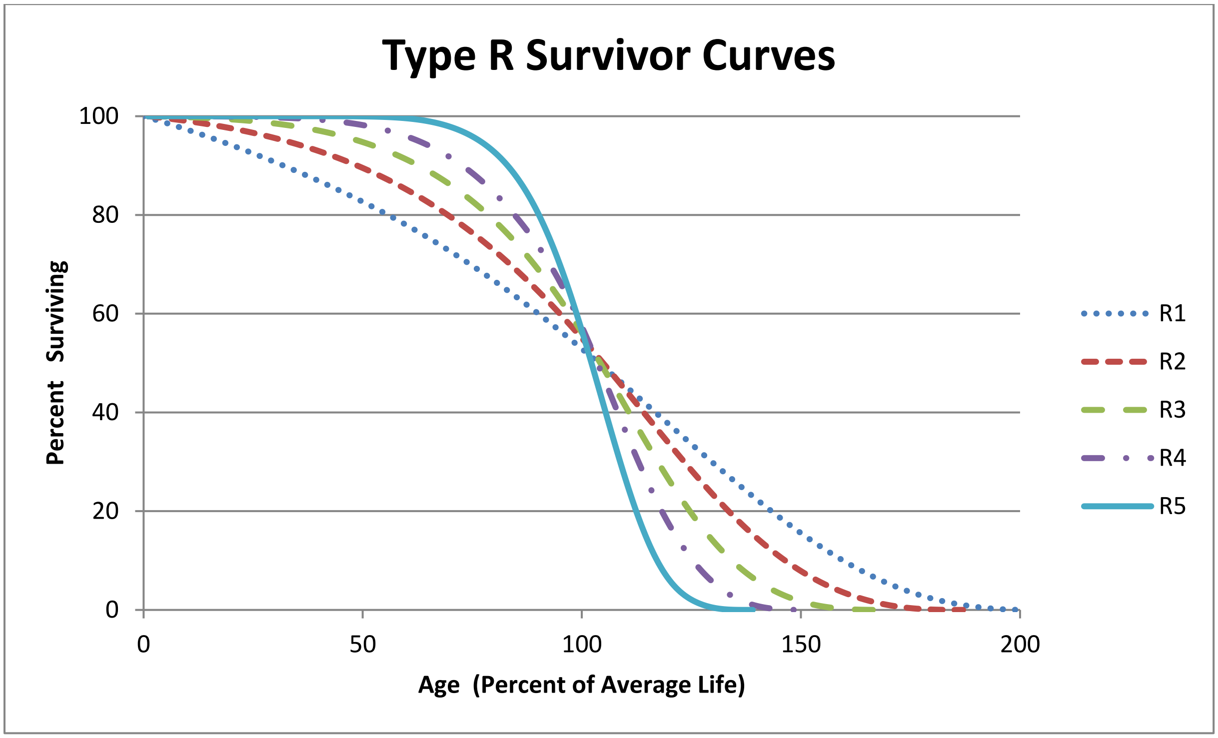
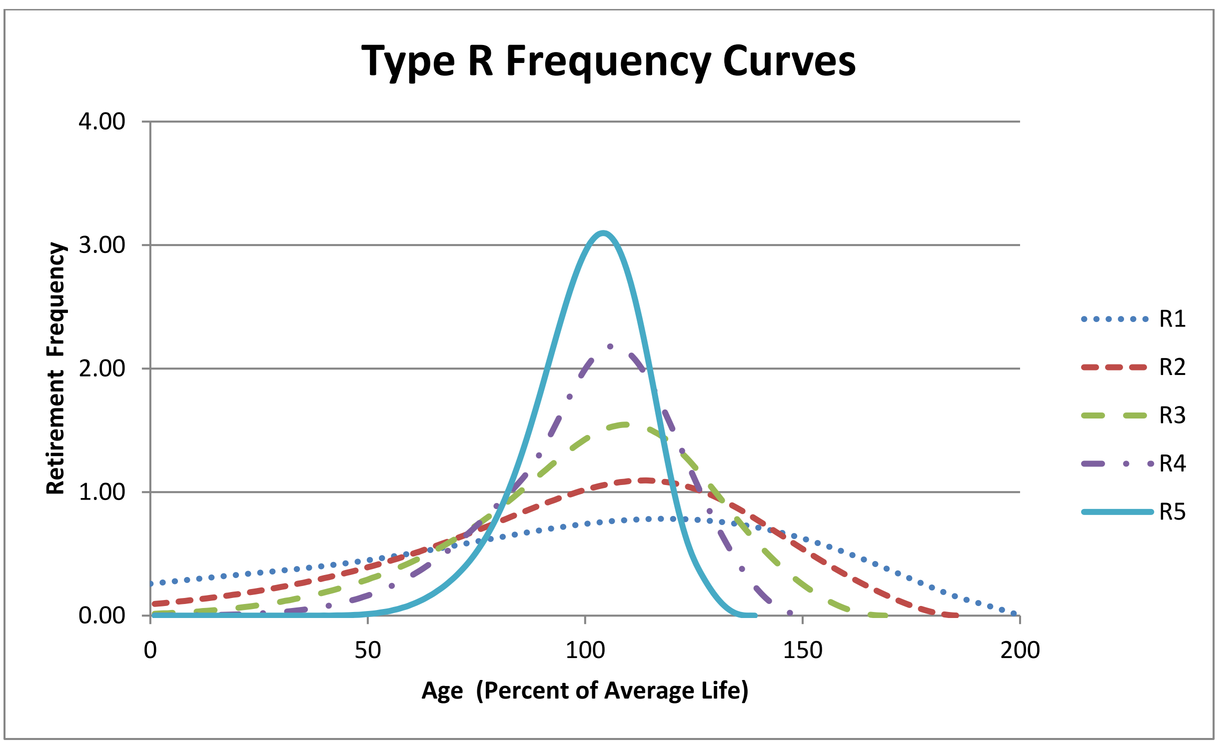


Figure 12:
Type R Survivor and Frequency Curves





As shown in the graphs above, the modes for the L family frequency curves occur to the left of average life (100% on the x-axis), while the S family modes occur at the average, and the R family modes occur after the average.

3. Types of Lives

Several other important statistical analyses and types of lives may be derived from an Iowa curve. These include: 1) average life; 2) realized life; 3) remaining life; and 4) probable life. The figure below illustrates these concepts. It shows the frequency curve, survivor curve, and probable life curve. Age M_x on the x-axis represents the modal age, while age AL_x represents the average age. Thus, this figure illustrates an "L type" Iowa curve since the mode occurs before the average.[80]

First, average life is the area under the survivor curve from age zero to maximum life. Because the survivor curve is measured in percent, the area under the curve must be divided by 100% to convert it from percent-years to years. The formula for average life is as follows:[81]

Equation 4:
Average Life

$$Average\ Life\ = \frac{Area\ Under\ Survivor\ Curve\ from\ Age\ 0\ to\ Max\ Life}{100\%}$$

Thus, average life may not be determined without a complete survivor curve. Many property groups being analyzed will not have experienced full retirement. This results in a "stub" survivor

[80] From age zero to age M_x on the survivor curve, it could be said that the percent surviving from this property group is decreasing at an increasing rate. Conversely, from point M_x to maximum on the survivor curve, the percent surviving is decreasing at a decreasing rate.

[81] *See* NARUC *supra* n. 8, at 71.

curve. Iowa curves are used to extend stub curves to maximum life in order for the average life calculation to be made (see Appendix C).

Realized life is similar to average life, except that realized life is the average years of service experienced to date from the vintage's original installations.[82] As shown in the figure below, realized life is the area under the survivor curve from zero to age RL_X. Likewise, unrealized life is the area under the survivor curve from age RL_X to maximum life. Thus, it could be said that average life equals realized life plus unrealized life.

Average remaining life represents the future years of service expected from the surviving property.[83] Remaining life is sometimes referred to as "average remaining life" and "life expectancy." To calculate average remaining life at age x, the area under the estimated future portion of the survivor curve is divided by the percent surviving at age x (denoted S_X). Thus, the average remaining life formula is:

Equation 5:
Average Remaining Life

$$Average\ Remaining\ Life = \frac{Area\ Under\ Survivor\ Curve\ from\ Age\ x\ to\ Max\ Life}{S_X}$$

It is necessary to determine average remaining life to calculate the annual accrual under the remaining life technique.

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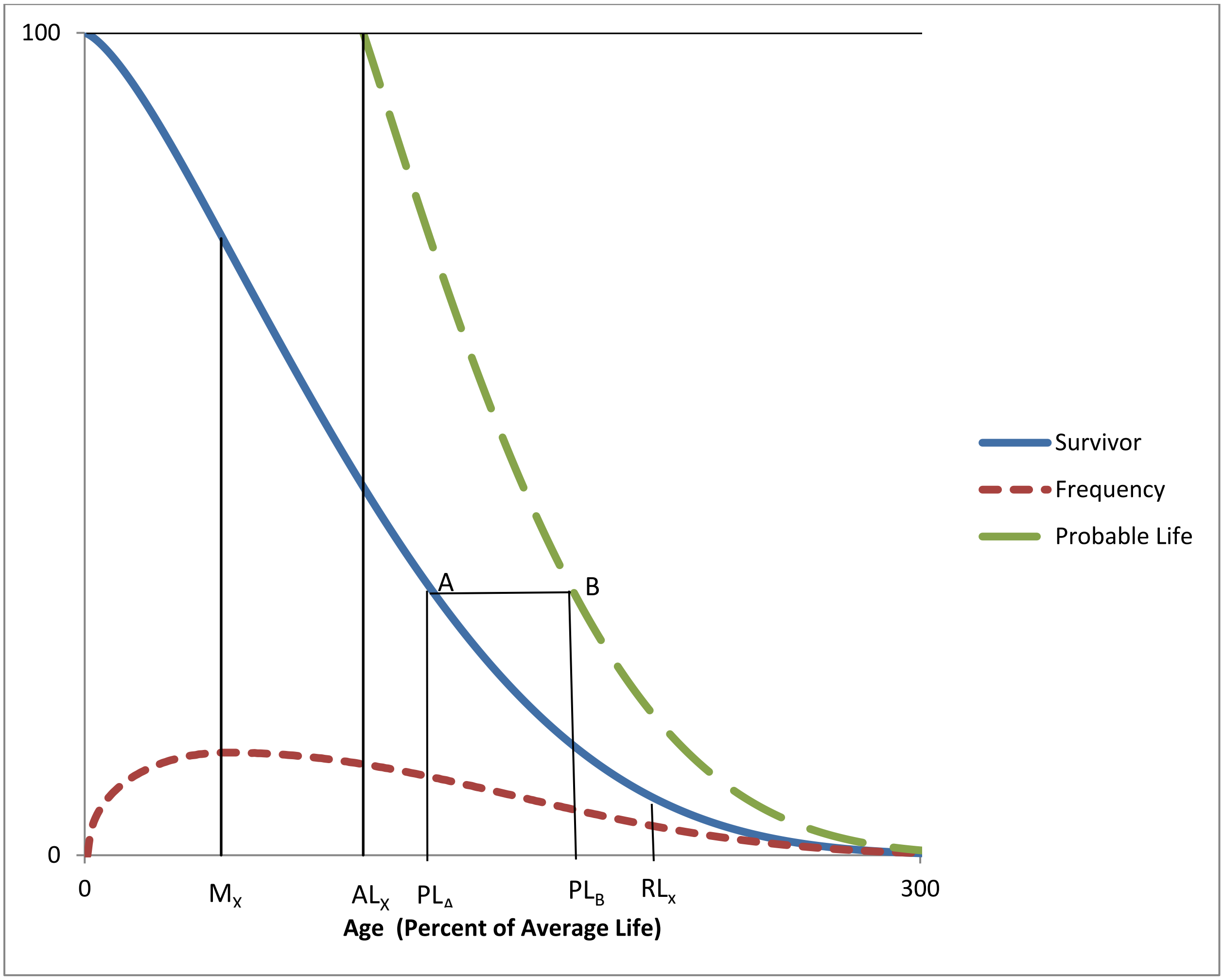
[82] *Id*. at 73.

[83] *Id*. at 74.

Figure 13:
Iowa Curve Derivations



Finally, the probable life may also be determined from the Iowa curve. The probable life of a property group is the total life expectancy of the property surviving at any age and is equal to the remaining life plus the current age.[84] The probable life is also illustrated in this figure. The probable life at age PL_A is the age at point PL_B. Thus, to read the probable life at age PL_A, see the

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84 Wolf *supra* n. 7, at 28.

corresponding point on the survivor curve above at point "A," then horizontally to point "B" on the probable life curve, and back down to the age corresponding to point "B." It is no coincidence that the vertical line from AL_X connects at the top of the probable life curve. This is because at age zero, probable life equals average life.

APPENDIX C:

ACTUARIAL ANALYSIS

Actuarial science is a discipline that applies various statistical methods to assess risk probabilities and other related functions. Actuaries often study human mortality. The results from historical mortality data are used to predict how long similar groups of people who are alive today will live. Insurance companies rely on actuarial analysis in determining premiums for life insurance policies.

The study of human mortality is analogous to estimating service lives of industrial property groups. While some humans die solely from chance, most deaths are related to age; that is, death rates generally increase as age increases. Similarly, physical plant is also subject to forces of retirement. These forces include physical, functional, and contingent factors, as shown in the table below.[85]

Figure 14:
Forces of Retirement

Physical Factors	Functional Factors	Contingent Factors
Wear and tear Decay or deterioration Action of the elements	Inadequacy Obsolescence Changes in technology Regulations Managerial discretion	Casualties or disasters Extraordinary obsolescence

While actuaries study historical mortality data in order to predict how long a group of people will live, depreciation analysts must look at a utility's historical data in order to estimate the average lives of property groups. A utility's historical data is often contained in the Continuing Property Records ("CPR"). Generally, a CPR should contain 1) an inventory of property record

[85] NARUC *supra* n. 8, at 14-15.

units; 2) the association of costs with such units; and 3) the dates of installation and removal of plant. Since actuarial analysis includes the examination of historical data to forecast future retirements, the historical data used in the analysis should not contain events that are anomalous or unlikely to recur.[86] Historical data is used in the retirement rate actuarial method, which is discussed further below.

The Retirement Rate Method

There are several systematic actuarial methods that use historical data to calculate observed survivor curves for property groups. Of these methods, the retirement rate method is superior, and is widely employed by depreciation analysts.[87] The retirement rate method is ultimately used to develop an observed survivor curve, which can be fitted with an Iowa curve discussed in Appendix B to forecast average life. The observed survivor curve is calculated by using an observed life table ("OLT"). The figures below illustrate how the OLT is developed. First, historical property data are organized in a matrix format, with placement years on the left forming rows, and experience years on the top forming columns. The placement year (a.k.a. "vintage year" or "installation year") is the year of placement into service of a group of property. The experience year (a.k.a. "activity year") refers to the accounting data for a particular calendar year. The two matrices below use aged data – that is, data for which the dates of placements, retirements, transfers, and other transactions are known. Without aged data, the retirement rate actuarial method may not be employed. The first matrix is the exposure matrix, which shows the exposures

[86] *Id*. at 112-13.

[87] Anson Marston, Robley Winfrey & Jean C. Hempstead, *Engineering Valuation and Depreciation* 154 (2nd ed., McGraw-Hill Book Company, Inc. 1953).

at the beginning of each year.[88] An exposure is simply the depreciable property subject to retirement during a period. The second matrix is the retirement matrix, which shows the annual retirements during each year. Each matrix covers placement years 2003–2015, and experience years 2008-2015. In the exposure matrix, the number in the 2012 experience column and the 2003 placement row is $192,000. This means at the beginning of 2012, there was $192,000 still exposed to retirement from the vintage group placed in 2003. Likewise, in the retirement matrix, $19,000 of the dollars invested in 2003 were retired during 2012.

Figure 15:
Exposure Matrix

	Experience Years Exposures at January 1 of Each Year (Dollars in 000's)									
Placement Years	2008	2009	2010	2011	2012	2013	2014	2015	Total at Start of Age Interval	Age Interval
2003	261	245	228	211	**192**	173	152	131	131	11.5 - 12.5
2004	267	252	236	220	202	**184**	165	145	297	10.5 - 11.5
2005	304	291	277	263	248	232	**216**	198	536	9.5 - 10.5
2006	345	334	322	310	298	284	270	**255**	**847**	8.5 - 9.5
2007	367	357	347	335	324	312	299	286	1,201	7.5 - 8.5
2008	375	366	357	347	336	325	314	302	1,581	6.5 - 7.5
2009		377	366	356	346	336	327	319	1,986	5.5 - 6.5
2010			381	369	358	347	336	327	2,404	4.5 - 5.5
2011				386	372	359	346	334	2,559	3.5 - 4.5
2012					395	380	366	352	2,722	2.5 - 3.5
2013						401	385	370	2,866	1.5 - 2.5
2014							410	393	2,998	0.5 - 1.5
2015								416	3,141	0.0 - 0.5
Total	1919	2222	2514	2796	3070	3333	3586	3827	23,268	

[88] Technically, the last numbers in each column are "gross additions" rather than exposures. Gross additions do not include adjustments and transfers applicable to plant placed in a previous year. Once retirements, adjustments, and transfers are factored in, the balance at the beginning of the next accounting period is called an "exposure" rather than an addition.

Figure 16:
Retirement Matrix

Placement Years	Experience Years Retirments During the Year (Dollars in 000's) 2008	2009	2010	2011	2012	2013	2014	2015	Total During Age Interval	Age Interval
2003	16	17	18	19	**19**	20	21	23	23	11.5 - 12.5
2004	15	16	17	17	18	**19**	20	21	43	10.5 - 11.5
2005	13	14	14	15	16	17	**17**	18	59	9.5 - 10.5
2006	11	12	12	13	13	14	15	**15**	**71**	8.5 - 9.5
2007	10	11	11	12	12	13	13	14	82	7.5 - 8.5
2008	9	9	10	10	11	11	12	13	91	6.5 - 7.5
2009		11	10	10	9	9	9	8	95	5.5 - 6.5
2010			12	11	11	10	10	9	100	4.5 - 5.5
2011				14	13	13	12	11	93	3.5 - 4.5
2012					15	14	14	13	91	2.5 - 3.5
2013						16	15	14	93	1.5 - 2.5
2014							17	16	100	0.5 - 1.5
2015								18	112	0.0 - 0.5
Total	74	89	104	121	139	157	175	194	1,052	

These matrices help visualize how exposure and retirement data are calculated for each age interval. An age interval is typically one year. A common convention is to assume that any unit installed during the year is installed in the middle of the calendar year (i.e., July 1st). This convention is called the "half-year convention" and effectively assumes that all units are installed uniformly during the year.[89] Adoption of the half-year convention leads to age intervals of 0-0.5 years, 0.5-1.5 years, etc., as shown in the matrices.

The purpose of the matrices is to calculate the totals for each age interval, which are shown in the second column from the right in each matrix. This column is calculated by adding each number from the corresponding age interval in the matrix. For example, in the exposure matrix, the total amount of exposures at the beginning of the 8.5-9.5 age interval is $847,000. This number was calculated by adding the numbers shown on the "stairs" to the left (192+184+216+255=847).

[89] Wolf *supra* n. 7, at 22.

The same calculation is applied to each number in the column. The amounts retired during the year in the retirements matrix affect the exposures at the beginning of each year in the exposures matrix. For example, the amount exposed to retirement in 2008 from the 2003 vintage is $261,000. The amount retired during 2008 from the 2003 vintage is $16,000. Thus, the amount exposed to retirement at the beginning of 2009 from the 2003 vintage is $245,000 ($261,000 - $16,000). The company's property records may contain other transactions which affect the property, including sales, transfers, and adjusting entries. Although these transactions are not shown in the matrices above, they would nonetheless affect the amount exposed to retirement at the beginning of each year.

The totaled amounts for each age interval in both matrices are used to form the exposure and retirement columns in the OLT, as shown in the chart below. This chart also shows the retirement ratio and the survivor ratio for each age interval. The retirement ratio for an age interval is the ratio of retirements during the interval to the property exposed to retirement at the beginning of the interval. The retirement ratio represents the probability that the property surviving at the beginning of an age interval will be retired during the interval. The survivor ratio is simply the complement to the retirement ratio (1 – retirement ratio). The survivor ratio represents the probability that the property surviving at the beginning of an age interval will survive to the next age interval.

Figure 17:
Observed Life Table

Age at Start of Interval	Exposures at Start of Age Interval	Retirements During Age Interval	Retirement Ratio	Survivor Ratio	Percent Surviving at Start of Age Interval
A	B	C	D = C / B	E = 1 - D	F
0.0	3,141	112	0.036	0.964	**100.00**
0.5	2,998	100	0.033	0.967	**96.43**
1.5	2,866	93	0.032	0.968	**93.21**
2.5	2,722	91	0.033	0.967	**90.19**
3.5	2,559	93	0.037	0.963	**87.19**
4.5	2,404	100	0.042	0.958	**84.01**
5.5	1,986	95	0.048	0.952	**80.50**
6.5	1,581	91	0.058	0.942	**76.67**
7.5	1,201	82	0.068	0.932	**72.26**
8.5	847	71	0.084	0.916	**67.31**
9.5	536	59	0.110	0.890	**61.63**
10.5	297	43	0.143	0.857	**54.87**
11.5	131	23	0.172	0.828	**47.01**
					38.91
Total	23,268	1,052			

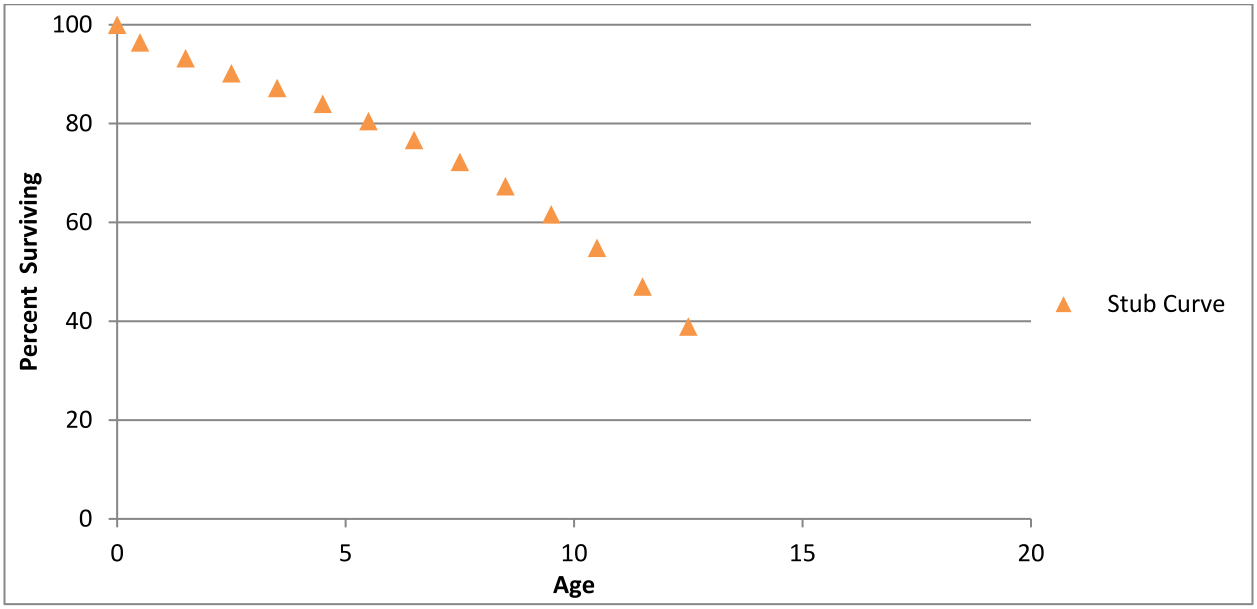
Column F on the right shows the percentages surviving at the beginning of each age interval. This column starts at 100% surviving. Each consecutive number below is calculated by multiplying the percent surviving from the previous age interval by the corresponding survivor ratio for that age interval. For example, the percent surviving at the start of age interval 1.5 is 93.21%, which was calculated by multiplying the percent surviving for age interval 0.5 (96.43%) by the survivor ratio for age interval 0.5 (0.967)[90].

The percentages surviving in Column F are the numbers that are used to form the original survivor curve. This particular curve starts at 100% surviving and ends at 38.91% surviving. An

[90] Multiplying 96.43 by 0.967 does not equal 93.21 exactly due to rounding.

observed survivor curve such as this that does not reach zero percent surviving is called a "stub" curve. The figure below illustrates the stub survivor curve derived from the OLT above.

Figure 18:
Original "Stub" Survivor Curve



The matrices used to develop the basic OLT and stub survivor curve provide a basic illustration of the retirement rate method in that only a few placement and experience years were used. In reality, analysts may have several decades of aged property data to analyze. In that case, it may be useful to use a technique called "banding" in order to identify trends in the data.

<u>Banding</u>

The forces of retirement and characteristics of industrial property are constantly changing. A depreciation analyst may examine the magnitude of these changes. Analysts often use a technique called "banding" to assist with this process. Banding refers to the merging of several years of data into a single data set for further analysis, and it is a common technique associated with the retirement rate method.[91] There are three primary benefits of using bands in depreciation analysis:

1. Increasing the sample size. In statistical analyses, the larger the sample size in relation to the body of total data, the greater the reliability of the result;

2. Smooth the observed data. Generally, the data obtained from a single activity or vintage year will not produce an observed life table that can be easily fit; and

3. Identify trends. By looking at successive bands, the analyst may identify broad trends in the data that may be useful in projecting the future life characteristics of the property.[92]

Two common types of banding methods are the “placement band” method and the “experience band” method.” A placement band, as the name implies, isolates selected placement years for analysis. The figure below illustrates the same exposure matrix shown above, except that only the placement years 2005-2008 are considered in calculating the total exposures at the beginning of each age interval.

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[91] NARUC *supra* n. 8, at 113.

[92] *Id*.

Figure 19:
Placement Bands

Placement Years	Experience Years Exposures at January 1 of Each Year (Dollars in 000's) 2008	2009	2010	2011	2012	2013	2014	2015	Total at Start of Age Interval	Age Interval
2003	261	245	228	211	192	173	152	131		11.5 - 12.5
2004	267	252	236	220	202	184	165	145		10.5 - 11.5
2005	304	291	277	263	248	232	216	198	198	9.5 - 10.5
2006	345	334	322	310	298	284	270	255	471	8.5 - 9.5
2007	367	357	347	335	324	312	299	286	788	7.5 - 8.5
2008	375	366	357	347	336	325	314	302	1,133	6.5 - 7.5
2009		377	366	356	346	336	327	319	1,186	5.5 - 6.5
2010			381	369	358	347	336	327	1,237	4.5 - 5.5
2011				386	372	359	346	334	1,285	3.5 - 4.5
2012					395	380	366	352	1,331	2.5 - 3.5
2013						401	385	370	1,059	1.5 - 2.5
2014							410	393	733	0.5 - 1.5
2015								416	375	0.0 - 0.5
Total	1919	2222	2514	2796	3070	3333	3586	3827	9,796	

The shaded cells within the placement band equal the total exposures at the beginning of age interval 4.5–5.5 ($1,237). The same placement band would be used for the retirement matrix covering the same placement years of 2005 – 2008. This of course would result in a different OLT and original stub survivor curve than those that were calculated above without the restriction of a placement band.

Analysts often use placement bands for comparing the survivor characteristics of properties with different physical characteristics.[93] Placement bands allow analysts to isolate the effects of changes in technology and materials that occur in successive generations of plant. For example, if in 2005 an electric utility began placing transmission poles into service with a special chemical treatment that extended the service lives of those poles, an analyst could use placement bands to isolate and analyze the effect of that change in the property group's physical characteristics. While

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[93] Wolf *supra* n. 7, at 182.

placement bands are very useful in depreciation analysis, they also possess an intrinsic dilemma. A fundamental characteristic of placement bands is that they yield fairly complete survivor curves for older vintages. However, with newer vintages, which are arguably more valuable for forecasting, placement bands yield shorter survivor curves. Longer "stub" curves are considered more valuable for forecasting average life. Thus, an analyst must select a band width broad enough to provide confidence in the reliability of the resulting curve fit yet narrow enough so that an emerging trend may be observed.[94]

Analysts also use "experience bands." Experience bands show the composite retirement history for all vintages during a select set of activity years. The figure below shows the same data presented in the previous exposure matrices, except that the experience band from 2011 – 2013 is isolated, resulting in different interval totals.

[94] NARUC *supra* n. 8, at 114.

Figure 20:
Experience Bands

Placement Years	2008	2009	2010	2011	2012	2013	2014	2015	Total at Start of Age Interval	Age Interval
	Experience Years Exposures at January 1 of Each Year (Dollars in 000's)									
2003	261	245	228	211	192	173	152	131		11.5 - 12.5
2004	267	252	236	220	202	184	165	145		10.5 - 11.5
2005	304	291	277	263	248	232	216	198	173	9.5 - 10.5
2006	345	334	322	310	298	284	270	255	376	8.5 - 9.5
2007	367	357	347	335	324	312	299	286	645	7.5 - 8.5
2008	375	366	357	347	336	325	314	302	752	6.5 - 7.5
2009		377	366	356	346	336	327	319	872	5.5 - 6.5
2010			381	369	358	347	336	327	959	4.5 - 5.5
2011				386	372	359	346	334	1,008	3.5 - 4.5
2012					395	380	366	352	1,039	2.5 - 3.5
2013						401	385	370	1,072	1.5 - 2.5
2014							410	393	1,121	0.5 - 1.5
2015								416	1,182	0.0 - 0.5
Total	1919	2222	2514	2796	3070	3333	3586	3827	9,199	

The shaded cells within the experience band equal the total exposures at the beginning of age interval 0.5 – 1.5 ($1,121). The same experience band would be used for the retirement matrix covering the same experience years of 2011 – 2013. This of course would result in a different OLT and original stub survivor than if the band had not been used. Analysts often use experience bands to isolate and analyze the effects of an operating environment over time.[95] Likewise, the use of experience bands allows analysis of the effects of an unusual environmental event. For example, if an unusually severe ice storm occurred in 2013, destruction from that storm would affect an electric utility's line transformers of all ages. That is, each of the line transformers from each placement year would be affected, including those recently installed in 2012, as well as those installed in 2003. Using experience bands, an analyst could isolate or even eliminate the 2013 experience year from the analysis. In contrast, a placement band would not effectively isolate the

[95] *Id.*

ice storm's effect on life characteristics. Rather, the placement band would show an unusually large rate of retirement during 2013, making it more difficult to accurately fit the data with a smooth Iowa curve. Experience bands tend to yield the most complete stub curves for recent bands because they have the greatest number of vintages included. Longer stub curves are better for forecasting. The experience bands, however, may also result in more erratic retirement dispersion making the curve fitting process more difficult.

Depreciation analysts must use professional judgment in determining the types of bands to use and the band widths. In practice, analysts may use various combinations of placement and experience bands in order to increase the data sample size, identify trends and changes in life characteristics, and isolate unusual events. Regardless of which bands are used, observed survivor curves in depreciation analysis rarely reach zero percent. This is because, as seen in the OLT above, relatively newer vintage groups have not yet been fully retired at the time the property is studied. An analyst could confine the analysis to older, fully retired vintage groups to get complete survivor curves, but such analysis would ignore some of the property currently in service and would arguably not provide an accurate description of life characteristics for current plant in service. Because a complete curve is necessary to calculate the average life of the property group, however, curve fitting techniques using Iowa curves or other standardized curves may be employed in order to complete the stub curve.

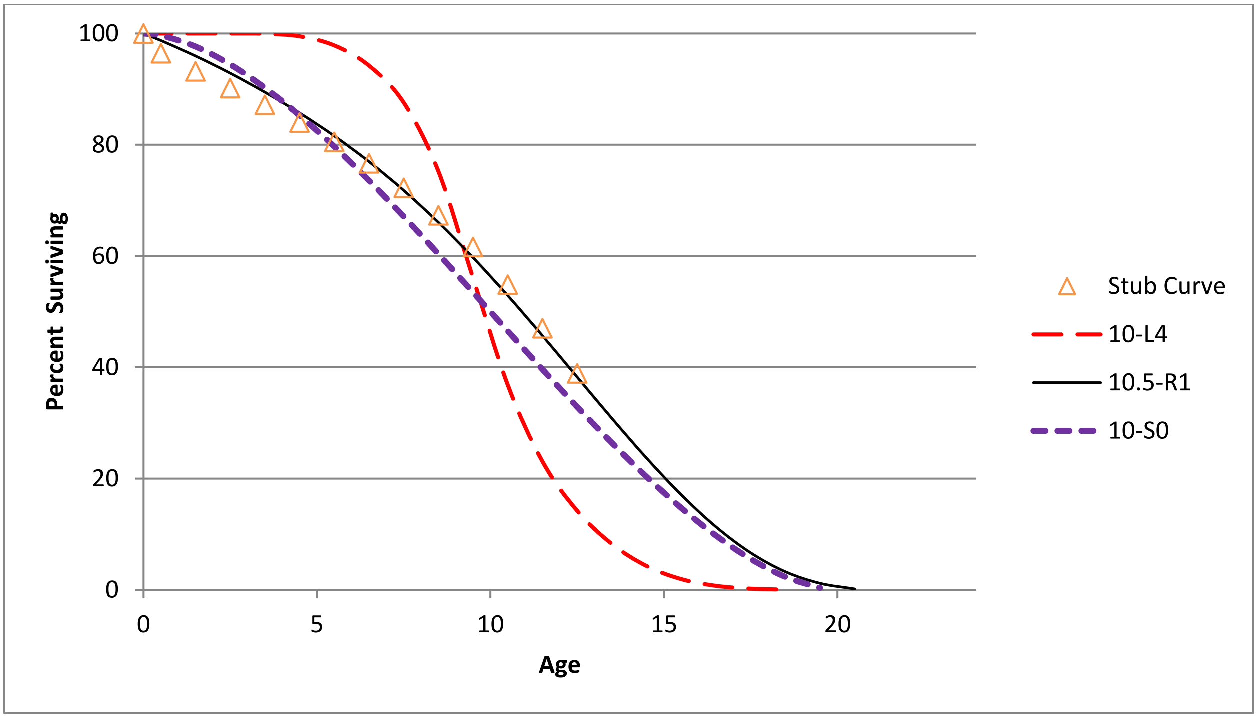
Curve Fitting

Depreciation analysts typically use the survivor curve rather than the frequency curve to fit the observed stub curves. The most commonly used generalized survivor curves in the curve fitting process are the Iowa curves discussed above. As Wolf notes, if "the Iowa curves are adopted as a model, an underlying assumption is that the process describing the retirement pattern is one of the 22 [or more] processes described by the Iowa curves."[96]

Curve fitting may be done through visual matching or mathematical matching. In visual curve fitting, the analyst visually examines the plotted data to make an initial judgment about the Iowa curves that may be a good fit. The figure below illustrates the stub survivor curve shown above. It also shows three different Iowa curves: the 10-L4, the 10.5-R1, and the 10-S0. Visually, it is clear that the 10.5-R1 curve is a better fit than the other two curves.

[96] Wolf *supra* n. 7, at 46 (22 curves includes Winfrey's 18 original curves plus Cowles's four "O" type curves).

Figure 21:
Visual Curve Fitting



In mathematical fitting, the least squares method is used to calculate the best fit. This mathematical method would be excessively time consuming if done by hand. With the use of modern computer software, however, mathematical fitting is an efficient and useful process. The typical logic for a computer program, as well as the software employed for the analysis in this testimony is as follows:

> First (an Iowa curve) curve is arbitrarily selected. . . . If the observed curve is a stub curve, . . . calculate the area under the curve and up to the age at final data point. Call this area the realized life. Then systematically vary the average life of the theoretical survivor curve and calculate its realized life at the age corresponding to the study date. This trial and error procedure ends when you find an average life such that the realized life of the theoretical curve equals the realized life of the observed curve. Call this the average life.
>
> Once the average life is found, calculate the difference between each percent surviving point on the observed survivor curve and the corresponding point on the Iowa curve. Square each difference and sum them. The sum of squares is used as a measure of goodness of fit for that particular Iowa type curve. This procedure is

> repeated for the remaining 21 Iowa type curves. The “best fit” is declared to be the type of curve that minimizes the sum of differences squared.[97]

Mathematical fitting requires less judgment from the analyst and is thus less subjective. Blind reliance on mathematical fitting, however, may lead to poor estimates. Thus, analysts should employ both mathematical and visual curve fitting in reaching their final estimates. This way, analysts may utilize the objective nature of mathematical fitting while still employing professional judgment. As Wolf notes: “The results of mathematical curve fitting serve as a guide for the analyst and speed the visual fitting process. But the results of the mathematical fitting should be checked visually, and the final determination of the best fit be made by the analyst.”[98]

In the graph above, visual fitting was sufficient to determine that the 10.5-R1 Iowa curve was a better fit than the 10-L4 and the 10-S0 curves. Using the sum of least squares method, mathematical fitting confirms the same result. In the chart below, the percentages surviving from the OLT that formed the original stub curve are shown in the left column, while the corresponding percentages surviving for each age interval are shown for the three Iowa curves. The right portion of the chart shows the differences between the points on each Iowa curve and the stub curve. These differences are summed at the bottom. Curve 10.5-R1 is the best fit because the sum of the squared differences for this curve is less than the same sum for the other two curves. Curve 10-L4 is the worst fit, which was also confirmed visually.

---

[97] Wolf *supra* n. 7, at 47.

[98] *Id*. at 48.

Figure 22:
Mathematical Fitting

Age Interval	Stub Curve	Iowa Curves 10-L4	Iowa Curves 10-S0	Iowa Curves 10.5-R1	Squared Differences 10-L4	Squared Differences 10-S0	Squared Differences 10.5-R1
0.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0
0.5	96.4	100.0	99.7	98.7	12.7	10.3	5.3
1.5	93.2	100.0	97.7	96.0	46.1	19.8	7.6
2.5	90.2	100.0	94.4	92.9	96.2	18.0	7.2
3.5	87.2	100.0	90.2	89.5	162.9	9.3	5.2
4.5	84.0	99.5	85.3	85.7	239.9	1.6	2.9
5.5	80.5	97.9	79.7	81.6	301.1	0.7	1.2
6.5	76.7	94.2	73.6	77.0	308.5	9.5	0.1
7.5	72.3	87.6	67.1	71.8	235.2	26.5	0.2
8.5	67.3	75.2	60.4	66.1	62.7	48.2	1.6
9.5	61.6	56.0	53.5	59.7	31.4	66.6	3.6
10.5	54.9	36.8	46.5	52.9	325.4	69.6	3.9
11.5	47.0	23.1	39.6	45.7	572.6	54.4	1.8
12.5	38.9	14.2	32.9	38.2	609.6	36.2	0.4
SUM					**3004.2**	**371.0**	**41.0**

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EDUCATION

University of Oklahoma — Norman, OK
Master of Business Administration — 2014
Areas of Concentration: Finance, Energy

University of Oklahoma College of Law — Norman, OK
Juris Doctor — 2007
Member, American Indian Law Review

University of Oklahoma — Norman, OK
Bachelor of Business Administration — 2003
Major: Finance

PROFESSIONAL DESIGNATIONS

Society of Depreciation Professionals
Certified Depreciation Professional (CDP)

Society of Utility and Regulatory Financial Analysts
Certified Rate of Return Analyst (CRRA)

The Mediation Institute
Certified Civil / Commercial & Employment Mediator

WORK EXPERIENCE

Resolve Utility Consulting PLLC — Oklahoma City, OK
Managing Member — 2016 – Present
Provide expert analysis and testimony specializing in depreciation and cost of capital issues for clients in utility regulatory proceedings.

Oklahoma Corporation Commission — Oklahoma City, OK
Public Utility Regulatory Analyst — 2012 – 2016
Assistant General Counsel — 2011 – 2012
Represented commission staff in utility regulatory proceedings and provided legal opinions to commissioners. Provided expert analysis and testimony in depreciation, cost of capital, incentive compensation, payroll and other issues.

Perebus Counsel, PLLC — Oklahoma City, OK
Managing Member — 2009 – 2011
Represented clients in the areas of family law, estate planning, debt negotiations, business organization, and utility regulation.

Moricoli & Schovanec, P.C. — Oklahoma City, OK
Associate Attorney — 2007 – 2009
Represented clients in the areas of contracts, oil and gas, business structures and estate administration.

TEACHING EXPERIENCE

University of Oklahoma — Norman, OK
Adjunct Instructor – "Conflict Resolution" — 2014 – Present
Adjunct Instructor – "Ethics in Leadership"

Rose State College — Midwest City, OK
Adjunct Instructor – "Legal Research" — 2013 – 2015
Adjunct Instructor – "Oil & Gas Law"

PUBLICATIONS

American Indian Law Review — Norman, OK
"Vine of the Dead: Reviving Equal Protection Rites for Religious Drug Use" — 2006
(31 Am. Indian L. Rev. 143)

VOLUNTEER EXPERIENCE

Calm Waters — Oklahoma City, OK
Board Member — 2015 – Present
Participate in management of operations, attend meetings, review performance, compensation, and financial records. Assist in fundraising events.

Group Facilitator & Fundraiser — 2014 – Present
Facilitate group meetings designed to help children and families cope with divorce and tragic events. Assist in fundraising events.

St. Jude Children's Research Hospital — Oklahoma City, OK
Oklahoma Fundraising Committee — 2008 – 2010
Raised money for charity by organizing local fundraising events.

PROFESSIONAL ASSOCIATIONS

Oklahoma Bar Association 2007 – Present

Society of Depreciation Professionals 2014 – Present
Board Member – President 2017
Participate in management of operations, attend meetings, review performance, organize presentation agenda.

Society of Utility Regulatory Financial Analysts 2014 – Present

SELECTED CONTINUING PROFESSIONAL EDUCATION

Society of Depreciation Professionals Austin, TX
"Life and Net Salvage Analysis" 2015
Extensive instruction on utility depreciation, including actuarial and simulation life analysis modes, gross salvage, cost of removal, life cycle analysis, and technology forecasting.

Society of Depreciation Professionals New Orleans, LA
"Introduction to Depreciation" and "Extended Training" 2014
Extensive instruction on utility depreciation, including average lives and net salvage.

Society of Utility and Regulatory Financial Analysts Indianapolis, IN
46th Financial Forum. "The Regulatory Compact: Is it Still Relevant?" 2014
Forum discussions on current issues.

New Mexico State University, Center for Public Utilities Santa Fe, NM
Current Issues 2012, "The Santa Fe Conference" 2012
Forum discussions on various current issues in utility regulation.

Michigan State University, Institute of Public Utilities Clearwater, FL
"39th Eastern NARUC Utility Rate School" 2011
One-week, hands-on training emphasizing the fundamentals of the utility ratemaking process.

New Mexico State University, Center for Public Utilities Albuquerque, NM
"The Basics: Practical Regulatory Training for the Changing Electric Industries" 2010
One-week, hands-on training designed to provide a solid foundation in core areas of utility ratemaking.

The Mediation Institute Oklahoma City, OK
"Civil / Commercial & Employment Mediation Training" 2009
Extensive instruction and mock mediations designed to build foundations in conducting mediations in civil matters.

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Indiana Utility Regulatory Commission	Citizens Energy Group	45039	Depreciation rates, service lifes, net salvage	Indiana Office of Consumer Counselor
Public Utility Commission of Texas	Entergy Texas, Inc.	PUC 48371	Depreciation rates, decommissioning costs	Texas Municipal Group
Washington Utilities & Transportation Commission	Avista Corporation	UE-180167	Depreciation rates, service lives, net salvage	Washington Office of Attorney General
New Mexico Public Regulation Commission	Southwestern Public Service Company	17-00255-UT	Cost of capital and authorized rate of return	HollyFrontier Navajo Refining; Occidental Permian
Public Utility Commission of Texas	Southwestern Public Service Company	PUC 47527	Depreciation rates, plant service lives	Alliance of Xcel Municipalities
Public Service Commission of the State of Montana	Montana-Dakota Utilities Co.	D2017.9.79	Depreciation rates, service lives, net salvage	Montana Consumer Counsel
Florida Public Service Commission	Florida City Gas	20170179-GU	Cost of capital, depreciation rates	Florida Office of Public Counsel
Washington Utilities & Transportation Commission	Avista Corporation	UE-170485	Cost of capital and authorized rate of return	Washington Office of Attorney General
Wyoming Public Service Commission	Powder River Energy Corporation	10014-182-CA-17	Credit analysis, cost of capital	Private customer
Oklahoma Corporation Commission	Public Service Co. of Oklahoma	PUD 201700151	Depreciation, terminal salvage, risk analysis	Oklahoma Industrial Energy Consumers
Public Utility Commission of Texas	Oncor Electric Delivery Company	PUC 46957	Depreciation rates, simulated analysis	Alliance of Oncor Cities
Nevada Public Utilities Commission	Nevada Power Company	17-06004	Depreciation rates, service lives, net salvage	Nevada Bureau of Consumer Protection
Public Utility Commission of Texas	El Paso Electric Company	PUC 46831	Depreciation rates, interim retirements	City of El Paso
Idaho Public Utilities Commission	Idaho Power Company	IPC-E-16-24	Accelerated depreciation of North Valmy plant	Micron Technology, Inc.
Idaho Public Utilities Commission	Idaho Power Company	IPC-E-16-23	Depreciation rates, service lives, net salvage	Micron Technology, Inc.
Public Utility Commission of Texas	Southwestern Electric Power Company	PUC 46449	Depreciation rates, decommissioning costs	Cities Advocating Reasonable Deregulation

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Massachusetts Department of Public Utilities	Eversource Energy	D.P.U. 17-05	Cost of capital, capital structure, and rate of return	Sunrun Inc.; Energy Freedom Coalition of America
Railroad Commission of Texas	Atmos Pipeline - Texas	GUD 10580	Depreciation rates, grouping procedure	City of Dallas
Public Utility Commission of Texas	Sharyland Utility Co.	PUC 45414	Depreciation rates, simulated analysis	City of Mission
Oklahoma Corporation Commission	Empire District Electric Co.	PUD 201600468	Cost of capital, depreciation rates	Oklahoma Industrial Energy Consumers
Railroad Commission of Texas	CenterPoint Energy Texas Gas	GUD 10567	Depreciation rates, simulated plant analysis	Texas Coast Utilities Coalition
Arkansas Public Service Commission	Oklahoma Gas & Electric Co.	160-159-GU	Cost of capital, depreciation rates, terminal salvage	Arkansas River Valley Energy Consumers; Wal-Mart
Florida Public Service Commission	Peoples Gas	160-159-GU	Depreciation rates, service lives, net salvage	Florida Office of Public Counsel
Arizona Corporation Commission	Arizona Public Service Co.	E-01345A-16-0036	Cost of capital, depreciation rates, terminal salvage	Energy Freedom Coalition of America
Nevada Public Utilities Commission	Sierra Pacific Power Co.	16-06008	Depreciation rates, net salvage, theoretical reserve	Northern Nevada Utility Customers
Oklahoma Corporation Commission	Oklahoma Gas & Electric Co.	PUD 201500273	Cost of capital, depreciation rates, terminal salvage	Public Utility Division
Oklahoma Corporation Commission	Public Service Co. of Oklahoma	PUD 201500208	Cost of capital, depreciation rates, terminal salvage	Public Utility Division
Oklahoma Corporation Commission	Oklahoma Natural Gas Co.	PUD 201500213	Cost of capital, depreciation rates, net salvage	Public Utility Division

Summary Expense Adjustment

Plant Function	Plant Balance 12/31/2016	WGL Position		OPC Position		OPC Adjustment	
		Rate	Accrual	Rate	Accrual	Rate	Accrual
Storage and Processing	24,986,853	2.64%	660,091	1.47%	366,150	-1.18%	(293,941)
Transmission	132,103,039	1.91%	2,522,220	1.38%	1,825,885	-0.53%	(696,335)
Distribution	1,325,516,741	1.65%	21,933,639	1.52%	20,155,337	-0.13%	(1,778,302)
General	178,027,566	8.45%	15,044,987	8.37%	14,904,289	-0.08%	(140,698)
Total	$ 1,660,634,199	2.42%	$ 40,160,937	2.24%	$ 37,251,661	-0.18%	**$ (2,909,276)**

*See Exhibit DJG-3 for detailed calculations

Detailed Rate Comparison

		[1]	[2]				[3]				[4]	
			WGL Proposal				OPC Proposal				Difference	
Account		Original	Iowa Curve			Annual	Iowa Curve			Annual		Annual
No.	Description	Cost	Type	AL	Rate	Accrual	Type	AL	Rate	Accrual	Rate	Accrual
	Storage and Processing Plant											
361.00	Structures and Improvements											
	Maryland (Rockville)	1,886,241	R3	45	2.92%	55,079	R1.5	59	1.50%	28,359	-1.42%	(26,720)
	Virginia (Ravensworth)	2,003,416	R4	45	2.75%	55,094	R4	45	2.31%	46,276	-0.44%	(8,818)
	Total 361	3,889,657			2.83%	110,173			1.92%	74,635	-0.91%	(35,538)
362.00	Gas Holders											
	Maryland (Rockville)	10,672,934	R3	45	2.43%	259,352	R1.5	57	0.89%	95,111	-1.54%	(164,241)
	Virginia (Ravensworth)	8,680,614	R4	45	2.01%	174,480	R4	45	1.24%	107,421	-0.77%	(67,059)
	Total 362	19,353,548			2.24%	433,832			1.05%	202,532	-1.20%	(231,300)
363.50	Other Equipment											
	Maryland (Rockville)	1,267,224	L1.5	15	8.89%	112,656	L2	19	6.75%	85,565	-2.14%	(27,091)
	Virginia (Ravensworth)	476,424	L0	35	0.72%	3,430	L0	35	0.72%	3,418	0.00%	(12)
	Total 363.5	1,743,648			6.66%	116,086			5.10%	88,984	-1.55%	(27,102)
	Total Storage and Processing Plant	24,986,853			2.64%	660,091			1.47%	366,150	-1.18%	(293,941)
	Transmission Plant											
365.20	Rights of Way	3,189,490	R3	60	1.18%	37,636	R3	60	1.44%	45,861	0.26%	8,225
366.00	Meas. and Reg. Station Structures	2,570,608	S4	43	1.44%	37,017	S4	43	1.69%	43,378	0.25%	6,361
367.10	Mains - Steel	43,066,433	R3	60	1.78%	766,583	R3	60	1.28%	550,839	-0.50%	(215,744)
369.00	Measuring and Regulating Equipment	20,862,592	R2	45	2.14%	446,460	R2	45	1.62%	337,111	-0.52%	(109,349)
365.20	Rights of Way											
	District	1,317	R3	60	1.94%	25	R3	60	1.50%	20	-0.44%	(5)
	Maryland	2,249,875	R3	60	1.69%	38,023	R3	60	1.50%	33,786	-0.19%	(4,237)
	Virginia	1,123,330	R3	60	1.36%	15,277	R3	60	1.50%	16,869	0.14%	1,592
	Total 365.20	3,374,522			1.58%	53,325			1.50%	50,674	-0.08%	(2,651)
366.00	Meas. and Reg. Station Structures											
	Maryland	1,112,281	S4	43	0.97%	10,789	S4	43	1.59%	17,702	0.62%	6,913
	Virginia	1,527,602	R3	50	1.59%	24,289	R3	50	1.10%	16,759	-0.49%	(7,530)
	Total 366	2,639,883			1.33%	35,078			1.31%	34,462	-0.02%	(616)
367.10	Mains - Steel											
	District	3,069,761	R3	80	-0.61%	(18,725)	R3	80	1.04%	31,857	1.65%	50,582
	Maryland	19,949,662	R3	60	2.95%	588,515	R3	60	1.32%	262,354	-1.63%	(326,161)
	Virginia	13,772,852	R4	60	1.57%	216,234	R4	60	1.23%	169,775	-0.34%	(46,459)

Detailed Rate Comparison

		[1]	[2]				[3]				[4]	
			WGL Proposal				OPC Proposal				Difference	
Account No.	Description	Original Cost	Iowa Curve Type	Iowa Curve AL	Rate	Annual Accrual	Iowa Curve Type	Iowa Curve AL	Rate	Annual Accrual	Rate	Annual Accrual
	Total 367.1	36,792,275			2.14%	786,024			1.26%	463,986	-0.88%	(322,038)
369.00	Measuring and Regulating Equipment											
	District	208,257	S3	50	4.52%	9,414	S3	50	1.45%	3,021	-3.07%	(6,393)
	Maryland	13,542,511	R2	45	1.85%	250,537	R2	45	1.69%	229,210	-0.16%	(21,327)
	Virginia	5,856,468	L0.5	60	1.71%	100,146	L0.5	60	1.15%	67,343	-0.56%	(32,803)
	Total 369	19,607,236			1.84%	360,097			1.53%	299,574	-0.31%	(60,523)
	Total Transmission Plant	132,103,039			1.91%	2,522,220			1.38%	1,825,885	-0.53%	(696,335)
	Distribution											
376.10	Mains - Steel	118,085,805	R4	80	1.04%	1,228,092	R4	80	0.60%	710,036	-0.44%	(518,056)
376.20	Mains - Plastic	503,756,309	R4	60	1.56%	7,858,599	R4	60	1.61%	8,120,574	0.05%	261,975
376.30	Mains - Cast Iron	184,186	S1.5	75	0.78%	1,437	S1.5	75	0.02%	43	-0.76%	(1,394)
376.40	Mains - Copper	1,217	S2	55	0.74%	9	S2	55	45.02%	548	44.28%	539
378.00	Measuring and Regulating Equipment	2,458,934	L1.5	65	1.47%	36,147	L1.5	65	0.32%	7,936	-1.15%	(28,211)
380.10	Services - Steel	30,293,195	R2.5	60	1.56%	472,574	R2.5	60	1.67%	507,278	0.11%	34,704
380.20	Services - Plastic	516,033,612	S3	55	1.78%	9,185,398	L3	65	1.34%	6,927,729	-0.44%	(2,257,669)
380.30	Services - Copper	5,759,781	R3	60	0.92%	52,990	R3	60	0.30%	17,448	-0.62%	(35,542)
381.10	Meters - Tin Case	22,726	S2	30	-9.96%	(2,264)	S2	30	100.00%	22,726	109.96%	24,990
381.20	Meters - Hard Case	42,366,087	S1.5	25	3.40%	1,440,447	S1.5	25	4.95%	2,096,999	1.55%	656,552
381.30	Meters - Electronic Devices	2,833,651	L3	20	3.65%	103,428	L3	20	6.79%	192,281	3.14%	88,853
381.50	Meters - Electronic Demand Recorders	637,812	L3	20	1.15%	7,335	L3	20	9.51%	60,657	8.36%	53,322
382.00	Meter Installations	82,030,807	S4	65	1.41%	1,156,634	S4	65	1.34%	1,098,459	-0.07%	(58,175)
383.00	House Regulators	12,837,377	S4	58	1.75%	224,654	S4	58	1.79%	230,090	0.04%	5,436
384.00	House Regulator Installations	5,884,240	S2	50	1.58%	92,971	S2	50	2.23%	131,282	0.65%	38,311
387.00	Other Equipment	1,757,936	L1	50	3.15%	55,375	L1	50	0.70%	12,269	-2.45%	(43,106)
378.00	Measuring and Regulating Equipment											
	District	-										
	Maryland	463,347	L1.5	65	3.04%	14,086	L1.5	65	2.92%	13,523	-0.12%	(563)
	Virginia	109,719	L0	35	5.22%	5,727	L0	35	4.97%	5,458	-0.25%	(269)
	Total 378	573,066			3.46%	19,813			3.31%	18,982	-0.15%	(831)
	Total Distribution Plant	1,325,516,741			1.65%	21,933,639			1.52%	20,155,337	-0.13%	(1,778,302)

Detailed Rate Comparison

		[1]	[2]				[3]				[4]	
			WGL Proposal				OPC Proposal				Difference	
Account No.	Description	Original Cost	Iowa Curve Type	AL	Rate	Annual Accrual	Iowa Curve Type	AL	Rate	Annual Accrual	Rate	Annual Accrual
	General Plant											
390.00	Structures and Improvements											
	District	682,963	S4	40	4.07%	27,796	S4	40	2.95%	20,119	-1.12%	(7,677)
	Maryland	7,436,121	R2.5	45	2.15%	159,876	S0	58	1.73%	128,479	-0.42%	(31,397)
	Virginia	37,596,541	R2	50	2.11%	793,287	R2	50	1.84%	691,663	-0.27%	(101,624)
	Total 390	45,715,625			2.15%	980,959			1.84%	840,261	-0.31%	(140,698)
	Ordered Amortization					359,097				359,097	0.00%	-
303.05	Software - 5 year	37,386,415	SQ	5	18.38%	6,873,209	SQ	5	18.38%	6,873,209	0.00%	-
303.10	Software - 10 year	17,304,296	SQ	10	8.14%	1,408,037	SQ	10	8.14%	1,408,037	0.00%	-
391.11	Office Furniture and Equipment	5,993,725	SQ	20	4.98%	298,715	SQ	20	4.98%	298,715	0.00%	-
391.21	Computer Equipment	10,782,113	SQ	7	13.96%	1,505,301	SQ	7	13.96%	1,505,301	0.00%	-
393.00	Stores Equipment	227,878	SQ	20	5.00%	11,394	SQ	20	5.00%	11,394	0.00%	-
394.00	Tools, Shop & Garage Equipment	6,883,518	SQ	20	4.88%	336,027	SQ	20	4.88%	336,027	0.00%	-
395.00	Laboratory Equipment	119,383	SQ	20	4.70%	5,615	SQ	20	4.70%	5,615	0.00%	-
397.10	Communication Equipment - Telephones	23,098,732	SQ	15	6.38%	1,473,525	SQ	15	6.38%	1,473,525	0.00%	-
397.20	ENSCAN Equipment	28,339,379	SQ	17	5.84%	1,655,925	SQ	17	5.84%	1,655,925	0.00%	-
397.30	TRACE - AMR Devices	1,009,471	SQ	17	5.88%	59,381	SQ	17	5.88%	59,381	0.00%	-
398.00	Miscellaneous Equipment	1,167,031	SQ	15	6.67%	77,802	SQ	15	6.67%	77,802	0.00%	-
	Total General Plant	178,027,566			8.45%	15,044,987			8.37%	14,904,289	-0.08%	(140,698)
	TOTAL PLANT STUDIED	**1,660,634,199**			**2.42%**	**40,160,937**			**2.24%**	**37,251,661**	**-0.18%**	**(2,909,276)**

[1] From Company depreciation study; plant balances as of the study date
[2] From Company depreciation study
[3] From Exhibits DJG-4 and DJG-5
[4] = [3] - [2]

Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Investment Accrual	[2] Investment Rate	[3] Net Salvage Accrual	[3] Net Salvage Rate	[4] Total Accrual	[4] Total Rate
	Storage and Processing Plant							
361.00	Structures and Improvements							
	Maryland (Rockville)	1,886,241	26,146	1.39%	2,213	0.12%	28,359	**1.50%**
	Virginia (Ravensworth)	2,003,416	42,262	2.11%	4,014	0.20%	46,276	**2.31%**
	Total 361	3,889,657	68,407	1.76%	6,228	0.16%	74,635	**1.92%**
362.00	Gas Holders							
	Maryland (Rockville)	10,672,934	69,430	0.65%	25,681	0.24%	95,111	**0.89%**
	Virginia (Ravensworth)	8,680,614	81,869	0.94%	25,552	0.29%	107,421	**1.24%**
	Total 362	19,353,548	151,298	0.78%	51,233	0.26%	202,532	**1.05%**
363.50	Other Equipment							
	Maryland (Rockville)	1,267,224	85,565	6.75%	-	0.00%	85,565	**6.75%**
	Virginia (Ravensworth)	476,424	3,418	0.72%	-	0.00%	3,418	**0.72%**
	Total 363.5	1,743,648	88,984	5.10%	-	0.00%	88,984	**5.10%**
	Total Storage and Processing Plant	24,986,853	308,689	1.24%	57,461	0.23%	366,150	**1.47%**
	Transmission Plant							
365.20	Rights of Way	3,189,490	45,861	1.44%	-	0.00%	45,861	**1.44%**
366.00	Meas. and Reg. Station Structures	2,570,608	43,378	1.69%	-	0.00%	43,378	**1.69%**
367.10	Mains - Steel	43,066,433	536,151	1.24%	14,688	0.03%	550,839	**1.28%**
369.00	Measuring and Regulating Equipment	20,862,592	302,028	1.45%	35,084	0.17%	337,111	**1.62%**
365.20	Rights of Way							
	District	1,317	20	1.50%	-	0.00%	20	**1.50%**
	Maryland	2,249,875	33,786	1.50%	-	0.00%	33,786	**1.50%**
	Virginia	1,123,330	16,869	1.50%	-	0.00%	16,869	**1.50%**
	Total 365.20	3,374,522	50,674	1.50%	-	0.00%	50,674	**1.50%**
366.00	Meas. and Reg. Station Structures							
	Maryland	1,112,281	17,702	1.59%	-	0.00%	17,702	**1.59%**
	Virginia	1,527,602	15,971	1.05%	788	0.05%	16,759	**1.10%**
	Total 366	2,639,883	33,673	1.28%	788	0.03%	34,462	**1.31%**
367.10	Mains - Steel							

Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Investment Accrual	[2] Investment Rate	[3] Net Salvage Accrual	[3] Net Salvage Rate	[4] Total Accrual	[4] Total Rate
	District	3,069,761	31,192	1.02%	665	0.02%	31,857	**1.04%**
	Maryland	19,949,662	255,550	1.28%	6,804	0.03%	262,354	**1.32%**
	Virginia	13,772,852	164,092	1.19%	5,684	0.04%	169,775	**1.23%**
	Total 367.1	36,792,275	450,834	1.23%	13,152	0.04%	463,986	**1.26%**
369.00	Measuring and Regulating Equipment							
	District	208,257	2,864	1.38%	157	0.08%	3,021	**1.45%**
	Maryland	13,542,511	206,436	1.52%	22,774	0.17%	229,210	**1.69%**
	Virginia	5,856,468	63,281	1.08%	4,062	0.07%	67,343	**1.15%**
	Total 369	19,607,236	272,581	1.39%	26,993	0.14%	299,574	**1.53%**
	Total Transmission Plant	132,103,039	1,735,180	1.31%	90,704	0.07%	1,825,885	**1.38%**
	Distribution							
376.10	Mains - Steel	118,085,805	701,973	0.59%	8,063	0.01%	710,036	**0.60%**
376.20	Mains - Plastic	503,756,309	8,087,058	1.61%	33,515	0.01%	8,120,574	**1.61%**
376.30	Mains - Cast Iron	184,186	0	0.00%	43	0.02%	43	**0.02%**
376.40	Mains - Copper	1,217	547	44.98%	1	0.05%	548	**45.02%**
378.00	Measuring and Regulating Equipment	2,458,934	7,076	0.29%	860	0.03%	7,936	**0.32%**
380.10	Services - Steel	30,293,195	480,829	1.59%	26,449	0.09%	507,278	**1.67%**
380.20	Services - Plastic	516,033,612	6,773,369	1.31%	154,360	0.03%	6,927,729	**1.34%**
380.30	Services - Copper	5,759,781	0	0.00%	17,448	0.30%	17,448	**0.30%**
381.10	Meters - Tin Case	22,726	22,726	100.00%	-	0.00%	22,726	**100.00%**
381.20	Meters - Hard Case	42,366,087	2,096,999	4.95%	-	0.00%	2,096,999	**4.95%**
381.30	Meters - Electronic Devices	2,833,651	192,281	6.79%	-	0.00%	192,281	**6.79%**
381.50	Meters - Electronic Demand Recorders	637,812	60,650	9.51%	6	0.00%	60,657	**9.51%**
382.00	Meter Installations	82,030,807	1,098,459	1.34%	-	0.00%	1,098,459	**1.34%**
383.00	House Regulators	12,837,377	214,219	1.67%	15,872	0.12%	230,090	**1.79%**
384.00	House Regulator Installations	5,884,240	131,269	2.23%	13	0.00%	131,282	**2.23%**
387.00	Other Equipment	1,757,936	0	0.00%	12,269	0.70%	12,269	**0.70%**
378.00	Measuring and Regulating Equipment							
	District							
	Maryland	463,347	13,361	2.88%	162	0.03%	13,523	**2.92%**
	Virginia	109,719	5,305	4.83%	154	0.14%	5,458	**4.97%**
	Total 378	573,066	18,666	3.26%	316	0.06%	18,982	**3.31%**
	Total Distribution Plant	1,325,516,741	19,886,121	1.50%	269,216	0.02%	20,155,337	**1.52%**

Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Investment Accrual	[2] Investment Rate	[3] Net Salvage Accrual	[3] Net Salvage Rate	[4] Total Accrual	[4] Total Rate
	General Plant							
390.00	Structures and Improvements							
	District	682,963	19,360	2.83%	760	0.11%	20,119	**2.95%**
	Maryland	7,436,121	126,396	1.70%	2,083	0.03%	128,479	**1.73%**
	Virginia	37,596,541	677,943	1.80%	13,720	0.04%	691,663	**1.84%**
	Total 378	45,715,625	823,698	1.80%	16,563	0.04%	840,261	**1.84%**
	Ordered Amortization		359,097				359,097	
303.05	Software - 5 year	37,386,415	6,873,209	18.38%	-	0.00%	6,873,209	**18.38%**
303.10	Software - 10 year	17,304,296	1,408,037	8.14%	-	0.00%	1,408,037	**8.14%**
391.11	Office Furniture and Equipment	5,993,725	298,715	4.98%	-	0.00%	298,715	**4.98%**
391.21	Computer Equipment	10,782,113	1,505,301	13.96%	-	0.00%	1,505,301	**13.96%**
393.00	Stores Equipment	227,878	11,394	5.00%	-	0.00%	11,394	**5.00%**
394.00	Tools, Shop & Garage Equipment	6,883,518	336,027	4.88%	-	0.00%	336,027	**4.88%**
395.00	Laboratory Equipment	119,383	5,615	4.70%	-	0.00%	5,615	**4.70%**
397.10	Communication Equipment - Telephones	23,098,732	1,473,525	6.38%	-	0.00%	1,473,525	**6.38%**
397.20	ENSCAN Equipment	28,339,379	1,655,925	5.84%	-	0.00%	1,655,925	**5.84%**
397.30	TRACE - AMR Devices	1,009,471	59,381	5.88%	-	0.00%	59,381	**5.88%**
398.00	Miscellaneous Equipment	1,167,031	77,802	6.67%	-	0.00%	77,802	**6.67%**
	Total General Plant	178,027,566	14,887,726	8.36%	16,563	0.01%	14,904,289	**8.37%**
	TOTAL PLANT STUDIED	**1,660,634,199**	**36,817,717**	**2.22%**	**433,944**	**0.03%**	**37,251,661**	**2.24%**

[1] From Company depreciation study; plant balances as of the study date
[2] Plant depreciation accruals and rates from Exhibit DJG-5
[3] Net salvage accruals and rates from Exhibit DJG-6
[4] = [2] + [3]

Plant Depreciation Rate Development

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]
Account No.	Description	Original Cost	Iowa Curve Type	AL	Book Reserve	Net Plant	Allocated Negative Plant	Adjusted Net Plant	Remaining Life	Investment Accrual	Investment Rate
	Storage and Processing Plant										
361.00	Structures and Improvements										
	Maryland (Rockville)	1,886,241	R1.5	59	693,739	1,192,502		1,192,502	45.6	26,146	**1.39%**
	Virginia (Ravensworth)	2,003,416	R4	45	736,835	1,266,581		1,266,581	30.0	42,262	**2.11%**
	Total 361	3,889,657			1,430,574	2,459,083		2,459,083	35.9	68,407	**1.76%**
362.00	Gas Holders										
	Maryland (Rockville)	10,672,934	R1.5	57	8,267,193	2,405,741		2,405,741	34.7	69,430	**0.65%**
	Virginia (Ravensworth)	8,680,614	R4	45	6,723,954	1,956,660		1,956,660	23.9	81,869	**0.94%**
	Total 362	19,353,548			14,991,147	4,362,401		4,362,401	28.8	151,298	**0.78%**
363.50	Other Equipment										
	Maryland (Rockville)	1,267,224	L2	19	-	1,267,224		1,267,224	14.8	85,565	**6.75%**
	Virginia (Ravensworth)	476,424	L0	35	366,801	109,623		109,623	32.1	3,418	**0.72%**
	Total 363.5	1,743,648			366,801	1,376,847		1,376,847	15.5	88,984	**5.10%**
	Total Storage and Processing Plant	24,986,853			16,788,522	8,198,331		8,198,331	26.6	308,689	**1.24%**
	Transmission Plant										
365.20	Rights of Way	3,189,490	R3	60	1,316,998	1,872,492		1,872,492	40.8	45,861	**1.44%**
366.00	Meas. and Reg. Station Structures	2,570,608	S4	43	1,431,930	1,138,678		1,138,678	26.3	43,378	**1.69%**
367.10	Mains - Steel	43,066,433	R3	60	18,816,317	24,250,116		24,250,116	45.2	536,151	**1.24%**
369.00	Measuring and Regulating Equipment	20,862,592	R2	45	9,847,648	11,014,944		11,014,944	36.5	302,028	**1.45%**
365.20	Rights of Way										
	District	1,317	R3	60	510	807		807	40.8	20	**1.50%**
	Maryland	2,249,875	R3	60	870,408	1,379,467		1,379,467	40.8	33,786	**1.50%**
	Virginia	1,123,330	R3	60	434,582	688,748		688,748	40.8	16,869	**1.50%**
	Total 365.20	3,374,522			1,305,500	2,069,022		2,069,022	40.8	50,674	**1.50%**
366.00	Meas. and Reg. Station Structures										
	Maryland	1,112,281	S4	43	647,592	464,689		464,689	26.3	17,702	**1.59%**
	Virginia	1,527,602	R3	50	889,401	638,201		638,201	40.0	15,971	**1.05%**
	Total 366	2,639,883			1,536,993	1,102,890		1,102,890	32.8	33,673	**1.28%**
367.10	Mains - Steel										
	District	3,069,761	R3	80	1,291,188	1,778,573		1,778,573	57.0	31,192	**1.02%**
	Maryland	19,949,662	R3	60	8,391,127	11,558,535		11,558,535	45.2	255,550	**1.28%**
	Virginia	13,772,852	R4	60	5,793,068	7,979,784		7,979,784	48.6	164,092	**1.19%**
	Total 367.1	36,792,275			15,475,383	21,316,892		21,316,892	47.3	450,834	**1.23%**

Plant Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Iowa Curve Type	AL	[3] Book Reserve	[4] Net Plant	[5] Allocated Negative Plant	[6] Adjusted Net Plant	[7] Remaining Life	[8] Investment Accrual	[9] Investment Rate
369.00	Measuring and Regulating Equipment										
	District	208,257	S3	50	92,480	115,777		115,777	40.4	2,864	**1.38%**
	Maryland	13,542,511	R2	45	6,013,790	7,528,721		7,528,721	36.5	206,436	**1.52%**
	Virginia	5,856,468	L0.5	60	2,600,668	3,255,800		3,255,800	51.5	63,281	**1.08%**
	Total 369	19,607,236			8,706,938	10,900,298		10,900,298	40.0	272,581	**1.39%**
	Total Transmission Plant	132,103,039			58,437,707	73,665,332		73,665,332	42.5	1,735,180	**1.31%**
	Distribution										
376.10	Mains - Steel	118,085,805	R4	80	86,947,673	31,138,132	68,813	31,069,319	44.3	701,973	**0.59%**
376.20	Mains - Plastic	503,756,309	R4	60	133,926,544	369,829,765	817,291	369,012,474	45.6	8,087,058	**1.61%**
376.30	Mains - Cast Iron	184,186	S1.5	75	360,397	(176,211)			26.2		**0.00%**
376.40	Mains - Copper	1,217	S2	55	(7,593)	8,810	19	8,791	16.1	547	**44.98%**
378.00	Measuring and Regulating Equipment	2,458,934	L1.5	65	2,143,856	315,078	696	314,382	44.4	7,076	**0.29%**
380.10	Services - Steel	30,293,195	R2.5	60	13,508,820	16,784,375	37,092	16,747,283	34.8	480,829	**1.59%**
380.20	Services - Plastic	516,033,612	L3	65	170,573,438	345,460,174	763,436	344,696,738	50.9	6,773,369	**1.31%**
380.30	Services - Copper	5,759,781	R3	60	7,437,814	(1,678,033)			16.4		**0.00%**
381.10	Meters - Tin Case	22,726	S2	30	(154,755)	177,481	392	177,089	1.7	22,726	**100.00%**
381.20	Meters - Hard Case	42,366,087	S1.5	25	10,946,517	31,419,570	69,434	31,350,136	15.0	2,096,999	**4.95%**
381.30	Meters - Electronic Devices	2,833,651	L3	20	906,586	1,927,065	4,259	1,922,806	10.0	192,281	**6.79%**
381.50	Meters - Electronic Demand Recorders	637,812	L3	20	300,458	337,354	746	336,608	5.6	60,650	**9.51%**
382.00	Meter Installations	82,030,807	S4	65	29,683,405	52,347,402	115,683	52,231,719	47.6	1,098,459	**1.34%**
383.00	House Regulators	12,837,377	S4	58	4,329,095	8,508,282	18,803	8,489,479	39.6	214,219	**1.67%**
384.00	House Regulator Installations	5,884,240	S2	50	2,372,906	3,511,334	7,760	3,503,574	26.7	131,269	**2.23%**
387.00	Other Equipment	1,757,936	L1	50	1,809,742	(51,806)			32.5		**0.00%**
378.00	Measuring and Regulating Equipment										
	District										
	Maryland	463,347	L1.5	65	(131,606)	594,953	1,315	593,638	44.4	13,361	**2.88%**
	Virginia	109,719	L0	35	(31,164)	140,883	311	140,572	26.5	5,305	**4.83%**
	Total 378	573,066			(162,770)	735,836	1,626	734,210	39.3	18,666	**3.26%**
	Total Distribution Plant	1,325,516,741			464,922,133	860,594,608	1,906,050	860,594,608	43.3	19,886,121	**1.50%**
	Negative Net Plant					(1,906,050)					
	General Plant										
390.00	Structures and Improvements										
	District	682,963	S4	40	118,433	564,530		564,530	29.2	19,360	**2.83%**
	Maryland	7,436,121	S0	58	1,289,502	6,146,619		6,146,619	48.6	126,396	**1.70%**
	Virginia	37,596,541	R2	50	6,519,638	31,076,903		31,076,903	45.8	677,943	**1.80%**
	Total 378	45,715,625			7,927,573	37,788,052		37,788,052	45.9	823,698	**1.80%**
	Ordered Amortization				(15,602,776)					359,097	

Plant Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Iowa Curve Type	AL	[3] Book Reserve	[4] Net Plant	[5] Allocated Negative Plant	[6] Adjusted Net Plant	[7] Remaining Life	[8] Investment Accrual	[9] Investment Rate
303.05	Software - 5 year	37,386,415	SQ	5	7,244,702				2.6	6,873,209	**18.38%**
303.10	Software - 10 year	17,304,296	SQ	10	15,396,450				1.8	1,408,037	**8.14%**
391.11	Office Furniture and Equipment	5,993,725	SQ	20	2,565,234				11.4	298,715	**4.98%**
391.21	Computer Equipment	10,782,113	SQ	7	5,553,886				3.4	1,505,301	**13.96%**
393.00	Stores Equipment	227,878	SQ	20	124,507				8.7	11,394	**5.00%**
394.00	Tools, Shop & Garage Equipment	6,883,518	SQ	20	2,704,079				11.9	336,027	**4.88%**
395.00	Laboratory Equipment	119,383	SQ	20	78,702				6.5	5,615	**4.70%**
397.10	Communication Equipment - Telephones	23,098,732	SQ	15	8,787,300				9.2	1,473,525	**6.38%**
397.20	ENSCAN Equipment	28,339,379	SQ	17	10,304,625				8.4	1,655,925	**5.84%**
397.30	TRACE - AMR Devices	1,009,471	SQ	17	653,727				4.4	59,381	**5.88%**
398.00	Miscellaneous Equipment	1,167,031	SQ	15	(286,618)				10.1	77,802	**6.67%**
	Total General Plant	178,027,566			45,451,391	116,973,399		37,788,052	2.5	14,887,726	**8.36%**
	TOTAL PLANT STUDIED	**1,660,634,199**			**585,599,753**	**1,075,034,446**		**1,075,034,446**	**29.2**	**36,817,717**	**2.22%**

[1] From Company depreciation study; plant balances as of the study date
[2] Selected Iowa curve type and average life through mathematical and visual curve fitting-techniques and professional judgement.
[3] Book reserve (aka accumulated provision for deprecaition) from deprecaition study
[4] = [1] - [3]
[5] = -(total negative plant by function) * ([4] / (total of [4] by plant function - total negative plant by function)
[6] = [4] - [5]
[7] Average remaining life based on Iowas Curve in Column [2]; see Exhibit DJG-13
[8] = [6] / [7]
[9] = [8] / [1]

Net Salvage Rate Development

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Account No.	**Description**	**Original Cost**	**Future Net Salvage**	**Removal Cost Recoverable**	**Average Live**	**Discounted Removal Cost**	**Depreciated Removal Cost**	**Remaining Life**	**Increment Factor**	**Increment in Removal Cost**	**SFAS 143 Charges**	**SFAS 143 COR Rate**
	Storage and Processing Plant											
361.00	Structures and Improvements											
	Maryland (Rockville)	1,886,241	-35.0%	660,184	59	11,223	190	45.6	0.00306	2,023	2,213	0.117%
	Virginia (Ravensworth)	2,003,416	-20.0%	400,683	45	17,912	398	30.0	0.00902	3,616	4,014	0.200%
	Total 361	3,889,657	-27.3%	1,060,868		29,136	588	35.9		5,639	6,228	0.160%
362.00	Gas Holders											
	Maryland (Rockville)	10,672,934	-35.0%	3,735,527	57	72,912	1,279	34.7	0.00653	24,402	25,681	0.241%
	Virginia (Ravensworth)	8,680,614	-20.0%	1,736,123	45	77,613	1,725	23.9	0.01372	23,827	25,552	0.294%
	Total 362	19,353,548	-28.3%	5,471,650		150,524	3,004	28.8		48,229	51,233	0.265%
363.50	Other Equipment											
	Maryland (Rockville)	1,267,224	0.0%	-	19	-	-	14.8	0.02571	-	-	0.000%
	Virginia (Ravensworth)	476,424	0.0%	-	35	-	-	32.1	0.00781	-	-	0.000%
	Total 363.5	1,743,648	0.0%	-		-	-	15.5		-	-	0.000%
	Total Storage and Processing Plant	24,986,853	-26.1%	6,532,517		179,660	3,592	26.6		53,869	57,461	0.230%
	Transmission Plant											
365.20	Rights of Way	3,189,490	0.0%	-	60	-	-	40.8	0.00426	-	-	0.000%
366.00	Meas. and Reg. Station Structures	2,570,608	0.0%	-	43	-	-	26.3	0.01167	-	-	0.000%
367.10	Mains - Steel	43,066,433	-10.0%	4,306,643	60	68,330	1,139	45.2	0.00315	13,549	14,688	0.034%
369.00	Measuring and Regulating Equipment	20,862,592	-25.0%	5,215,648	45	228,225	5,037	36.5	0.00576	30,047	35,084	0.168%
365.20	Rights of Way										-	
	District	1,317	0.0%	-	60	-	-	40.8	0.00426	-	-	0.000%
	Maryland	2,249,875	0.0%	-	60	-	-	40.8	0.00426	-	-	0.000%
	Virginia	1,123,330	0.0%	-	60	-	-	40.8	0.00426	-	-	0.000%
	Total 365.20	3,374,522	0.0%	-		-	-	40.8		-	-	0.000%
366.00	Meas. and Reg. Station Structures											
	Maryland	1,112,281	0.0%	-	43	-	-	26.3	0.01167	-	-	0.000%
	Virginia	1,527,602	-10.0%	152,760	50	4,835	97	40.0	0.00453	692	788	0.052%
	Total 366	2,639,883	-5.8%	152,760		4,835	97	32.8		692	788	0.030%
367.10	Mains - Steel											
	District	3,069,761	-15.0%	460,464	80	1,836	23	57.0	0.00139	642	665	0.022%
	Maryland	19,949,662	-10.0%	1,994,966	60	31,652	528	45.2	0.00315	6,276	6,804	0.034%
	Virginia	13,772,852	-15.0%	2,065,928	60	32,688	544	48.6	0.00249	5,139	5,684	0.041%
	Total 367.1	36,792,275	-12.3%	4,521,358		66,176	1,095	47.3		12,057	13,152	0.036%
369.00	Measuring and Regulating Equipment											
	District	208,257	-15.0%	31,239	50	989	20	40.4	0.00439	137	157	0.075%

Net Salvage Rate Development

Account No.	Description	[1] Original Cost	[2] Future Net Salvage	[3] Removal Cost Recoverable	[4] Average Live	[5] Discounted Removal Cost	[6] Depreciated Removal Cost	[7] Remaining Life	[8] Increment Factor	[9] Increment in Removal Cost	[10] SFAS 143 Charges	[11] SFAS 143 COR Rate
	Maryland	13,542,511	-25.0%	3,385,628	45	148,147	3,270	36.5	0.00576	19,504	22,774	0.168%
	Virginia	5,856,468	-30.0%	1,756,940	60	27,876	465	51.5	0.00205	3,597	4,062	0.069%
	Total 369	19,607,236	-26.4%	5,173,807		177,012	3,754	40.0		23,239	26,993	0.138%
	Total Transmission Plant	132,103,039	-14.7%	19,370,216		544,577	11,121	42.5		79,583	90,704	0.069%
	Distribution											
376.10	Mains - Steel	118,085,805	-2.0%	2,361,716	80	9,468	118	44.3	0.00336	7,945	8,063	0.007%
376.20	Mains - Plastic	503,756,309	-2.0%	10,075,126	60	160,738	2,683	45.6	0.00306	30,833	33,515	0.007%
376.30	Mains - Cast Iron	184,186	-2.0%	3,684	75	21	0	26.2	0.01168	43	43	0.024%
376.40	Mains - Copper	1,217	-2.0%	24	55	1	0	16.1	0.02358	1	1	0.048%
378.00	Measuring and Regulating Equipment	2,458,934	-10.0%	245,893	65	2,762	42	44.4	0.00332	818	860	0.035%
380.10	Services - Steel	30,293,195	-13.0%	3,938,115	60	62,482	1,041	34.8	0.00645	25,408	26,449	0.087%
380.20	Services - Plastic	516,033,612	-13.0%	67,084,370	65	753,581	11,594	50.9	0.00213	142,766	154,360	0.030%
380.30	Services - Copper	5,759,781	-13.0%	748,772	60	11,880	198	16.4	0.02304	17,250	17,448	0.303%
381.10	Meters - Tin Case	22,726	0.0%	-	30	-	-	1.7	0.06380	-	-	0.000%
381.20	Meters - Hard Case	42,366,087	0.0%	-	25	-	-	15.0	0.02546	-	-	0.000%
381.30	Meters - Electronic Devices	2,833,651	0.0%	-	20	-	-	10.0	0.03584	-	-	0.000%
381.50	Meters - Electronic Demand Recorders	637,812	0.0%	105	20	26	1	5.6	0.04874	5	6	0.001%
382.00	Meter Installations	82,030,807	0.0%	-	65	-	-	47.6	0.00268	-	-	0.000%
383.00	House Regulators	12,837,377	-25.0%	3,209,344	58	58,462	1,008	39.6	0.00463	14,864	15,872	0.124%
384.00	House Regulator Installations	5,884,240	0.0%	1,106	50	35	1	26.7	0.01132	13	13	0.000%
387.00	Other Equipment	1,757,936	-85.0%	1,494,246	50	47,295	946	32.5	0.00758	11,324	12,269	0.698%
378.00	Measuring and Regulating Equipment										-	
	District										-	
	Maryland	463,347	-10.0%	46,335	65	520	8	44.4	0.00332	154	162	0.035%
	Virginia	109,719	-10.0%	10,972	35	978	28	26.5	0.01147	126	154	0.140%
	Total 378	573,066	-10.0%	57,307		1,499	36	39.3		280	316	0.055%
	Total Distribution Plant	1,325,516,741	-6.7%	89,219,808		1,108,250	17,669	43.3		251,548	269,216	0.020%
	General Plant											
390.00	Structures and Improvements											
	District	682,963	-10.0%	68,296	40	4,312	108	29.2	0.00954	652	760	0.111%
	Maryland	7,436,121	-10.0%	743,612	58	13,546	234	48.6	0.00249	1,850	2,083	0.028%
	Virginia	37,596,541	-10.0%	3,759,654	50	118,998	2,380	45.8	0.00302	11,340	13,720	0.036%
	Total 378	45,715,625	-10.0%	4,571,563		136,856	2,721	45.9		13,842	16,563	0.036%
	Ordered Amortization											
303.05	Software - 5 year	37,386,415	0.0%	-	5	-	-	2.6	0.05987	-	-	0.000%
303.10	Software - 10 year	17,304,296	0.0%	-	10	-	-	1.8	0.06332	-	-	0.000%

Net Salvage Rate Development

Account No.	Description	[1] Original Cost	[2] Future Net Salvage	[3] Removal Cost Recoverable	[4] Average Live	[5] Discounted Removal Cost	[6] Depreciated Removal Cost	[7] Remaining Life	[8] Increment Factor	[9] Increment in Removal Cost	[10] SFAS 143 Charges	[11] SFAS 143 COR Rate
391.11	Office Furniture and Equipment	5,993,725	0.0%	-	20	-	-	11.4	0.03261	-	-	0.000%
391.21	Computer Equipment	10,782,113	0.0%	-	7	-	-	3.4	0.05673	-	-	0.000%
393.00	Stores Equipment	227,878	0.0%	-	20	-	-	8.7	0.03924	-	-	0.000%
394.00	Tools, Shop & Garage Equipment	6,883,518	0.0%	-	20	-	-	11.9	0.03150	-	-	0.000%
395.00	Laboratory Equipment	119,383	0.0%	-	20	-	-	6.5	0.04574	-	-	0.000%
397.10	Communication Equipment - Telephones	23,098,732	0.0%	-	15	-	-	9.2	0.03780	-	-	0.000%
397.20	ENSCAN Equipment	28,339,379	0.0%	-	17	-	-	8.4	0.04008	-	-	0.000%
397.30	TRACE - AMR Devices	1,009,471	0.0%	-	17	-	-	4.4	0.05280	-	-	0.000%
398.00	Miscellaneous Equipment	1,167,031	0.0%	-	15	-	-	10.1	0.03569	-	-	0.000%
	Total General Plant	178,027,566	-2.6%	4,571,563		136,856	2,721			13,842	16,563	0.009%
	TOTAL PLANT STUDIED	**1,660,634,199**	**-7.2%**	**119,694,104**		**1,969,343**	**35,103**			**398,841**	**433,944**	**0.026%**
	Discount Rate	**7.15%**	[12]									

[1] From Company depreciation study; plant balances as of the study date
[2] Future net salvage estimates from depreciation study
[3] = [1]*[2]*-1
[4] Average life estimate from Exhibit DJG-5
[5] = [3] / (1+[12])^[4]
[6] = [5] / [4]
[7] Remaining life estimate from Exhibit DJG-5
[8] = (1/(1+[12])^([7]-1)) - (1/(1+[12]^[7]))
[9] = [3]*[8]
[10] = [6] + [9]
[11] = [10] / [1]
[12] = Company's estimated weighted average cost of capital (see direct testimony and exhibits of OPC witness David C. Parcell)
* Model is based on Present Value Methodology reaffirmed by the Commission in Docket No. 9286

Account 361 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL R3-45	[5] OPC R1.5-59	[6] WGL SSD	[7] OPC SSD
0.0	4,066,470	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	4,053,633	100.00%	99.98%	99.85%	0.0000	0.0000
1.5	4,033,689	100.00%	99.94%	99.54%	0.0000	0.0000
2.5	3,690,811	98.02%	99.90%	99.23%	0.0004	0.0001
3.5	3,398,638	96.68%	99.84%	98.90%	0.0010	0.0005
4.5	3,402,226	96.68%	99.77%	98.56%	0.0010	0.0004
5.5	3,266,910	96.68%	99.69%	98.22%	0.0009	0.0002
6.5	1,794,397	96.61%	99.60%	97.86%	0.0009	0.0002
7.5	1,555,055	96.18%	99.49%	97.49%	0.0011	0.0002
8.5	1,480,225	96.18%	99.37%	97.11%	0.0010	0.0001
9.5	1,440,315	95.82%	99.22%	96.71%	0.0012	0.0001
10.5	1,414,860	95.79%	99.06%	96.31%	0.0011	0.0000
11.5	1,414,860	95.79%	98.87%	95.89%	0.0009	0.0000
12.5	1,223,472	85.90%	98.66%	95.46%	0.0163	0.0091
13.5	1,223,472	85.90%	98.41%	95.02%	0.0157	0.0083
14.5	1,221,754	85.17%	98.14%	94.56%	0.0168	0.0088
15.5	1,299,348	85.17%	97.83%	94.09%	0.0160	0.0080
16.5	1,306,854	85.17%	97.49%	93.61%	0.0152	0.0071
17.5	1,244,304	85.17%	97.10%	93.11%	0.0142	0.0063
18.5	987,036	85.10%	96.68%	92.60%	0.0134	0.0056
19.5	831,993	85.10%	96.20%	92.08%	0.0123	0.0049
20.5	752,360	85.10%	95.68%	91.53%	0.0112	0.0041
21.5	713,427	83.91%	95.10%	90.98%	0.0125	0.0050
22.5	546,500	83.91%	94.47%	90.41%	0.0111	0.0042
23.5	450,213	83.10%	93.77%	89.82%	0.0114	0.0045
24.5	415,174	83.10%	93.01%	89.21%	0.0098	0.0037
25.5	442,777	83.10%	92.18%	88.59%	0.0082	0.0030
26.5	448,823	83.10%	91.28%	87.94%	0.0067	0.0023
27.5	320,768	83.10%	90.30%	87.28%	0.0052	0.0017
28.5	319,612	83.10%	89.23%	86.60%	0.0038	0.0012
29.5	318,552	83.10%	88.08%	85.90%	0.0025	0.0008
30.5	325,657	83.10%	86.84%	85.17%	0.0014	0.0004
31.5	316,583	80.78%	85.49%	84.42%	0.0022	0.0013
32.5	308,390	76.92%	84.04%	83.66%	0.0051	0.0045
33.5	311,107	76.92%	82.47%	82.86%	0.0031	0.0035
34.5	776,532	76.88%	80.79%	82.05%	0.0015	0.0027
35.5	781,190	76.88%	78.98%	81.21%	0.0004	0.0019
36.5	763,439	76.88%	77.04%	80.34%	0.0000	0.0012
37.5	763,439	76.88%	74.95%	79.45%	0.0004	0.0007
38.5	729,759	74.44%	72.73%	78.53%	0.0003	0.0017
39.5	703,727	74.44%	70.36%	77.58%	0.0017	0.0010
40.5	698,529	73.89%	67.84%	76.61%	0.0037	0.0007
41.5	693,229	73.33%	65.17%	75.61%	0.0067	0.0005
42.5	669,416	72.30%	62.36%	74.58%	0.0099	0.0005
43.5	662,709	71.55%	59.40%	73.52%	0.0148	0.0004
44.5	654,008	71.55%	56.32%	72.44%	0.0232	0.0001
45.5	580,934	71.01%	53.13%	71.32%	0.0320	0.0000
46.5	574,170	70.96%	49.83%	70.17%	0.0446	0.0001
47.5	574,302	70.96%	46.47%	69.00%	0.0600	0.0004

Account 361 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**WGL R3-45**	**OPC R1.5-59**	**WGL SSD**	**OPC SSD**
48.5	558,444	70.75%	43.05%	67.79%	0.0767	0.0009
49.5	548,438	69.84%	39.62%	66.56%	0.0913	0.0011
50.5	553,163	69.84%	36.20%	65.29%	0.1132	0.0021
51.5	557,681	69.84%	32.82%	64.00%	0.1371	0.0034
52.5	557,681	69.84%	29.52%	62.68%	0.1626	0.0051
53.5	555,917	69.84%	26.33%	61.33%	0.1893	0.0072
54.5	531,943	69.84%	23.28%	59.96%	0.2168	0.0098
55.5	514,391	69.27%	20.40%	58.56%	0.2389	0.0115
56.5	508,109	69.24%	17.70%	57.13%	0.2656	0.0147
57.5	508,065	69.24%	15.21%	55.68%	0.2920	0.0184
58.5	497,832	68.26%	12.93%	54.20%	0.3062	0.0198
59.5	470,850	68.11%	10.87%	52.71%	0.3276	0.0237
60.5	468,453	68.09%	9.03%	51.19%	0.3488	0.0285
61.5	468,250	68.06%	7.40%	49.66%	0.3679	0.0338
62.5	465,486	67.94%	5.98%	48.12%	0.3840	0.0393
63.5	452,509	67.25%	4.74%	46.55%	0.3907	0.0428
64.5	21,165	66.22%	3.69%	44.98%	0.3910	0.0451
65.5	0	66.22%	2.81%	43.40%	0.4021	0.0521
66.5			2.07%	41.82%		
Sum of Squared Differences				[8]	5.1243	0.4715

[1] Age in years using half-year convention

[2] Dollars exposed to retirement at the beginning of each age interval

[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.

[4] The Company's selected Iowa curve to be fitted to the OLT.

[5] My selected Iowa curve to be fitted to the OLT.

[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.

[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.

[8] = Sum of squared differences excluding less than 1% of beginning exposures or other statistically-relevant cut-off point when applicable

Account 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL R3-45	[5] OPC R1.5-57	[6] WGL SSD	[7] OPC SSD
0.0	16,209,193	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	16,489,801	98.65%	99.98%	99.85%	0.0002	0.0001
1.5	16,337,686	97.57%	99.94%	99.53%	0.0006	0.0004
2.5	16,150,545	96.53%	99.90%	99.20%	0.0011	0.0007
3.5	16,369,113	96.46%	99.84%	98.86%	0.0011	0.0006
4.5	16,377,145	95.97%	99.77%	98.51%	0.0014	0.0006
5.5	15,942,627	95.93%	99.69%	98.15%	0.0014	0.0005
6.5	14,588,232	95.92%	99.60%	97.77%	0.0014	0.0003
7.5	13,924,796	95.67%	99.49%	97.39%	0.0015	0.0003
8.5	13,185,623	93.30%	99.37%	96.99%	0.0037	0.0014
9.5	13,186,727	93.14%	99.22%	96.58%	0.0037	0.0012
10.5	12,324,289	92.96%	99.06%	96.15%	0.0037	0.0010
11.5	11,078,204	92.52%	98.87%	95.72%	0.0040	0.0010
12.5	10,747,754	92.50%	98.66%	95.27%	0.0038	0.0008
13.5	10,223,468	92.19%	98.41%	94.80%	0.0039	0.0007
14.5	10,093,108	91.82%	98.14%	94.32%	0.0040	0.0006
15.5	8,218,858	91.46%	97.83%	93.83%	0.0041	0.0006
16.5	7,500,636	91.27%	97.49%	93.32%	0.0039	0.0004
17.5	6,249,807	91.05%	97.10%	92.80%	0.0037	0.0003
18.5	5,228,078	90.02%	96.68%	92.26%	0.0044	0.0005
19.5	4,740,874	89.17%	96.20%	91.71%	0.0049	0.0006
20.5	4,640,500	88.66%	95.68%	91.14%	0.0049	0.0006
21.5	4,665,528	88.64%	95.10%	90.55%	0.0042	0.0004
22.5	4,429,305	88.39%	94.47%	89.94%	0.0037	0.0002
23.5	4,526,394	88.10%	93.77%	89.32%	0.0032	0.0001
24.5	4,399,594	84.92%	93.01%	88.68%	0.0065	0.0014
25.5	5,054,833	84.55%	92.18%	88.01%	0.0058	0.0012
26.5	4,863,949	84.19%	91.28%	87.33%	0.0050	0.0010
27.5	4,816,045	84.17%	90.30%	86.62%	0.0038	0.0006
28.5	4,884,556	83.45%	89.23%	85.90%	0.0033	0.0006
29.5	4,697,273	82.91%	88.08%	85.14%	0.0027	0.0005
30.5	4,302,195	82.64%	86.84%	84.37%	0.0018	0.0003
31.5	3,792,366	82.55%	85.49%	83.57%	0.0009	0.0001
32.5	4,257,705	81.11%	84.04%	82.75%	0.0009	0.0003
33.5	10,304,484	81.08%	82.47%	81.90%	0.0002	0.0001
34.5	9,660,693	80.97%	80.79%	81.03%	0.0000	0.0000
35.5	9,454,199	80.84%	78.98%	80.12%	0.0003	0.0001
36.5	9,376,556	80.77%	77.04%	79.19%	0.0014	0.0002
37.5	9,326,523	80.73%	74.95%	78.23%	0.0033	0.0006
38.5	9,253,370	80.23%	72.73%	77.25%	0.0056	0.0009
39.5	9,250,788	80.18%	70.36%	76.23%	0.0096	0.0016
40.5	9,231,575	80.15%	67.84%	75.18%	0.0151	0.0025
41.5	9,134,585	80.12%	65.17%	74.10%	0.0223	0.0036
42.5	9,036,772	80.04%	62.36%	72.99%	0.0313	0.0050
43.5	9,032,120	80.04%	59.40%	71.85%	0.0426	0.0067
44.5	9,842,395	79.90%	56.32%	70.68%	0.0556	0.0085
45.5	9,228,829	79.90%	53.13%	69.48%	0.0717	0.0109
46.5	9,164,450	79.89%	49.83%	68.24%	0.0903	0.0136
47.5	9,144,237	79.73%	46.47%	66.97%	0.1106	0.0163
48.5	9,058,784	79.58%	43.05%	65.68%	0.1334	0.0193

Account 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL R3-45	[5] OPC R1.5-57	[6] WGL SSD	[7] OPC SSD
49.5	9,010,548	79.29%	39.62%	64.35%	0.1574	0.0223
50.5	8,939,068	79.12%	36.20%	62.99%	0.1843	0.0260
51.5	9,537,189	79.09%	32.82%	61.60%	0.2141	0.0306
52.5	9,491,386	79.08%	29.52%	60.18%	0.2456	0.0357
53.5	9,480,081	79.04%	26.33%	58.73%	0.2779	0.0412
54.5	9,167,422	79.04%	23.28%	57.25%	0.3109	0.0475
55.5	9,165,873	79.03%	20.40%	55.75%	0.3438	0.0542
56.5	8,332,117	79.03%	17.70%	54.23%	0.3761	0.0615
57.5	8,298,251	78.73%	15.21%	52.68%	0.4035	0.0678
58.5	7,470,349	70.88%	12.93%	51.11%	0.3359	0.0391
59.5	7,065,378	70.85%	10.87%	49.53%	0.3598	0.0455
60.5	7,060,099	70.85%	9.03%	47.92%	0.3822	0.0526
61.5	7,060,099	70.85%	7.40%	46.31%	0.4026	0.0602
62.5	7,052,171	70.85%	5.98%	44.68%	0.4209	0.0685
63.5	6,526,818	70.84%	4.74%	43.04%	0.4369	0.0773
64.5	598,056	70.82%	3.69%	41.40%	0.4506	0.0866
65.5	655	0.08%	2.81%	39.76%	0.0007	0.1574
66.5	655	0.08%	2.07%	38.11%	0.0004	0.1446
67.5	655	0.08%	1.47%	36.47%	0.0002	0.1325
68.5	514	0.06%	1.00%	34.84%	0.0001	0.1210
69.5	514	0.06%	0.64%	33.22%	0.0000	0.1100
70.5	514	0.06%	0.38%	31.62%	0.0000	0.0996
71.5	514	0.06%	0.20%	30.04%	0.0000	0.0899
72.5	514	0.06%	0.09%	28.47%	0.0000	0.0807
73.5	0	0.00%	0.03%	26.93%	0.0000	0.0725
74.5			0.01%	25.43%		
Sum of Squared Differences				[8]	6.0004	1.9346
Up to 1% of Beginning Exposures				[9]	5.9989	0.9264

[1] Age in years using half-year convention

[2] Dollars exposed to retirement at the beginning of each age interval

[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.

[4] The Company's selected Iowa curve to be fitted to the OLT.

[5] My selected Iowa curve to be fitted to the OLT.

[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.

[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.

[8] = Sum of squared differences excluding less than 1% of beginning exposures or other statistically-relevant cut-off point when applicable

[9] = Sum of squared differences up to the 1% of beginning exposures cut-off.

Account 363.5 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL L1.5-15	[5] OPC L2-19	[6] WGL SSD	[7] OPC SSD
0.0	3,566,488	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	3,594,222	99.75%	99.89%	100.00%	0.0000	0.0000
1.5	3,307,323	99.01%	99.47%	99.94%	0.0000	0.0001
2.5	2,865,903	97.43%	98.68%	99.76%	0.0002	0.0005
3.5	2,087,535	96.94%	97.38%	99.37%	0.0000	0.0006
4.5	1,373,729	95.74%	95.52%	98.74%	0.0000	0.0009
5.5	981,447	94.57%	93.05%	97.83%	0.0002	0.0011
6.5	774,429	93.50%	89.87%	96.63%	0.0013	0.0010
7.5	684,977	93.05%	85.90%	95.04%	0.0051	0.0004
8.5	654,412	92.37%	81.18%	92.90%	0.0125	0.0000
9.5	596,240	89.84%	75.89%	90.08%	0.0195	0.0000
10.5	565,777	87.17%	70.25%	86.54%	0.0286	0.0000
11.5	487,448	87.17%	64.44%	82.33%	0.0517	0.0023
12.5	461,521	84.48%	58.63%	77.60%	0.0668	0.0047
13.5	425,981	78.55%	52.97%	72.49%	0.0654	0.0037
14.5	372,077	74.34%	47.56%	67.18%	0.0717	0.0051
15.5	371,234	74.01%	42.45%	61.82%	0.0996	0.0149
16.5	361,870	72.11%	37.68%	56.53%	0.1185	0.0243
17.5	246,968	49.15%	33.26%	51.43%	0.0253	0.0005
18.5	243,742	48.32%	29.18%	46.59%	0.0366	0.0003
19.5	198,288	38.49%	25.42%	42.04%	0.0171	0.0013
20.5	160,310	30.94%	21.98%	37.80%	0.0080	0.0047
21.5	159,538	30.79%	18.85%	33.87%	0.0143	0.0010
22.5	153,095	29.36%	16.00%	30.25%	0.0178	0.0001
23.5	145,385	27.88%	13.45%	26.91%	0.0208	0.0001
24.5	107,085	20.30%	11.17%	23.83%	0.0083	0.0012
25.5	106,846	20.22%	9.17%	21.01%	0.0122	0.0001
26.5	101,064	19.12%	7.42%	18.41%	0.0137	0.0001
27.5	99,748	18.81%	5.92%	16.03%	0.0166	0.0008
28.5	99,060	18.68%	4.65%	13.85%	0.0197	0.0023
29.5	83,789	15.80%	3.59%	11.88%	0.0149	0.0015
30.5	60,078	11.28%	2.72%	10.10%	0.0073	0.0001
31.5	45,418	8.53%	2.01%	8.50%	0.0042	0.0000
32.5	36,972	6.94%	1.46%	7.07%	0.0030	0.0000
33.5	22,003	3.53%	1.03%	5.82%	0.0006	0.0005
34.5	20,081	3.22%	0.71%	4.73%	0.0006	0.0002
35.5	17,712	2.84%	0.47%	3.79%	0.0006	0.0001
36.5	14,897	2.36%	0.30%	2.99%	0.0004	0.0000
37.5	14,898	2.35%	0.19%	2.33%	0.0005	0.0000
38.5	13,200	2.07%	0.11%	1.77%	0.0004	0.0000
39.5	13,019	2.04%	0.06%	1.32%	0.0004	0.0001
40.5	11,819	1.86%	0.03%	0.96%	0.0003	0.0001
41.5	10,456	1.64%	0.02%	0.68%	0.0003	0.0001
42.5	10,456	1.64%	0.01%	0.47%	0.0003	0.0001
43.5	9,842	1.47%	0.00%	0.31%	0.0002	0.0001
44.5	9,503	1.42%	0.00%	0.20%	0.0002	0.0001
45.5	8,368	1.23%	0.00%	0.12%	0.0002	0.0001
46.5	7,593	1.11%		0.07%	0.0001	0.0001
47.5	7,788	1.11%		0.04%	0.0001	0.0001
48.5	7,455	1.06%		0.02%	0.0001	0.0001
49.5	7,029	0.99%		0.01%	0.0001	0.0001
50.5	6,629	0.93%		0.00%	0.0001	0.0001
51.5	6,558	0.89%		0.00%	0.0001	0.0001
52.5	6,494	0.88%		0.00%	0.0001	0.0001
53.5	6,237	0.83%			0.0001	0.0001

Account 363.5 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**WGL L1.5-15**	**OPC L2-19**	**WGL SSD**	**OPC SSD**
54.5	6,237	0.83%			0.0001	0.0001
55.5	5,007	0.66%			0.0000	0.0000
56.5	5,007	0.66%			0.0000	0.0000
57.5	4,513	0.60%			0.0000	0.0000
58.5	4,192	0.56%			0.0000	0.0000
59.5	4,147	0.55%			0.0000	0.0000
60.5	4,009	0.53%			0.0000	0.0000
61.5	3,664	0.49%			0.0000	0.0000
62.5	3,664	0.49%			0.0000	0.0000
63.5	2,623	0.35%			0.0000	0.0000
64.5	442	0.06%			0.0000	0.0000
65.5	240	0.03%			0.0000	0.0000
66.5	240	0.03%			0.0000	0.0000
67.5	240	0.03%			0.0000	0.0000
68.5	240	0.03%			0.0000	0.0000
69.5	240	0.03%			0.0000	0.0000
70.5	240	0.03%			0.0000	0.0000
71.5	240	0.03%			0.0000	0.0000
72.5	240	0.03%			0.0000	0.0000
73.5	240	0.03%			0.0000	0.0000
74.5	240	0.03%			0.0000	0.0000
75.5	240	0.03%			0.0000	0.0000
76.5	135	0.02%			0.0000	0.0000
77.5	135	0.02%			0.0000	0.0000
78.5	135	0.02%			0.0000	0.0000
79.5	135	0.02%			0.0000	0.0000
80.5	135	0.02%			0.0000	0.0000
81.5	135	0.02%			0.0000	0.0000
82.5	135	0.02%			0.0000	0.0000
83.5						
Sum of Squared Differences				[8]	0.7872	0.0764
Up to 1% of Beginning Exposures				[9]	0.7812	0.0737

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences excluding less than 1% of beginning exposures or other statistically-relevant cut-off point when applicable
[9] = Sum of squared differences up to the 1% of beginning exposures cut-off.

Account 380.2 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL S3-55	[5] OPC L3-65	[6] WGL SSD	[7] OPC SSD
0.0	462,175,424	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	440,045,703	99.96%	100.00%	100.00%	0.0000	0.0000
1.5	404,116,906	99.87%	100.00%	100.00%	0.0000	0.0000
2.5	374,096,105	99.80%	100.00%	100.00%	0.0000	0.0000
3.5	351,807,074	99.68%	100.00%	100.00%	0.0000	0.0000
4.5	336,369,374	99.62%	100.00%	100.00%	0.0000	0.0000
5.5	331,413,159	99.56%	100.00%	100.00%	0.0000	0.0000
6.5	324,185,869	99.50%	100.00%	100.00%	0.0000	0.0000
7.5	319,636,304	99.43%	100.00%	100.00%	0.0000	0.0000
8.5	308,252,908	99.37%	100.00%	99.99%	0.0000	0.0000
9.5	290,266,332	99.28%	100.00%	99.99%	0.0001	0.0001
10.5	270,781,173	99.22%	100.00%	99.98%	0.0001	0.0001
11.5	250,439,321	99.13%	100.00%	99.96%	0.0001	0.0001
12.5	238,303,272	99.06%	99.99%	99.94%	0.0001	0.0001
13.5	231,616,590	98.99%	99.98%	99.90%	0.0001	0.0001
14.5	223,315,335	98.88%	99.97%	99.86%	0.0001	0.0001
15.5	211,671,279	98.80%	99.96%	99.81%	0.0001	0.0001
16.5	200,332,916	98.70%	99.94%	99.74%	0.0002	0.0001
17.5	188,358,930	98.58%	99.90%	99.66%	0.0002	0.0001
18.5	161,963,829	98.43%	99.86%	99.56%	0.0002	0.0001
19.5	150,351,056	98.33%	99.80%	99.45%	0.0002	0.0001
20.5	139,321,759	98.18%	99.72%	99.32%	0.0002	0.0001
21.5	128,743,033	97.99%	99.62%	99.17%	0.0003	0.0001
22.5	119,397,585	97.82%	99.49%	99.00%	0.0003	0.0001
23.5	109,592,269	97.62%	99.32%	98.81%	0.0003	0.0001
24.5	101,476,112	97.49%	99.12%	98.60%	0.0003	0.0001
25.5	94,768,188	97.28%	98.87%	98.36%	0.0003	0.0001
26.5	87,042,494	97.10%	98.57%	98.10%	0.0002	0.0001
27.5	81,508,865	96.79%	98.21%	97.81%	0.0002	0.0001
28.5	73,435,530	96.46%	97.79%	97.49%	0.0002	0.0001
29.5	67,338,519	96.16%	97.29%	97.13%	0.0001	0.0001
30.5	62,312,200	95.85%	96.71%	96.74%	0.0001	0.0001
31.5	57,448,401	95.60%	96.05%	96.31%	0.0000	0.0000
32.5	52,561,611	95.21%	95.30%	95.83%	0.0000	0.0000
33.5	47,965,806	94.89%	94.45%	95.30%	0.0000	0.0000
34.5	43,267,581	94.58%	93.49%	94.71%	0.0001	0.0000
35.5	36,350,443	94.12%	92.42%	94.06%	0.0003	0.0000
36.5	29,232,119	93.51%	91.24%	93.35%	0.0005	0.0000
37.5	25,669,126	92.59%	89.95%	92.55%	0.0007	0.0000
38.5	22,038,937	91.39%	88.53%	91.68%	0.0008	0.0000
39.5	20,430,714	90.40%	86.98%	90.72%	0.0012	0.0000
40.5	18,281,093	89.47%	85.32%	89.66%	0.0017	0.0000
41.5	15,410,933	88.25%	83.53%	88.52%	0.0022	0.0000
42.5	13,576,558	87.20%	81.62%	87.28%	0.0031	0.0000
43.5	11,976,774	86.10%	79.60%	85.94%	0.0042	0.0000
44.5	9,073,142	85.05%	77.46%	84.50%	0.0058	0.0000
45.5	6,098,059	83.72%	75.20%	82.97%	0.0073	0.0001
46.5	3,932,479	82.46%	72.85%	81.33%	0.0092	0.0001
47.5	1,886,402	80.75%	70.40%	79.61%	0.0107	0.0001

Account 380.2 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL S3-55	[5] OPC L3-65	[6] WGL SSD	[7] OPC SSD
48.5	608,964	78.60%	67.87%	77.80%	0.0115	0.0001
49.5	294,149	76.64%	65.26%	75.92%	0.0130	0.0001
50.5	118,303	73.78%	62.58%	73.97%	0.0126	0.0000
51.5			59.84%	71.96%		
Sum of Squared Differences				[8]	0.0888	0.0030
Up to 1% of Beginning Exposures				[9]	0.0319	0.0027

[1] Age in years using half-year convention

[2] Dollars exposed to retirement at the beginning of each age interval

[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.

[4] The Company's selected Iowa curve to be fitted to the OLT.

[5] My selected Iowa curve to be fitted to the OLT.

[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.

[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.

[8] = Sum of squared differences excluding less than 1% of beginning exposures or other statistically-relevant cut-off point when applicable

[9] = Sum of squared differences up to the 1% of beginning exposures cut-off.

Account 390 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] WGL R2.5-45	[5] OPC S0-58	[6] WGL SSD	[7] OPC SSD
0.0	16,267,129	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	15,974,269	100.00%	99.94%	99.98%	0.0000	0.0000
1.5	12,185,195	100.00%	99.81%	99.89%	0.0000	0.0000
2.5	10,278,266	99.66%	99.66%	99.73%	0.0000	0.0000
3.5	10,154,845	99.66%	99.50%	99.51%	0.0000	0.0000
4.5	9,804,322	96.97%	99.33%	99.25%	0.0006	0.0005
5.5	8,837,958	95.34%	99.14%	98.94%	0.0014	0.0013
6.5	8,470,277	95.34%	98.94%	98.58%	0.0013	0.0011
7.5	7,888,253	94.79%	98.71%	98.19%	0.0015	0.0012
8.5	7,493,139	94.79%	98.47%	97.76%	0.0014	0.0009
9.5	7,305,438	94.73%	98.20%	97.29%	0.0012	0.0007
10.5	8,048,468	94.73%	97.91%	96.78%	0.0010	0.0004
11.5	7,447,720	94.53%	97.59%	96.24%	0.0009	0.0003
12.5	7,241,017	93.12%	97.25%	95.67%	0.0017	0.0007
13.5	6,057,158	92.37%	96.87%	95.07%	0.0020	0.0007
14.5	6,006,316	91.84%	96.47%	94.44%	0.0021	0.0007
15.5	6,202,686	91.73%	96.02%	93.78%	0.0018	0.0004
16.5	6,159,804	91.72%	95.55%	93.09%	0.0015	0.0002
17.5	5,692,331	91.37%	95.03%	92.38%	0.0013	0.0001
18.5	5,601,062	91.36%	94.48%	91.64%	0.0010	0.0000
19.5	5,529,917	90.50%	93.88%	90.88%	0.0011	0.0000
20.5	5,502,107	90.45%	93.23%	90.09%	0.0008	0.0000
21.5	5,466,732	90.24%	92.54%	89.28%	0.0005	0.0001
22.5	2,675,713	90.24%	91.80%	88.44%	0.0002	0.0003
23.5	2,459,763	90.24%	90.99%	87.59%	0.0001	0.0007
24.5	2,099,312	88.33%	90.14%	86.72%	0.0003	0.0003
25.5	2,053,598	88.08%	89.22%	85.82%	0.0001	0.0005
26.5	2,028,523	87.69%	88.24%	84.91%	0.0000	0.0008
27.5	2,035,068	87.69%	87.19%	83.98%	0.0000	0.0014
28.5	1,831,866	82.24%	86.07%	83.03%	0.0015	0.0001
29.5	1,950,902	82.13%	84.87%	82.06%	0.0008	0.0000
30.5	1,883,000	80.36%	83.60%	81.08%	0.0011	0.0001
31.5	1,832,656	79.14%	82.25%	80.08%	0.0010	0.0001
32.5	1,831,656	79.10%	80.81%	79.07%	0.0003	0.0000
33.5	1,507,646	73.80%	79.28%	78.04%	0.0030	0.0018
34.5	1,430,338	73.65%	77.66%	77.00%	0.0016	0.0011
35.5	1,333,702	71.80%	75.94%	75.94%	0.0017	0.0017
36.5	1,248,668	71.47%	74.12%	74.88%	0.0007	0.0012
37.5	1,206,373	71.19%	72.19%	73.80%	0.0001	0.0007
38.5	1,185,755	70.38%	70.16%	72.71%	0.0000	0.0005
39.5	1,185,755	70.38%	68.02%	71.61%	0.0006	0.0002
40.5	1,100,415	70.38%	65.77%	70.50%	0.0021	0.0000
41.5	421,032	70.38%	63.41%	69.37%	0.0049	0.0001
42.5	421,032	70.38%	60.95%	68.25%	0.0089	0.0005
43.5	416,732	69.66%	58.39%	67.11%	0.0127	0.0007
44.5	416,732	69.66%	55.74%	65.96%	0.0194	0.0014
45.5	416,732	69.66%	53.00%	64.81%	0.0277	0.0024
46.5	235,375	68.78%	50.20%	63.65%	0.0345	0.0026
47.5	213,229	62.71%	47.33%	62.48%	0.0236	0.0000

Account 390 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**WGL R2.5-45**	**OPC S0-58**	**WGL SSD**	**OPC SSD**
48.5	201,526	59.26%	44.43%	61.31%	0.0220	0.0004
49.5	151,526	44.56%	41.51%	60.13%	0.0009	0.0243
50.5	151,526	44.56%	38.58%	58.95%	0.0036	0.0207
51.5	151,526	44.56%	35.68%	57.77%	0.0079	0.0174
52.5	112,101	32.97%	32.82%	56.58%	0.0000	0.0557
53.5			30.02%	55.39%		
Sum of Squared Differences				[8]	0.2046	0.1466
Up to 1% of Beginning Exposures				[9]	0.1922	0.0285

[1] Age in years using half-year convention

[2] Dollars exposed to retirement at the beginning of each age interval

[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.

[4] The Company's selected Iowa curve to be fitted to the OLT.

[5] My selected Iowa curve to be fitted to the OLT.

[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.

[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.

[8] = Sum of squared differences excluding less than 1% of beginning exposures or other statistically-relevant cut-off point when applicable

[9] = Sum of squared differences up to the 1% of beginning exposures cut-off.

WGL
Gas Division
361.00 Structures and Improvements

Observed Life Table
Retirement Expr. 1987 TO 2016
Placement Years 1935 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$4,066,469.65	$0.00	0.00000	100.00
0.5 - 1.5	$4,053,633.14	$0.00	0.00000	100.00
1.5 - 2.5	$4,033,689.21	$79,672.01	0.01975	100.00
2.5 - 3.5	$3,690,810.77	$50,536.95	0.01369	98.02
3.5 - 4.5	$3,398,638.12	$0.00	0.00000	96.68
4.5 - 5.5	$3,402,226.07	$0.00	0.00000	96.68
5.5 - 6.5	$3,266,910.37	$2,597.72	0.00080	96.68
6.5 - 7.5	$1,794,397.12	$7,950.77	0.00443	96.61
7.5 - 8.5	$1,555,055.25	$0.00	0.00000	96.18
8.5 - 9.5	$1,480,225.00	$5,553.93	0.00375	96.18
9.5 - 10.5	$1,440,314.94	$376.22	0.00026	95.82
10.5 - 11.5	$1,414,859.88	$0.00	0.00000	95.79
11.5 - 12.5	$1,414,859.88	$146,066.13	0.10324	95.79
12.5 - 13.5	$1,223,472.14	$0.00	0.00000	85.90
13.5 - 14.5	$1,223,472.14	$10,463.95	0.00855	85.90
14.5 - 15.5	$1,221,754.21	$0.00	0.00000	85.17
15.5 - 16.5	$1,299,347.95	$0.00	0.00000	85.17
16.5 - 17.5	$1,306,854.20	$0.00	0.00000	85.17
17.5 - 18.5	$1,244,303.62	$1,033.84	0.00083	85.17
18.5 - 19.5	$987,036.26	$0.00	0.00000	85.10
19.5 - 20.5	$831,993.15	$0.00	0.00000	85.10
20.5 - 21.5	$752,360.24	$10,520.65	0.01398	85.10
21.5 - 22.5	$713,426.92	$0.00	0.00000	83.91
22.5 - 23.5	$546,499.89	$5,270.59	0.00964	83.91
23.5 - 24.5	$450,213.15	$0.00	0.00000	83.10
24.5 - 25.5	$415,174.47	$0.00	0.00000	83.10
25.5 - 26.5	$442,776.85	$0.00	0.00000	83.10
26.5 - 27.5	$448,823.43	$0.00	0.00000	83.10
27.5 - 28.5	$320,768.46	$0.00	0.00000	83.10
28.5 - 29.5	$319,612.48	$0.00	0.00000	83.10
29.5 - 30.5	$318,551.85	$0.00	0.00000	83.10
30.5 - 31.5	$325,657.19	$9,074.21	0.02786	83.10
31.5 - 32.5	$316,582.98	$15,120.00	0.04776	80.78
32.5 - 33.5	$308,390.45	$0.00	0.00000	76.92
33.5 - 34.5	$311,107.05	$178.96	0.00058	76.92
34.5 - 35.5	$776,531.95	$0.00	0.00000	76.88
35.5 - 36.5	$781,189.74	$0.00	0.00000	76.88

WGL
Gas Division
361.00 Structures and Improvements

Observed Life Table
Retirement Expr. 1987 TO 2016
Placement Years 1935 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$763,438.77	$0.00	0.00000	76.88
37.5 - 38.5	$763,438.77	$24,241.83	0.03175	76.88
38.5 - 39.5	$729,758.85	$0.00	0.00000	74.44
39.5 - 40.5	$703,727.44	$5,198.86	0.00739	74.44
40.5 - 41.5	$698,528.58	$5,300.00	0.00759	73.89
41.5 - 42.5	$693,228.58	$9,686.00	0.01397	73.33
42.5 - 43.5	$669,415.79	$6,941.08	0.01037	72.30
43.5 - 44.5	$662,709.29	$0.00	0.00000	71.55
44.5 - 45.5	$654,008.16	$4,966.65	0.00759	71.55
45.5 - 46.5	$580,933.69	$400.00	0.00069	71.01
46.5 - 47.5	$574,169.72	$0.00	0.00000	70.96
47.5 - 48.5	$574,301.89	$1,677.04	0.00292	70.96
48.5 - 49.5	$558,443.57	$7,245.00	0.01297	70.75
49.5 - 50.5	$548,437.86	$0.00	0.00000	69.84
50.5 - 51.5	$553,162.97	$0.00	0.00000	69.84
51.5 - 52.5	$557,680.82	$0.00	0.00000	69.84
52.5 - 53.5	$557,680.82	$0.00	0.00000	69.84
53.5 - 54.5	$555,917.13	$0.00	0.00000	69.84
54.5 - 55.5	$531,943.42	$4,292.30	0.00807	69.84
55.5 - 56.5	$514,390.57	$234.58	0.00046	69.27
56.5 - 57.5	$508,109.41	$44.89	0.00009	69.24
57.5 - 58.5	$508,064.52	$7,176.16	0.01412	69.24
58.5 - 59.5	$497,832.48	$1,108.44	0.00223	68.26
59.5 - 60.5	$470,849.69	$132.17	0.00028	68.11
60.5 - 61.5	$468,453.26	$203.30	0.00043	68.09
61.5 - 62.5	$468,249.96	$802.84	0.00171	68.06
62.5 - 63.5	$465,486.30	$4,725.11	0.01015	67.94
63.5 - 64.5	$452,508.72	$6,958.23	0.01538	67.25
64.5 - 65.5	$21,164.76	$0.00	0.00000	66.22
65.5 - 66.5	$0.00	$0.00	0.00000	66.22
66.5 - 67.5	$0.00	$0.00	0.00000	66.22
67.5 - 68.5	$0.00	$0.00	0.00000	66.22
68.5 - 69.5	$0.00	$0.00	0.00000	66.22
69.5 - 70.5	$0.00	$0.00	0.00000	66.22
70.5 - 71.5	$0.00	$0.00	0.00000	66.22
71.5 - 72.5	$0.00	$0.00	0.00000	66.22
72.5 - 73.5	$0.00	$0.00	0.00000	66.22

WGL
Gas Division
361.00 Structures and Improvements

Observed Life Table

Retirement Expr. 1987 TO 2016
Placement Years 1935 TO 2016

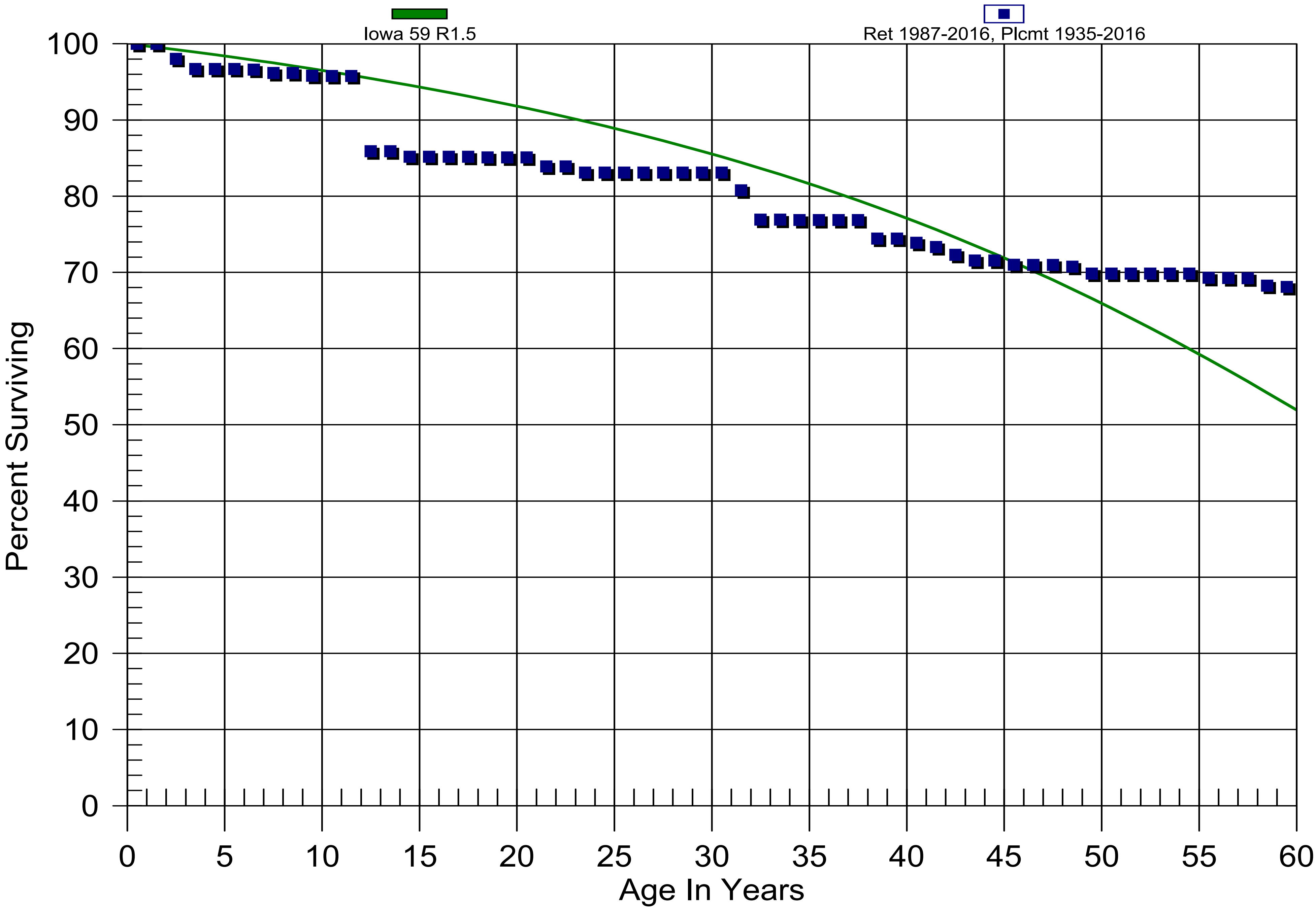
Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$0.00	$0.00	0.00000	66.22
74.5 - 75.5	$0.00	$0.00	0.00000	66.22
75.5 - 76.5	$0.00	$0.00	0.00000	66.22
76.5 - 77.5	$0.00	$0.00	0.00000	66.22
77.5 - 78.5	$0.00	$0.00	0.00000	66.22
78.5 - 79.5	$0.00	$0.00	0.00000	66.22
79.5 - 80.5	$0.00	$0.00	0.00000	66.22
80.5 - 81.5	$0.00	$0.00	0.00000	66.22

WGL

Gas Division

361.00 Structures and Improvements

Original And Smooth Survivor Curves



WGL
Gas Division
362.00 Gas Holders

Observed Life Table

Retirement Expr. 1986 TO 2016
Placement Years 1900 TO 2016

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0.0 - 0.5	$16,209,192.75	$218,173.83	0.01346	100.00
0.5 - 1.5	$16,489,801.24	$181,352.89	0.01100	98.65
1.5 - 2.5	$16,337,685.72	$173,774.47	0.01064	97.57
2.5 - 3.5	$16,150,544.63	$12,003.64	0.00074	96.53
3.5 - 4.5	$16,369,113.35	$83,524.34	0.00510	96.46
4.5 - 5.5	$16,377,145.07	$5,939.73	0.00036	95.97
5.5 - 6.5	$15,942,627.37	$2,355.68	0.00015	95.93
6.5 - 7.5	$14,588,232.07	$37,422.21	0.00257	95.92
7.5 - 8.5	$13,924,795.95	$345,545.13	0.02482	95.67
8.5 - 9.5	$13,185,622.96	$22,597.61	0.00171	93.30
9.5 - 10.5	$13,186,727.19	$25,637.06	0.00194	93.14
10.5 - 11.5	$12,324,289.40	$57,912.27	0.00470	92.96
11.5 - 12.5	$11,078,203.66	$1,902.52	0.00017	92.52
12.5 - 13.5	$10,747,753.53	$36,600.00	0.00341	92.50
13.5 - 14.5	$10,223,467.93	$41,508.75	0.00406	92.19
14.5 - 15.5	$10,093,107.70	$39,133.68	0.00388	91.82
15.5 - 16.5	$8,218,857.55	$17,268.23	0.00210	91.46
16.5 - 17.5	$7,500,635.72	$17,789.43	0.00237	91.27
17.5 - 18.5	$6,249,806.70	$70,408.10	0.01127	91.05
18.5 - 19.5	$5,228,078.32	$49,480.38	0.00946	90.02
19.5 - 20.5	$4,740,874.37	$27,376.96	0.00577	89.17
20.5 - 21.5	$4,640,500.14	$1,079.63	0.00023	88.66
21.5 - 22.5	$4,665,527.59	$13,030.28	0.00279	88.64
22.5 - 23.5	$4,429,305.17	$14,541.93	0.00328	88.39
23.5 - 24.5	$4,526,394.34	$163,289.78	0.03608	88.10
24.5 - 25.5	$4,399,593.59	$19,417.07	0.00441	84.92
25.5 - 26.5	$5,054,833.48	$21,221.77	0.00420	84.55
26.5 - 27.5	$4,863,949.13	$960.90	0.00020	84.19
27.5 - 28.5	$4,816,044.96	$41,456.11	0.00861	84.17
28.5 - 29.5	$4,884,556.45	$31,590.89	0.00647	83.45
29.5 - 30.5	$4,697,273.02	$15,471.63	0.00329	82.91
30.5 - 31.5	$4,302,194.66	$4,758.51	0.00111	82.64
31.5 - 32.5	$3,792,366.03	$65,789.59	0.01735	82.55
32.5 - 33.5	$4,257,705.44	$1,600.00	0.00038	81.11
33.5 - 34.5	$10,304,484.10	$13,926.46	0.00135	81.08
34.5 - 35.5	$9,660,693.28	$16,242.74	0.00168	80.97
35.5 - 36.5	$9,454,199.33	$7,713.34	0.00082	80.84

WGL

Gas Division

362.00 Gas Holders

Observed Life Table

Retirement Expr. 1986 TO 2016

Placement Years 1900 TO 2016

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
36.5 - 37.5	$9,376,555.72	$4,450.00	0.00047	80.77
37.5 - 38.5	$9,326,523.44	$58,652.06	0.00629	80.73
38.5 - 39.5	$9,253,370.21	$5,000.00	0.00054	80.23
39.5 - 40.5	$9,250,787.53	$4,105.68	0.00044	80.18
40.5 - 41.5	$9,231,575.47	$3,388.33	0.00037	80.15
41.5 - 42.5	$9,134,584.83	$8,394.85	0.00092	80.12
42.5 - 43.5	$9,036,772.05	$0.00	0.00000	80.04
43.5 - 44.5	$9,032,119.57	$15,766.36	0.00175	80.04
44.5 - 45.5	$9,842,395.29	$0.00	0.00000	79.90
45.5 - 46.5	$9,228,829.31	$2,000.00	0.00022	79.90
46.5 - 47.5	$9,164,449.72	$17,900.00	0.00195	79.89
47.5 - 48.5	$9,144,237.02	$16,913.57	0.00185	79.73
48.5 - 49.5	$9,058,783.66	$33,500.00	0.00370	79.58
49.5 - 50.5	$9,010,547.64	$19,340.00	0.00215	79.29
50.5 - 51.5	$8,939,067.93	$3,425.00	0.00038	79.12
51.5 - 52.5	$9,537,188.82	$500.00	0.00005	79.09
52.5 - 53.5	$9,491,386.16	$5,417.32	0.00057	79.08
53.5 - 54.5	$9,480,081.46	$0.00	0.00000	79.04
54.5 - 55.5	$9,167,421.67	$940.87	0.00010	79.04
55.5 - 56.5	$9,165,873.47	$595.53	0.00006	79.03
56.5 - 57.5	$8,332,116.79	$30,925.00	0.00371	79.03
57.5 - 58.5	$8,298,251.42	$827,902.51	0.09977	78.73
58.5 - 59.5	$7,470,348.91	$3,327.34	0.00045	70.88
59.5 - 60.5	$7,065,377.92	$0.00	0.00000	70.85
60.5 - 61.5	$7,060,099.41	$0.00	0.00000	70.85
61.5 - 62.5	$7,060,099.41	$0.00	0.00000	70.85
62.5 - 63.5	$7,052,170.53	$154.50	0.00002	70.85
63.5 - 64.5	$6,526,818.33	$2,220.29	0.00034	70.84
64.5 - 65.5	$598,055.72	$597,400.60	0.99890	70.82
65.5 - 66.5	$655.12	$0.00	0.00000	0.08
66.5 - 67.5	$655.12	$0.00	0.00000	0.08
67.5 - 68.5	$655.12	$141.25	0.21561	0.08
68.5 - 69.5	$513.87	$0.00	0.00000	0.06
69.5 - 70.5	$513.87	$0.00	0.00000	0.06
70.5 - 71.5	$513.87	$0.00	0.00000	0.06
71.5 - 72.5	$513.87	$0.00	0.00000	0.06
72.5 - 73.5	$513.87	$0.00	0.00000	0.06

WGL
Gas Division
362.00 Gas Holders

Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1900 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$0.00	$0.00	0.00000	0.06
74.5 - 75.5	$0.00	$0.00	0.00000	0.06
75.5 - 76.5	$0.00	$0.00	0.00000	0.06
76.5 - 77.5	$0.00	$0.00	0.00000	0.06
77.5 - 78.5	$0.00	$0.00	0.00000	0.06
78.5 - 79.5	$0.00	$0.00	0.00000	0.06
79.5 - 80.5	$0.00	$0.00	0.00000	0.06
80.5 - 81.5	$0.00	$0.00	0.00000	0.06
81.5 - 82.5	$0.00	$0.00	0.00000	0.06
82.5 - 83.5	$0.00	$0.00	0.00000	0.06
83.5 - 84.5	$0.00	$0.00	0.00000	0.06
84.5 - 85.5	$0.00	$0.00	0.00000	0.06
85.5 - 86.5	$0.00	$0.00	0.00000	0.06
86.5 - 87.5	$0.00	$0.00	0.00000	0.06
87.5 - 88.5	$0.00	$0.00	0.00000	0.06
88.5 - 89.5	$0.00	$0.00	0.00000	0.06
89.5 - 90.5	$0.00	$0.00	0.00000	0.06
90.5 - 91.5	$0.00	$0.00	0.00000	0.06
91.5 - 92.5	$0.00	$0.00	0.00000	0.06
92.5 - 93.5	$0.00	$0.00	0.00000	0.06
93.5 - 94.5	$0.00	$0.00	0.00000	0.06
94.5 - 95.5	$0.00	$0.00	0.00000	0.06
95.5 - 96.5	$0.00	$0.00	0.00000	0.06
96.5 - 97.5	$0.00	$0.00	0.00000	0.06
97.5 - 98.5	$0.00	$0.00	0.00000	0.06
98.5 - 99.5	$0.00	$0.00	0.00000	0.06
99.5 - 100.5	$0.00	$0.00	0.00000	0.06
100.5 - 101.5	$0.00	$0.00	0.00000	0.06
101.5 - 102.5	$0.00	$0.00	0.00000	0.06
102.5 - 103.5	$0.00	$0.00	0.00000	0.06
103.5 - 104.5	$0.00	$0.00	0.00000	0.06
104.5 - 105.5	$0.00	$0.00	0.00000	0.06
105.5 - 106.5	$0.00	$0.00	0.00000	0.06
106.5 - 107.5	$0.00	$0.00	0.00000	0.06
107.5 - 108.5	$0.00	$0.00	0.00000	0.06
108.5 - 109.5	$0.00	$0.00	0.00000	0.06
109.5 - 110.5	$0.00	$0.00	0.00000	0.06

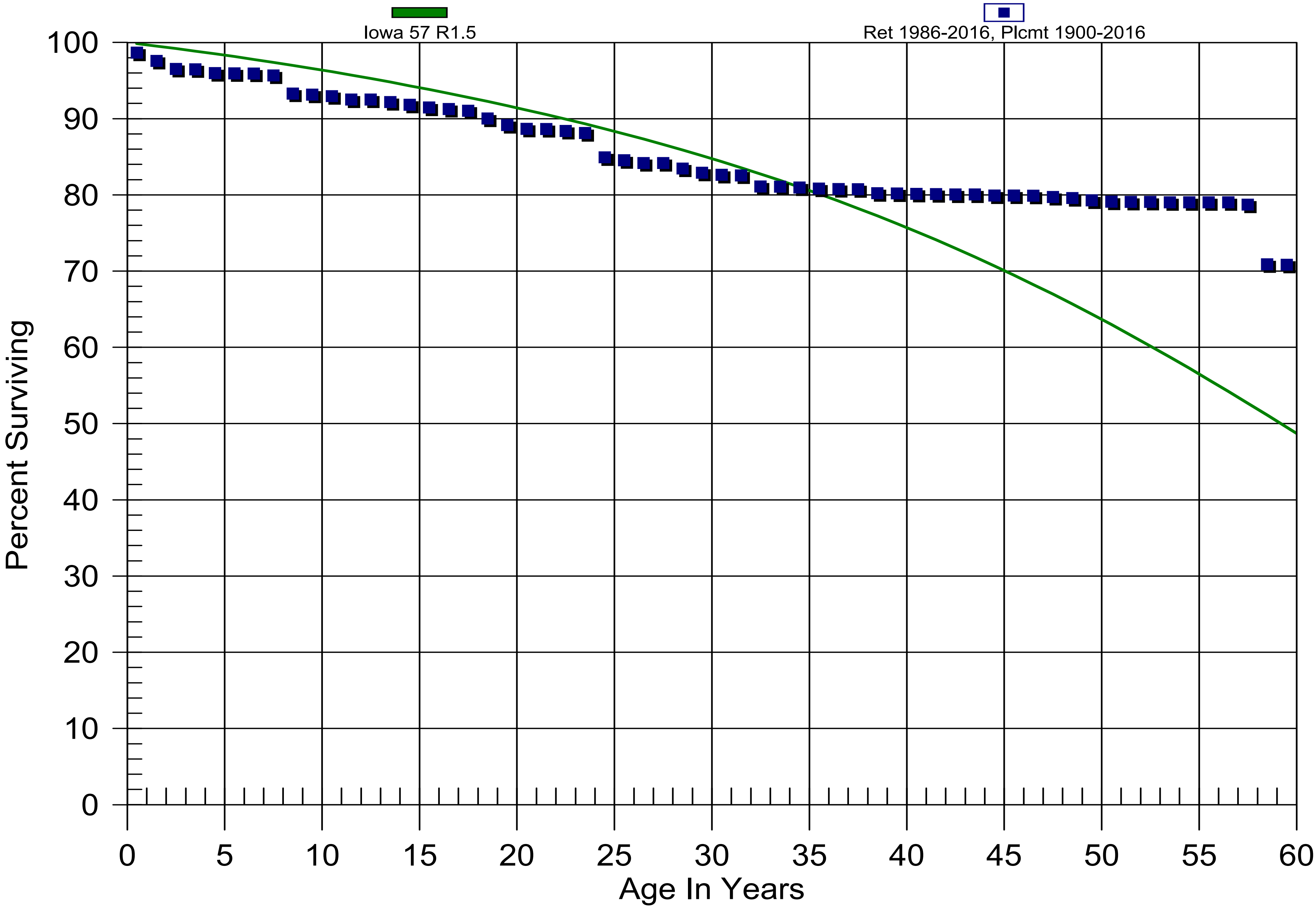
WGL
Gas Division
362.00 Gas Holders

Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1900 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
110.5 - 111.5	$0.00	$0.00	0.00000	0.06
111.5 - 112.5	$0.00	$0.00	0.00000	0.06
112.5 - 113.5	$0.00	$0.00	0.00000	0.06
113.5 - 114.5	$0.00	$0.00	0.00000	0.06
114.5 - 115.5	$0.00	$0.00	0.00000	0.06
115.5 - 116.5	$0.00	$0.00	0.00000	0.06

WGL

Gas Division
362.00 Gas Holders
Original And Smooth Survivor Curves



WGL
Gas Division
363.50 Other Equipment

Observed Life Table

Retirement Expr. 1986 TO 2016
Placement Years 1914 TO 2015

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$3,566,488.08	$8,799.09	0.00247	100.00
0.5 - 1.5	$3,594,222.16	$26,835.50	0.00747	99.75
1.5 - 2.5	$3,307,323.29	$52,811.55	0.01597	99.01
2.5 - 3.5	$2,865,903.31	$14,343.74	0.00500	97.43
3.5 - 4.5	$2,087,534.98	$25,740.08	0.01233	96.94
4.5 - 5.5	$1,373,728.97	$16,798.06	0.01223	95.74
5.5 - 6.5	$981,447.18	$11,101.97	0.01131	94.57
6.5 - 7.5	$774,428.79	$3,791.70	0.00490	93.50
7.5 - 8.5	$684,977.21	$5,008.77	0.00731	93.05
8.5 - 9.5	$654,412.07	$17,900.69	0.02735	92.37
9.5 - 10.5	$596,239.59	$17,732.17	0.02974	89.84
10.5 - 11.5	$565,777.01	$0.00	0.00000	87.17
11.5 - 12.5	$487,447.67	$15,052.07	0.03088	87.17
12.5 - 13.5	$461,520.74	$32,388.78	0.07018	84.48
13.5 - 14.5	$425,981.24	$22,809.94	0.05355	78.55
14.5 - 15.5	$372,077.45	$1,646.25	0.00442	74.34
15.5 - 16.5	$371,233.70	$9,556.27	0.02574	74.01
16.5 - 17.5	$361,869.98	$115,235.25	0.31844	72.11
17.5 - 18.5	$246,967.62	$4,133.48	0.01674	49.15
18.5 - 19.5	$243,741.76	$49,571.66	0.20338	48.32
19.5 - 20.5	$198,288.00	$38,935.70	0.19636	38.49
20.5 - 21.5	$160,310.08	$772.14	0.00482	30.94
21.5 - 22.5	$159,537.94	$7,385.02	0.04629	30.79
22.5 - 23.5	$153,095.08	$7,749.68	0.05062	29.36
23.5 - 24.5	$145,384.99	$39,529.66	0.27190	27.88
24.5 - 25.5	$107,084.94	$419.83	0.00392	20.30
25.5 - 26.5	$106,846.06	$5,782.22	0.05412	20.22
26.5 - 27.5	$101,063.84	$1,636.70	0.01619	19.12
27.5 - 28.5	$99,747.72	$687.68	0.00689	18.81
28.5 - 29.5	$99,060.04	$15,270.99	0.15416	18.68
29.5 - 30.5	$83,789.05	$23,971.47	0.28609	15.80
30.5 - 31.5	$60,078.42	$14,660.36	0.24402	11.28
31.5 - 32.5	$45,418.06	$8,446.51	0.18597	8.53
32.5 - 33.5	$36,971.55	$18,181.84	0.49178	6.94
33.5 - 34.5	$22,002.84	$1,921.36	0.08732	3.53
34.5 - 35.5	$20,081.48	$2,369.03	0.11797	3.22
35.5 - 36.5	$17,712.45	$3,014.30	0.17018	2.84

WGL
Gas Division
363.50 Other Equipment

Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1914 TO 2015

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$14,897.38	$39.59	0.00266	2.36
37.5 - 38.5	$14,897.59	$1,762.29	0.11829	2.35
38.5 - 39.5	$13,200.25	$180.95	0.01371	2.07
39.5 - 40.5	$13,019.30	$1,200.00	0.09217	2.04
40.5 - 41.5	$11,819.30	$1,362.88	0.11531	1.86
41.5 - 42.5	$10,456.42	$0.00	0.00000	1.64
42.5 - 43.5	$10,456.42	$1,108.89	0.10605	1.64
43.5 - 44.5	$9,841.85	$338.48	0.03439	1.47
44.5 - 45.5	$9,503.37	$1,284.92	0.13521	1.42
45.5 - 46.5	$8,367.62	$802.50	0.09591	1.23
46.5 - 47.5	$7,593.07	$0.00	0.00000	1.11
47.5 - 48.5	$7,787.70	$332.89	0.04275	1.11
48.5 - 49.5	$7,454.81	$470.01	0.06305	1.06
49.5 - 50.5	$7,028.90	$482.05	0.06858	0.99
50.5 - 51.5	$6,628.64	$272.89	0.04117	0.93
51.5 - 52.5	$6,558.48	$64.95	0.00990	0.89
52.5 - 53.5	$6,493.53	$392.13	0.06039	0.88
53.5 - 54.5	$6,236.55	$0.00	0.00000	0.83
54.5 - 55.5	$6,236.55	$1,229.61	0.19716	0.83
55.5 - 56.5	$5,006.94	$0.00	0.00000	0.66
56.5 - 57.5	$5,006.94	$494.32	0.09873	0.66
57.5 - 58.5	$4,512.62	$320.58	0.07104	0.60
58.5 - 59.5	$4,192.04	$44.62	0.01064	0.56
59.5 - 60.5	$4,147.42	$138.17	0.03331	0.55
60.5 - 61.5	$4,009.25	$345.25	0.08611	0.53
61.5 - 62.5	$3,664.00	$0.00	0.00000	0.49
62.5 - 63.5	$3,664.00	$1,040.97	0.28411	0.49
63.5 - 64.5	$2,623.03	$2,180.60	0.83133	0.35
64.5 - 65.5	$442.43	$202.73	0.45822	0.06
65.5 - 66.5	$239.70	$0.00	0.00000	0.03
66.5 - 67.5	$239.70	$0.00	0.00000	0.03
67.5 - 68.5	$239.70	$0.00	0.00000	0.03
68.5 - 69.5	$239.70	$0.00	0.00000	0.03
69.5 - 70.5	$239.70	$0.00	0.00000	0.03
70.5 - 71.5	$239.70	$0.00	0.00000	0.03
71.5 - 72.5	$239.70	$0.00	0.00000	0.03
72.5 - 73.5	$239.70	$0.00	0.00000	0.03

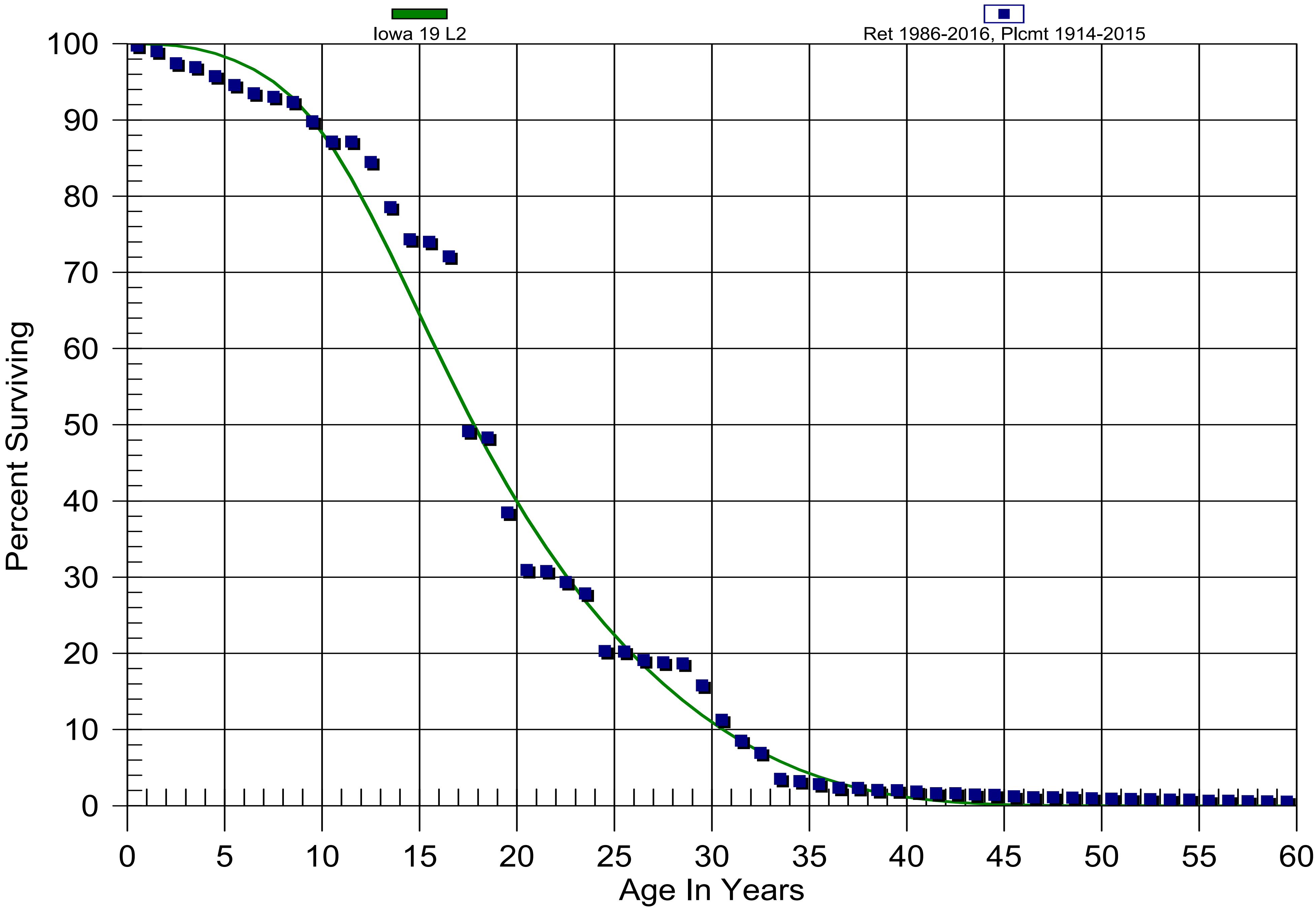
WGL
Gas Division
363.50 Other Equipment

Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1914 TO 2015

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$239.70	$0.00	0.00000	0.03
74.5 - 75.5	$239.70	$0.00	0.00000	0.03
75.5 - 76.5	$239.70	$104.55	0.43617	0.03
76.5 - 77.5	$135.15	$0.00	0.00000	0.02
77.5 - 78.5	$135.15	$0.00	0.00000	0.02
78.5 - 79.5	$135.15	$0.00	0.00000	0.02
79.5 - 80.5	$135.15	$0.00	0.00000	0.02
80.5 - 81.5	$135.15	$0.00	0.00000	0.02
81.5 - 82.5	$135.15	$0.00	0.00000	0.02
82.5 - 83.5	$135.15	$0.00	0.00000	0.02

WGL

Gas Division
363.50 Other Equipment
Original And Smooth Survivor Curves



WGL
Gas Division
380.20 Services - Plastic

Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1776 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$462,175,424.31	$165,702.80	0.00036	100.00
0.5 - 1.5	$440,045,702.81	$398,653.45	0.00091	99.96
1.5 - 2.5	$404,116,905.89	$288,943.60	0.00072	99.87
2.5 - 3.5	$374,096,105.24	$457,622.62	0.00122	99.80
3.5 - 4.5	$351,807,074.35	$202,444.87	0.00058	99.68
4.5 - 5.5	$336,369,373.51	$219,737.78	0.00065	99.62
5.5 - 6.5	$331,413,159.15	$190,861.12	0.00058	99.56
6.5 - 7.5	$324,185,869.02	$229,957.23	0.00071	99.50
7.5 - 8.5	$319,636,304.05	$180,785.55	0.00057	99.43
8.5 - 9.5	$308,252,907.51	$289,164.47	0.00094	99.37
9.5 - 10.5	$290,266,332.23	$170,901.40	0.00059	99.28
10.5 - 11.5	$270,781,173.06	$253,992.18	0.00094	99.22
11.5 - 12.5	$250,439,320.63	$181,060.67	0.00072	99.13
12.5 - 13.5	$238,303,272.03	$160,660.06	0.00067	99.06
13.5 - 14.5	$231,616,589.63	$263,912.15	0.00114	98.99
14.5 - 15.5	$223,315,334.87	$173,860.41	0.00078	98.88
15.5 - 16.5	$211,671,279.14	$208,295.24	0.00098	98.80
16.5 - 17.5	$200,332,916.46	$241,531.68	0.00121	98.70
17.5 - 18.5	$188,358,930.15	$295,449.89	0.00157	98.58
18.5 - 19.5	$161,963,829.07	$162,780.56	0.00101	98.43
19.5 - 20.5	$150,351,055.61	$225,681.08	0.00150	98.33
20.5 - 21.5	$139,321,758.52	$272,299.37	0.00195	98.18
21.5 - 22.5	$128,743,033.38	$227,069.75	0.00176	97.99
22.5 - 23.5	$119,397,585.14	$245,245.55	0.00205	97.82
23.5 - 24.5	$109,592,268.63	$148,042.84	0.00135	97.62
24.5 - 25.5	$101,476,111.58	$218,623.25	0.00215	97.49
25.5 - 26.5	$94,768,188.15	$169,196.25	0.00179	97.28
26.5 - 27.5	$87,042,493.58	$280,372.46	0.00322	97.10
27.5 - 28.5	$81,508,864.55	$279,786.67	0.00343	96.79
28.5 - 29.5	$73,435,530.48	$229,590.93	0.00313	96.46
29.5 - 30.5	$67,338,518.94	$212,612.24	0.00316	96.16
30.5 - 31.5	$62,312,200.29	$164,305.29	0.00264	95.85
31.5 - 32.5	$57,448,400.92	$233,294.88	0.00406	95.60
32.5 - 33.5	$52,561,610.77	$175,076.27	0.00333	95.21
33.5 - 34.5	$47,965,805.62	$158,151.36	0.00330	94.89
34.5 - 35.5	$43,267,580.58	$210,310.96	0.00486	94.58
35.5 - 36.5	$36,350,442.80	$237,264.14	0.00653	94.12

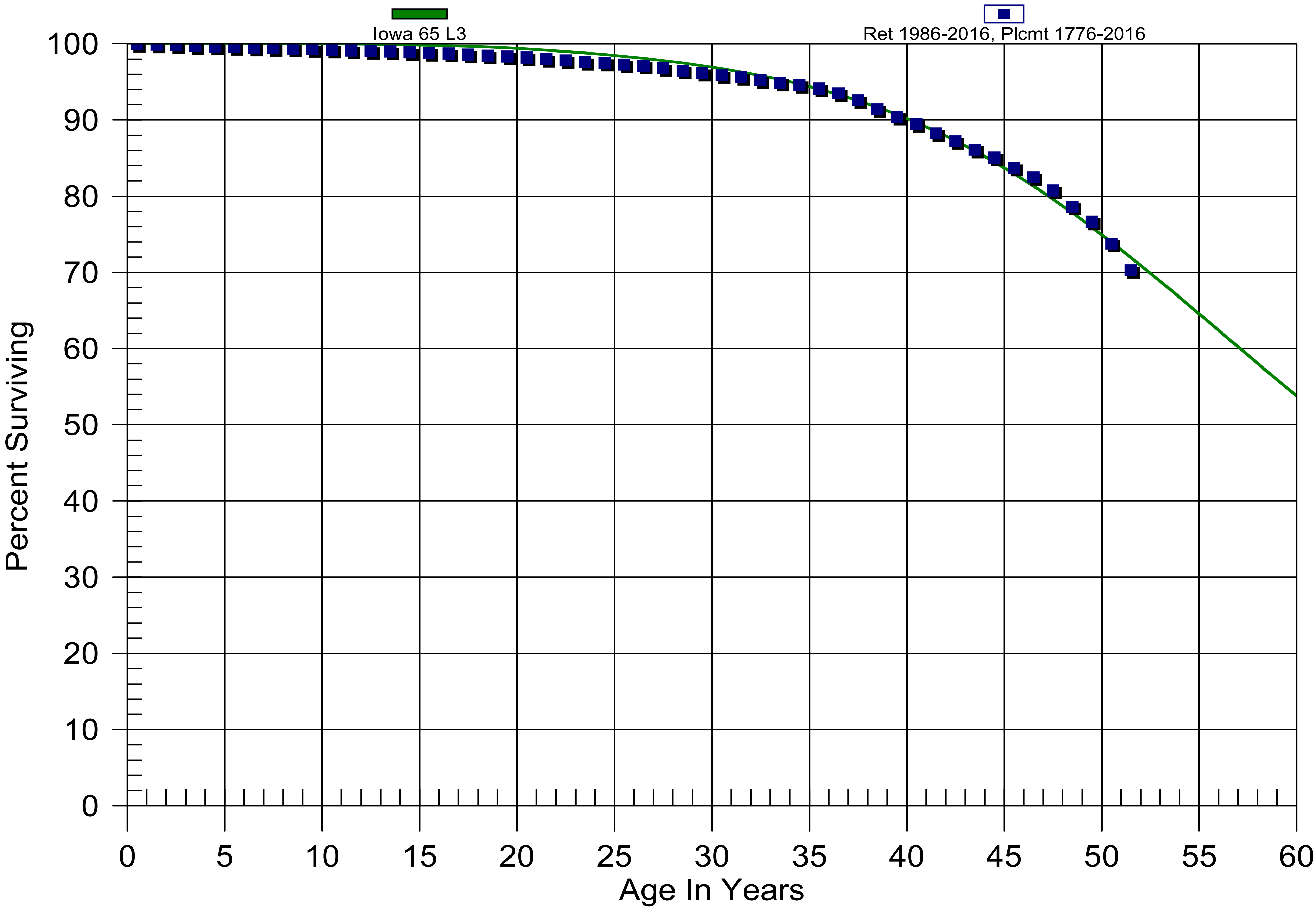
WGL
Gas Division
380.20 Services - Plastic

Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1776 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$29,232,118.81	$286,424.52	0.00980	93.51
37.5 - 38.5	$25,669,126.21	$332,642.79	0.01296	92.59
38.5 - 39.5	$22,038,937.12	$238,928.07	0.01084	91.39
39.5 - 40.5	$20,430,714.27	$210,168.09	0.01029	90.40
40.5 - 41.5	$18,281,093.22	$248,915.82	0.01362	89.47
41.5 - 42.5	$15,410,933.17	$183,709.69	0.01192	88.25
42.5 - 43.5	$13,576,557.78	$171,029.11	0.01260	87.20
43.5 - 44.5	$11,976,773.97	$145,791.45	0.01217	86.10
44.5 - 45.5	$9,073,142.43	$142,463.11	0.01570	85.05
45.5 - 46.5	$6,098,059.23	$91,789.58	0.01505	83.72
46.5 - 47.5	$3,932,478.91	$81,292.32	0.02067	82.46
47.5 - 48.5	$1,886,402.03	$50,251.71	0.02664	80.75
48.5 - 49.5	$608,963.89	$15,188.93	0.02494	78.60
49.5 - 50.5	$294,149.10	$10,985.89	0.03735	76.64
50.5 - 51.5	$118,303.32	$5,622.92	0.04753	73.78

WGL

Gas Division
380.20 Services - Plastic
Original And Smooth Survivor Curves



WGL
Gas Division
390.00 Structures and Improvements
Observed Life Table
Retirement Expr. 1986 TO 2016
Placement Years 1956 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$16,267,129.18	$0.00	0.00000	100.00
0.5 - 1.5	$15,974,268.88	$0.00	0.00000	100.00
1.5 - 2.5	$12,185,194.85	$41,800.00	0.00343	100.00
2.5 - 3.5	$10,278,265.83	$0.00	0.00000	99.66
3.5 - 4.5	$10,154,844.60	$274,091.87	0.02699	99.66
4.5 - 5.5	$9,804,322.31	$164,909.59	0.01682	96.97
5.5 - 6.5	$8,837,958.34	$0.00	0.00000	95.34
6.5 - 7.5	$8,470,277.22	$48,446.19	0.00572	95.34
7.5 - 8.5	$7,888,253.11	$0.00	0.00000	94.79
8.5 - 9.5	$7,493,139.31	$5,000.00	0.00067	94.79
9.5 - 10.5	$7,305,437.51	$0.00	0.00000	94.73
10.5 - 11.5	$8,048,468.49	$16,706.31	0.00208	94.73
11.5 - 12.5	$7,447,720.06	$110,896.90	0.01489	94.53
12.5 - 13.5	$7,241,017.31	$58,539.98	0.00808	93.12
13.5 - 14.5	$6,057,158.15	$35,000.00	0.00578	92.37
14.5 - 15.5	$6,006,315.69	$6,714.70	0.00112	91.84
15.5 - 16.5	$6,202,686.45	$1,016.38	0.00016	91.73
16.5 - 17.5	$6,159,803.86	$23,732.78	0.00385	91.72
17.5 - 18.5	$5,692,330.82	$627.71	0.00011	91.37
18.5 - 19.5	$5,601,061.56	$52,416.67	0.00936	91.36
19.5 - 20.5	$5,529,917.10	$3,026.75	0.00055	90.50
20.5 - 21.5	$5,502,106.75	$12,943.75	0.00235	90.45
21.5 - 22.5	$5,466,731.68	$86.41	0.00002	90.24
22.5 - 23.5	$2,675,712.62	$0.00	0.00000	90.24
23.5 - 24.5	$2,459,762.79	$51,916.66	0.02111	90.24
24.5 - 25.5	$2,099,311.91	$6,000.00	0.00286	88.33
25.5 - 26.5	$2,053,597.76	$9,000.00	0.00438	88.08
26.5 - 27.5	$2,028,523.00	$0.00	0.00000	87.69
27.5 - 28.5	$2,035,067.73	$126,553.18	0.06219	87.69
28.5 - 29.5	$1,831,865.69	$2,500.00	0.00136	82.24
29.5 - 30.5	$1,950,902.38	$42,000.00	0.02153	82.13
30.5 - 31.5	$1,883,000.49	$28,532.40	0.01515	80.36
31.5 - 32.5	$1,832,655.56	$1,000.00	0.00055	79.14
32.5 - 33.5	$1,831,655.56	$122,682.61	0.06698	79.10
33.5 - 34.5	$1,507,645.71	$3,000.00	0.00199	73.80
34.5 - 35.5	$1,430,338.01	$36,070.03	0.02522	73.65
35.5 - 36.5	$1,333,701.87	$6,000.00	0.00450	71.80

WGL

Gas Division

390.00 Structures and Improvements

Observed Life Table

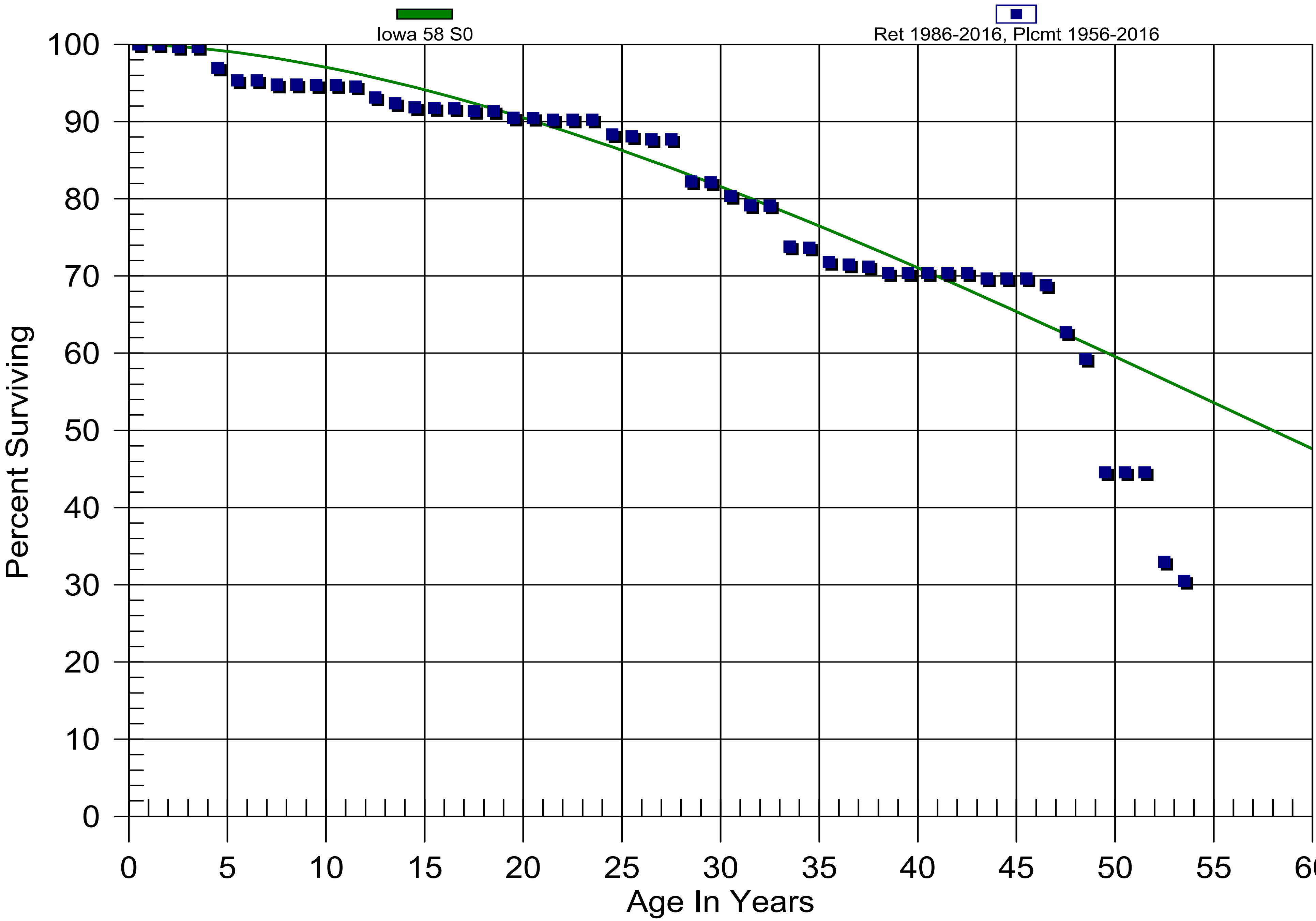
Retirement Expr. 1986 TO 2016

Placement Years 1956 TO 2016

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
36.5 - 37.5	$1,248,668.30	$5,000.00	0.00400	71.47
37.5 - 38.5	$1,206,373.07	$13,766.67	0.01141	71.19
38.5 - 39.5	$1,185,754.95	$0.00	0.00000	70.38
39.5 - 40.5	$1,185,754.95	$0.00	0.00000	70.38
40.5 - 41.5	$1,100,414.88	$0.00	0.00000	70.38
41.5 - 42.5	$421,032.37	$0.00	0.00000	70.38
42.5 - 43.5	$421,032.37	$4,300.00	0.01021	70.38
43.5 - 44.5	$416,732.37	$0.00	0.00000	69.66
44.5 - 45.5	$416,732.37	$0.00	0.00000	69.66
45.5 - 46.5	$416,732.37	$5,232.58	0.01256	69.66
46.5 - 47.5	$235,374.88	$20,795.53	0.08835	68.78
47.5 - 48.5	$213,228.62	$11,702.15	0.05488	62.71
48.5 - 49.5	$201,526.47	$50,000.00	0.24811	59.26
49.5 - 50.5	$151,526.47	$0.00	0.00000	44.56
50.5 - 51.5	$151,526.47	$0.00	0.00000	44.56
51.5 - 52.5	$151,526.47	$39,425.39	0.26019	44.56
52.5 - 53.5	$112,101.08	$8,368.97	0.07466	32.97

WGL

Gas Division
390.00 Structures and Improvements
Original And Smooth Survivor Curves



WGL
Gas Division
361.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 59 **Survivor Curve:** R1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1951	21,164.76	59.00	358.72	16.10	5,776.09
1952	424,385.73	59.00	7,192.89	16.52	118,818.88
1953	8,252.47	59.00	139.87	16.94	2,369.97
1954	1,960.82	59.00	33.23	17.38	577.55
1956	2,264.26	59.00	38.38	18.27	701.24
1957	25,874.35	59.00	438.54	18.73	8,215.49
1958	3,055.88	59.00	51.79	19.20	994.62
1960	6,046.58	59.00	102.48	20.17	2,066.95
1961	13,260.55	59.00	224.75	20.67	4,644.61
1962	23,973.71	59.00	406.33	21.17	8,602.33
1963	1,763.69	59.00	29.89	21.68	648.18
1965	2,440.38	59.00	41.36	22.74	940.52
1967	3,563.55	59.00	60.40	23.83	1,439.12
1968	14,384.58	59.00	243.80	24.38	5,945.08
1970	6,472.41	59.00	109.70	25.52	2,799.92
1971	75,283.98	59.00	1,275.98	26.11	33,310.65
1972	8,746.02	59.00	148.24	26.70	3,957.31
1974	14,819.09	59.00	251.17	27.90	7,007.42
1977	26,031.41	59.00	441.21	29.76	13,131.14
1978	9,438.09	59.00	159.97	30.40	4,862.65
1980	17,750.97	59.00	300.86	31.69	9,534.30
1981	18,184.01	59.00	308.20	32.35	9,969.43
1982	3,211.73	59.00	54.44	33.01	1,796.96
1983	5,535.87	59.00	93.83	33.68	3,160.08
1987	26,934.98	59.00	456.52	36.42	16,627.45
1988	4,211.86	59.00	71.39	37.12	2,650.07
1989	128,054.97	59.00	2,170.40	37.83	82,100.75

WGL
Gas Division
361.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 59 **Survivor Curve:** R1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1992	59,012.39	59.00	1,000.20	39.98	39,984.94
1993	92,779.84	59.00	1,572.52	40.70	64,008.60
1994	166,927.03	59.00	2,829.24	41.44	117,233.43
1995	31,032.01	59.00	525.96	42.17	22,181.18
1996	79,632.91	59.00	1,349.69	42.91	57,919.09
1997	173,726.66	59.00	2,944.49	43.66	128,551.39
1998	279,692.31	59.00	4,740.49	44.41	210,515.85
1999	62,550.58	59.00	1,060.17	45.16	47,878.02
2004	60,140.70	59.00	1,019.32	48.99	49,937.61
2006	28,039.67	59.00	475.24	50.55	24,023.80
2007	60,387.54	59.00	1,023.51	51.34	52,543.64
2008	94,788.99	59.00	1,606.57	52.13	83,746.03
2009	231,391.10	59.00	3,921.84	52.92	207,545.05
2010	1,487,666.50	59.00	25,214.39	53.72	1,354,484.53
2011	161,651.36	59.00	2,739.82	54.52	149,377.19
2013	247,171.57	59.00	4,189.30	56.14	235,170.38
2014	263,206.43	59.00	4,461.07	56.95	254,057.44
2015	30,407.88	59.00	515.38	57.77	29,771.78
2016	12,836.51	59.00	217.57	58.59	12,746.80
Total	4,520,108.68	59.00	76,611.12	45.61	3,494,325.51

Composite Average Remaining Life ... 45.61 Years

WGL
Gas Division
362.00 Gas Holders

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 **Survivor Curve:** R1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1943	513.87	57.00	9.02	11.76	106.01
1952	5,926,542.32	57.00	103,973.21	15.06	1,565,744.46
1953	525,197.70	57.00	9,213.89	15.47	142,498.03
1954	7,928.88	57.00	139.10	15.88	2,208.99
1956	5,278.51	57.00	92.60	16.74	1,549.98
1957	401,643.65	57.00	7,046.30	17.18	121,053.48
1959	2,940.37	57.00	51.58	18.09	933.21
1960	833,161.15	57.00	14,616.69	18.56	271,294.71
1961	607.33	57.00	10.65	19.04	202.86
1962	312,801.04	57.00	5,487.67	19.53	107,154.68
1963	5,887.38	57.00	103.29	20.02	2,068.22
1964	45,302.66	57.00	794.77	20.53	16,317.42
1966	52,139.71	57.00	914.72	21.57	19,730.38
1967	14,890.52	57.00	261.23	22.10	5,774.33
1968	68,539.79	57.00	1,202.44	22.65	27,231.59
1969	2,312.70	57.00	40.57	23.20	941.24
1970	62,379.59	57.00	1,094.37	23.76	25,999.00
1971	617,018.32	57.00	10,824.76	24.33	263,328.98
1972	3,200.43	57.00	56.15	24.90	1,398.31
1973	4,652.48	57.00	81.62	25.49	2,080.54
1974	90,527.33	57.00	1,588.18	26.08	41,423.71
1975	94,543.18	57.00	1,658.63	26.69	44,261.13
1976	15,106.38	57.00	265.02	27.30	7,233.98
1978	14,501.17	57.00	254.40	28.54	7,260.22
1979	45,582.28	57.00	799.68	29.17	23,328.44
1980	69,930.27	57.00	1,226.83	29.81	36,576.10
1981	190,251.21	57.00	3,337.70	30.46	101,672.04

WGL
Gas Division
362.00 Gas Holders

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 **Survivor Curve:** R1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1982	629,864.36	57.00	11,050.12	31.12	343,827.54
1983	46,006.49	57.00	807.12	31.78	25,648.78
1984	226.15	57.00	3.97	32.45	128.74
1985	512,999.00	57.00	8,999.88	33.12	298,105.03
1986	379,606.73	57.00	6,659.69	33.80	225,122.37
1987	160,971.05	57.00	2,824.02	34.49	97,408.18
1988	298,256.05	57.00	5,232.50	35.19	184,119.32
1989	46,943.27	57.00	823.56	35.89	29,556.02
1990	176,566.51	57.00	3,097.62	36.59	113,355.97
1991	189,500.48	57.00	3,324.53	37.31	124,023.19
1992	18,698.87	57.00	328.05	38.02	12,473.37
1993	207,502.01	57.00	3,640.34	38.75	141,048.51
1994	229,079.52	57.00	4,018.89	39.47	158,640.36
1995	24,833.07	57.00	435.66	40.21	17,516.02
1996	97,559.44	57.00	1,711.55	40.94	70,076.43
1997	505,141.41	57.00	8,862.03	41.69	369,418.75
1998	1,025,541.33	57.00	17,991.74	42.43	763,430.27
1999	1,308,721.38	57.00	22,959.75	43.18	991,459.78
2000	716,336.32	57.00	12,567.16	43.94	552,178.44
2001	1,901,251.89	57.00	33,354.90	44.70	1,490,897.96
2002	729,219.30	57.00	12,793.17	45.46	581,601.50
2003	545,966.44	57.00	9,578.25	46.23	442,793.57
2004	345,295.01	57.00	6,057.74	47.00	284,723.40
2005	1,278,700.80	57.00	22,433.08	47.78	1,071,811.74
2006	940,187.48	57.00	16,494.32	48.56	800,943.45
2007	5,946.47	57.00	104.32	49.34	5,147.56
2008	408,156.47	57.00	7,160.56	50.13	358,970.87

WGL
Gas Division
362.00 Gas Holders

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: ***57*** ***Survivor Curve:*** ***R1.5***

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2009	640,515.08	57.00	11,236.97	50.92	572,240.47
2010	1,397,621.90	57.00	24,519.39	51.72	1,268,187.98
2011	500,812.05	57.00	8,786.07	52.52	461,463.10
2012	253,989.54	57.00	4,455.90	53.33	237,622.66
2013	432,347.92	57.00	7,584.96	54.14	410,627.00
2014	87,020.13	57.00	1,526.65	54.95	83,889.93
2015	12,418.00	57.00	217.86	55.77	12,149.19
2016	108,983.53	57.00	1,911.97	56.59	108,195.31
Total	25,576,165.67	57.00	448,699.40	34.65	15,548,174.81

Composite Average Remaining Life ... 34.65 Years

WGL
Gas Division
363.50 Other Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 19 **Survivor Curve:** L2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2002	33,578.77	19.00	1,767.30	8.59	15,182.66
2003	3,552.41	19.00	186.97	8.92	1,668.59
2004	12,096.70	19.00	636.67	9.30	5,923.43
2005	84,446.62	19.00	4,444.56	9.74	43,287.82
2006	14,980.18	19.00	788.43	10.24	8,076.26
2007	40,503.40	19.00	2,131.76	10.82	23,067.07
2008	25,556.37	19.00	1,345.07	11.48	15,435.99
2009	88,061.32	19.00	4,634.80	12.21	56,577.99
2010	201,323.56	19.00	10,595.97	13.00	137,733.87
2011	381,229.23	19.00	20,064.69	13.83	277,541.52
2012	691,479.42	19.00	36,393.64	14.70	534,997.78
2013	766,969.09	19.00	40,366.78	15.60	629,893.49
2014	423,077.03	19.00	22,267.20	16.54	368,342.15
2015	269,866.45	19.00	14,203.49	17.51	248,701.99
Total	3,036,720.55	19.00	159,827.34	14.81	2,366,430.62

Composite Average Remaining Life ... 14.81 Years

WGL

Gas Division

365.20 Rights of Way

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 **Survivor Curve:** R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1931	29,105.53	60.00	485.09	3.93	1,904.11
1943	7,406.68	60.00	123.44	7.10	875.96
1950	29,895.10	60.00	498.25	9.38	4,674.73
1952	32,471.92	60.00	541.20	10.15	5,494.38
1955	7,587.17	60.00	126.45	11.42	1,444.12
1958	1,007.52	60.00	16.79	12.83	215.43
1959	4,545.23	60.00	75.75	13.33	1,009.76
1961	155,747.58	60.00	2,595.79	14.38	37,322.08
1965	128,912.56	60.00	2,148.54	16.66	35,802.55
1968	137,088.58	60.00	2,284.81	18.53	42,331.99
1969	20,473.21	60.00	341.22	19.18	6,543.47
1972	63,177.07	60.00	1,052.95	21.20	22,317.48
1974	2.00	60.00	0.03	22.60	0.75
1977	772.08	60.00	12.87	24.78	318.93
1978	2,195.71	60.00	36.60	25.54	934.46
1979	3,592.50	60.00	59.88	26.29	1,574.22
1981	56,434.49	60.00	940.58	27.84	26,185.81
1982	10,033.18	60.00	167.22	28.63	4,787.04
1983	14,042.80	60.00	234.05	29.42	6,886.11
1985	7,437.66	60.00	123.96	31.04	3,847.54
1986	9,841.00	60.00	164.02	31.86	5,225.75
1987	5,035.59	60.00	83.93	32.69	2,743.69
1988	380,276.75	60.00	6,337.95	33.53	212,509.31
1989	97.50	60.00	1.63	34.37	55.86
1990	86,238.16	60.00	1,437.30	35.23	50,634.81
1991	139,684.93	60.00	2,328.08	36.09	84,017.61
1992	736,280.79	60.00	12,271.35	36.96	453,533.24

WGL
Gas Division
365.20 Rights of Way

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 **Survivor Curve:** R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1993	37,295.97	60.00	621.60	37.84	23,518.53
1994	36,863.47	60.00	614.39	38.72	23,788.60
1995	6,885.83	60.00	114.76	39.61	4,545.62
1997	1.00	60.00	0.02	41.41	0.69
1998	3,179,721.65	60.00	52,995.40	42.32	2,242,708.77
1999	31,505.09	60.00	525.09	43.24	22,702.24
2000	10,131.99	60.00	168.87	44.16	7,456.48
2001	15,413.47	60.00	256.89	45.08	11,581.74
2002	1,899,688.57	60.00	31,661.50	46.02	1,456,981.39
2004	55,252.15	60.00	920.87	47.90	44,107.81
2005	1,087,457.36	60.00	18,124.30	48.85	885,297.44
Total	8,429,599.84	60.00	140,493.43	40.83	5,735,880.52

Composite Average Remaining Life ... 40.83 Years

WGL
Gas Division
366.00 Measuring and Regulating Station Structures
Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 43 *Survivor Curve:* S4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1959	1,743.58	43.00	40.55	2.51	101.69
1963	1,193.71	43.00	27.76	3.18	88.41
1964	141.11	43.00	3.28	3.38	11.11
1969	14,170.78	43.00	329.55	4.57	1,505.47
1973	8,600.00	43.00	200.00	5.84	1,167.37
1974	4,920.00	43.00	114.42	6.21	710.72
1978	10,144.02	43.00	235.90	8.00	1,886.38
1983	851.18	43.00	19.79	11.00	217.84
1987	475,300.84	43.00	11,053.28	14.08	155,641.87
1988	14,004.87	43.00	325.69	14.94	4,865.12
1990	21,639.70	43.00	503.24	16.73	8,417.70
1991	1,495.91	43.00	34.79	17.66	614.31
1992	494,388.79	43.00	11,497.18	18.61	213,921.10
1993	87,367.43	43.00	2,031.76	19.57	39,758.77
1995	654,843.50	43.00	15,228.61	21.53	327,816.19
1997	556,958.50	43.00	12,952.26	23.51	304,492.02
1998	1,401,095.31	43.00	32,582.94	24.50	798,441.36
1999	1,019,991.70	43.00	23,720.25	25.50	604,931.52
2001	38,583.57	43.00	897.27	27.50	24,676.13
2003	114,691.50	43.00	2,667.19	29.50	78,684.55
2005	233,948.95	43.00	5,440.56	31.50	171,382.51
2009	291,463.50	43.00	6,778.08	35.50	240,627.89
2010	249,674.02	43.00	5,806.25	36.50	211,933.37
2011	35,321.19	43.00	821.41	37.50	30,803.46
2012	244,025.58	43.00	5,674.90	38.50	218,488.54
2013	119,263.54	43.00	2,773.51	39.50	109,556.24
2014	496,851.48	43.00	11,554.45	40.50	467,965.36

WGL
Gas Division
366.00 Measuring and Regulating Station Structures

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

***Average Service Life:* 43** ***Survivor Curve:* S4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2015	16,315.46	43.00	379.42	41.50	15,746.33
Total	6,608,989.72	43.00	153,694.28	26.25	4,034,453.34

Composite Average Remaining Life ... 26.25 Years

WGL
Gas Division
367.10 Mains - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1962	865,498.24	60.00	14,424.98	14.93	215,338.97
1963	156,428.91	60.00	2,607.15	15.49	40,392.54
1964	278,597.83	60.00	4,643.30	16.07	74,626.82
1965	1,528,648.05	60.00	25,477.48	16.66	424,547.40
1966	920,780.80	60.00	15,346.36	17.27	265,066.59
1967	80,981.64	60.00	1,349.69	17.89	24,146.96
1968	1,544,009.95	60.00	25,733.52	18.53	476,779.47
1969	560,097.13	60.00	9,334.96	19.18	179,013.39
1970	219,502.99	60.00	3,658.39	19.84	72,573.81
1971	522,851.67	60.00	8,714.20	20.51	178,721.35
1972	384,240.05	60.00	6,404.01	21.20	135,733.88
1973	26,915.08	60.00	448.58	21.89	9,819.03
1974	150,897.98	60.00	2,514.97	22.60	56,833.99
1975	62,230.85	60.00	1,037.18	23.32	24,184.72
1976	237,470.43	60.00	3,957.84	24.05	95,174.22
1977	193,695.49	60.00	3,228.26	24.78	80,012.41
1978	29,335.94	60.00	488.93	25.54	12,484.94
1979	354,298.85	60.00	5,904.98	26.29	155,252.26
1980	476,065.01	60.00	7,934.42	27.06	214,718.63
1981	603,748.83	60.00	10,062.49	27.84	280,141.70
1982	790,525.98	60.00	13,175.44	28.63	377,176.61
1983	204,925.96	60.00	3,415.43	29.42	100,488.66
1984	340,710.07	60.00	5,678.51	30.23	171,645.13
1985	710,656.17	60.00	11,844.28	31.04	367,625.85
1986	919,812.47	60.00	15,330.22	31.86	488,436.86
1987	1,432,932.77	60.00	23,882.23	32.69	780,746.94
1988	3,107,567.27	60.00	51,792.82	33.53	1,736,595.69

WGL

Gas Division

367.10 Mains - Steel

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 **Survivor Curve: R3**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1989	491,935.34	60.00	8,198.93	34.37	281,835.36
1990	2,462,241.20	60.00	41,037.38	35.23	1,445,707.12
1991	1.00	60.00	0.02	36.09	0.60
1992	5,485,417.36	60.00	91,423.68	36.96	3,378,899.94
1993	1,434,300.85	60.00	23,905.03	37.84	904,458.10
1994	5,442,354.30	60.00	90,705.97	38.72	3,512,039.96
1995	3,292,711.15	60.00	54,878.56	39.61	2,173,656.35
1996	872,218.54	60.00	14,536.99	40.51	588,835.30
1997	2,570,812.14	60.00	42,846.90	41.41	1,774,213.66
1998	16,881,164.93	60.00	281,352.94	42.32	11,906,556.89
1999	2,535,909.16	60.00	42,265.18	43.24	1,827,350.06
2000	185,654.22	60.00	3,094.24	44.16	136,629.24
2001	17,500,688.33	60.00	291,678.34	45.08	13,150,087.31
2002	3,845,104.93	60.00	64,085.13	46.02	2,949,034.08
2003	1,958,077.29	60.00	32,634.64	46.95	1,532,341.72
2004	1,322,306.48	60.00	22,038.46	47.90	1,055,597.78
2006	1.00	60.00	0.02	49.80	0.83
2007	606,219.66	60.00	10,103.67	50.75	512,798.15
2008	886,498.80	60.00	14,774.99	51.71	764,073.69
2009	381,535.16	60.00	6,358.92	52.68	334,969.36
2010	1,207,230.28	60.00	20,120.52	53.64	1,079,358.38
2011	804,126.14	60.00	13,402.11	54.62	731,959.92
2012	3,930,171.38	60.00	65,502.90	55.59	3,641,220.61
2013	5,930,087.79	60.00	98,834.86	56.56	5,590,552.50
2014	10,161,315.14	60.00	169,355.37	57.54	9,745,290.41
2015	15,533,177.17	60.00	258,886.46	58.52	15,151,089.14
2016	4,515,884.61	60.00	75,264.79	59.51	4,478,822.20

WGL
Gas Division
367.10 Mains - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 **Survivor Curve:** R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	126,940,570.76	60.00	2,115,677.61	45.23	95,685,657.48

Composite Average Remaining Life ... 45.23 Years

WGL
Gas Division
369.00 Measuring and Regulating Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 45 *Survivor Curve:* R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1942	381.48	45.00	8.48	2.44	20.70
1943	614.82	45.00	13.66	2.71	37.04
1946	4,303.76	45.00	95.64	3.57	341.88
1949	3,297.27	45.00	73.27	4.44	325.27
1950	166,365.46	45.00	3,696.99	4.73	17,491.89
1951	23,295.19	45.00	517.67	5.02	2,601.08
1952	2,697.93	45.00	59.95	5.31	318.52
1954	88.51	45.00	1.97	5.91	11.62
1955	231,435.02	45.00	5,142.98	6.21	31,948.55
1956	66,324.22	45.00	1,473.86	6.52	9,604.33
1957	55,123.59	45.00	1,224.96	6.83	8,365.98
1958	94,856.28	45.00	2,107.91	7.15	15,070.34
1959	81,464.92	45.00	1,810.32	7.48	13,535.31
1960	55,592.11	45.00	1,235.37	7.81	9,651.04
1961	159,565.13	45.00	3,545.88	8.15	28,915.57
1962	161,750.89	45.00	3,594.45	8.51	30,584.36
1963	105,347.70	45.00	2,341.05	8.87	20,772.64
1964	49,202.78	45.00	1,093.39	9.25	10,112.24
1965	224,757.14	45.00	4,994.58	9.63	48,122.20
1966	24,190.72	45.00	537.57	10.03	5,393.69
1967	71,432.50	45.00	1,587.38	10.44	16,579.01
1968	136,090.44	45.00	3,024.22	10.87	32,865.56
1969	72,401.07	45.00	1,608.91	11.30	18,185.96
1970	110,035.87	45.00	2,445.23	11.75	28,739.02
1971	125,427.48	45.00	2,787.26	12.22	34,047.09
1972	131,628.69	45.00	2,925.07	12.69	37,120.47
1973	117,769.78	45.00	2,617.09	13.18	34,490.17

WGL
Gas Division
369.00 Measuring and Regulating Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 45 **Survivor Curve:** R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1974	11,818.42	45.00	262.63	13.68	3,593.24
1975	24,230.79	45.00	538.46	14.20	7,644.45
1976	66,460.18	45.00	1,476.89	14.73	21,747.25
1978	38,944.86	45.00	865.44	15.82	13,691.33
1979	59,982.93	45.00	1,332.95	16.39	21,845.58
1980	205,368.91	45.00	4,563.73	16.97	77,440.70
1981	205,330.14	45.00	4,562.87	17.56	80,127.93
1982	216,525.24	45.00	4,811.65	18.17	87,404.34
1983	4,018.72	45.00	89.30	18.78	1,677.43
1984	204,755.25	45.00	4,550.10	19.41	88,326.03
1985	116,632.34	45.00	2,591.82	20.05	51,971.30
1986	132,101.94	45.00	2,935.59	20.70	60,776.96
1987	681,304.47	45.00	15,140.03	21.37	323,482.82
1988	580,338.69	45.00	12,896.36	22.04	284,256.33
1989	270,282.35	45.00	6,006.25	22.73	136,499.43
1990	840,037.73	45.00	18,667.42	23.42	437,214.87
1991	389,573.18	45.00	8,657.14	24.13	208,866.62
1992	1,295,168.35	45.00	28,781.39	24.84	715,026.42
1993	439,570.19	45.00	9,768.18	25.57	249,761.66
1994	1,178,625.99	45.00	26,191.57	26.30	688,942.53
1995	2,942,621.47	45.00	65,391.29	27.05	1,768,730.02
1996	437,255.44	45.00	9,716.74	27.80	270,144.74
1997	3,019,169.94	45.00	67,092.36	28.57	1,916,581.24
1998	4,873,057.57	45.00	108,289.67	29.34	3,177,017.67
1999	1,955,830.09	45.00	43,462.69	30.12	1,309,033.06
2000	1,366,642.97	45.00	30,369.71	30.91	938,647.25
2001	1,094,967.91	45.00	24,332.51	31.71	771,480.00

WGL
Gas Division
369.00 Measuring and Regulating Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 45 **Survivor Curve:** R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2002	1,096,816.50	45.00	24,373.59	32.51	792,416.85
2003	7,495,668.00	45.00	166,569.64	33.32	5,550,885.20
2004	1,526,101.41	45.00	33,913.21	34.15	1,157,994.74
2005	3,694,417.07	45.00	82,097.78	34.97	2,871,327.96
2006	5,976,023.96	45.00	132,799.93	35.81	4,755,819.65
2007	6,885,077.57	45.00	153,001.02	36.66	5,608,334.69
2008	1,415,250.93	45.00	31,449.88	37.51	1,179,564.20
2009	1,502,039.93	45.00	33,378.51	38.36	1,280,521.40
2010	1,069,356.93	45.00	23,763.38	39.23	932,209.47
2011	599,379.76	45.00	13,319.49	40.10	534,109.48
2012	1,501,886.86	45.00	33,375.11	40.98	1,367,617.94
2013	25,477,211.91	45.00	566,157.68	41.86	23,699,733.10
2014	3,712,330.09	45.00	82,495.85	42.75	3,526,707.21
2015	11,843,026.09	45.00	263,177.16	43.65	11,486,737.89
2016	6,122,747.62	45.00	136,060.44	44.55	6,061,162.68
Total	104,843,391.44	45.00	2,329,842.50	36.47	84,972,325.22

Composite Average Remaining Life ... 36.47 Years

WGL
Gas Division
376.10 Mains - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **80** *Survivor Curve:* **R4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1949	527,979.12	80.00	6,599.71	19.01	125,435.22
1950	648,919.05	80.00	8,111.45	19.69	159,680.70
1951	1,199,526.78	80.00	14,994.01	20.37	305,479.92
1952	1,045,223.19	80.00	13,065.23	21.07	275,270.10
1953	1,023,211.05	80.00	12,790.08	21.78	278,543.46
1954	1,388,531.76	80.00	17,356.56	22.49	390,384.03
1955	1,843,443.56	80.00	23,042.93	23.21	534,928.38
1956	1,850,238.37	80.00	23,127.87	23.95	553,808.06
1957	1,705,029.84	80.00	21,312.77	24.69	526,236.14
1958	1,821,296.49	80.00	22,766.09	25.44	579,215.11
1959	2,180,136.73	80.00	27,251.58	26.20	714,040.91
1960	2,201,314.48	80.00	27,516.30	26.97	742,131.35
1961	2,631,356.22	80.00	32,891.79	27.75	912,877.20
1962	3,332,413.94	80.00	41,654.97	28.54	1,188,945.92
1963	3,613,160.27	80.00	45,164.28	29.34	1,325,135.37
1964	3,413,491.78	80.00	42,668.44	30.15	1,286,316.58
1965	3,823,241.08	80.00	47,790.28	30.97	1,479,926.88
1966	3,800,711.36	80.00	47,508.66	31.79	1,510,430.35
1967	3,355,833.55	80.00	41,947.71	32.63	1,368,618.91
1968	3,048,044.80	80.00	38,100.37	33.47	1,275,185.19
1969	3,817,881.86	80.00	47,723.29	34.32	1,638,060.63
1970	3,938,118.68	80.00	49,226.24	35.18	1,731,982.33
1971	3,623,236.81	80.00	45,290.24	36.05	1,632,793.60
1972	2,261,705.17	80.00	28,271.18	36.93	1,043,967.24
1973	1,304,727.92	80.00	16,309.02	37.81	616,696.86
1974	1,547,115.40	80.00	19,338.85	38.70	748,491.10
1975	361,901.14	80.00	4,523.74	39.60	179,147.03

WGL
Gas Division
376.10 Mains - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 80 *Survivor Curve:* R4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1976	837,681.16	80.00	10,470.96	40.51	424,131.60
1977	573,816.77	80.00	7,172.67	41.42	297,084.92
1978	1,231,361.50	80.00	15,391.94	42.34	651,638.15
1979	1,491,908.55	80.00	18,648.77	43.26	806,732.53
1980	3,987,922.06	80.00	49,848.78	44.19	2,202,704.12
1981	4,458,193.90	80.00	55,727.15	45.12	2,514,626.96
1982	2,307,556.52	80.00	28,844.32	46.06	1,328,663.74
1983	692,161.95	80.00	8,651.98	47.01	406,705.79
1984	925,271.78	80.00	11,565.84	47.96	554,646.46
1985	1,524,213.61	80.00	19,052.58	48.91	931,862.06
1986	1,220,100.92	80.00	15,251.19	49.87	760,531.02
1987	1,687,398.79	80.00	21,092.38	50.83	1,072,074.66
1988	2,289,635.57	80.00	28,620.30	51.79	1,482,289.08
1989	1,562,913.62	80.00	19,536.32	52.76	1,030,738.86
1990	570,815.42	80.00	7,135.16	53.73	383,376.58
1991	39,187.60	80.00	489.84	54.70	26,796.28
1992	599,635.93	80.00	7,495.41	55.68	417,341.47
1993	301,001.67	80.00	3,762.50	56.66	213,178.50
1994	664,406.36	80.00	8,305.04	57.64	478,696.00
1995	819,506.99	80.00	10,243.79	58.62	600,508.11
1996	408,691.85	80.00	5,108.62	59.61	304,504.34
1997	1,257,986.09	80.00	15,724.75	60.59	952,803.26
1998	1,441,227.98	80.00	18,015.26	61.58	1,109,383.47
1999	1,120,463.46	80.00	14,005.72	62.57	876,326.61
2000	2,284,495.62	80.00	28,556.06	63.56	1,815,004.59
2001	697,843.60	80.00	8,723.00	64.55	563,079.83
2002	1,335,482.20	80.00	16,693.45	65.54	1,094,148.58

WGL
Gas Division
376.10 Mains - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 80 *Survivor Curve:* R4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2003	1,125,077.86	80.00	14,063.40	66.54	935,735.95
2004	1,087,816.15	80.00	13,597.64	67.53	918,263.10
2005	48,043.40	80.00	600.54	68.53	41,152.72
2006	1,647,708.49	80.00	20,596.26	69.52	1,431,889.67
2007	2,154,055.45	80.00	26,925.56	70.52	1,898,736.63
2008	959,908.09	80.00	11,998.79	71.51	858,089.44
2009	1,190,530.27	80.00	14,881.56	72.51	1,079,090.45
2010	2,669,964.17	80.00	33,374.39	73.51	2,453,334.22
2011	1,253,742.33	80.00	15,671.70	74.51	1,167,657.38
2012	241,835.00	80.00	3,022.92	75.51	228,247.46
2013	1,670,032.61	80.00	20,875.31	76.50	1,597,046.69
2014	1,371,539.06	80.00	17,144.15	77.50	1,328,720.09
2015	2,378,680.43	80.00	29,733.36	78.50	2,334,119.52
2016	2,648,199.46	80.00	33,102.33	79.50	2,631,660.55
Total	118,085,804.64	80.00	1,476,065.34	44.26	65,327,050.03

Composite Average Remaining Life ... 44.26 Years

WGL
Gas Division
376.20 Mains - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **60** *Survivor Curve:* **R4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1969	52,383.73	60.00	873.06	16.42	14,337.84
1970	126,788.83	60.00	2,113.14	17.14	36,219.98
1971	647,490.69	60.00	10,791.48	17.87	192,826.84
1972	889,103.94	60.00	14,818.36	18.61	275,794.22
1973	1,563,831.96	60.00	26,063.79	19.36	504,679.04
1974	3,155,102.90	60.00	52,584.90	20.13	1,058,665.83
1975	1,348,333.73	60.00	22,472.17	20.91	469,972.11
1976	1,552,373.18	60.00	25,872.81	21.71	561,602.57
1977	1,242,591.47	60.00	20,709.80	22.51	466,171.89
1978	1,630,581.74	60.00	27,176.29	23.33	633,965.36
1979	1,868,529.18	60.00	31,142.07	24.15	752,216.52
1980	3,440,767.71	60.00	57,345.97	25.00	1,433,472.12
1981	3,326,392.57	60.00	55,439.72	25.85	1,433,117.85
1982	1,514,139.74	60.00	25,235.59	26.71	674,128.79
1983	2,023,669.17	60.00	33,727.73	27.59	930,413.46
1984	2,315,985.18	60.00	38,599.65	28.47	1,098,958.27
1985	3,070,336.58	60.00	51,172.13	29.36	1,502,528.86
1986	5,578,430.93	60.00	92,973.59	30.27	2,813,965.83
1987	7,327,325.56	60.00	122,121.75	31.18	3,807,560.96
1988	11,371,612.68	60.00	189,526.35	32.10	6,083,456.77
1989	11,814,037.19	60.00	196,900.08	33.02	6,502,585.58
1990	11,280,392.23	60.00	188,006.02	33.96	6,384,662.02
1991	8,911,482.33	60.00	148,524.29	34.90	5,183,477.26
1992	7,265,072.87	60.00	121,084.21	35.85	4,340,645.69
1993	11,718,620.76	60.00	195,309.81	36.80	7,187,743.75
1994	10,979,172.28	60.00	182,985.70	37.76	6,909,594.00
1995	15,763,249.35	60.00	262,720.10	38.72	10,173,338.22

WGL
Gas Division
376.20 Mains - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **60** *Survivor Curve:* **R4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1996	14,856,144.98	60.00	247,601.73	39.69	9,827,576.81
1997	18,975,676.27	60.00	316,260.40	40.66	12,859,769.69
1998	31,889,287.28	60.00	531,486.65	41.64	22,129,859.05
1999	14,622,140.16	60.00	243,701.66	42.62	10,385,666.01
2000	15,817,189.97	60.00	263,619.10	43.60	11,493,035.00
2001	18,158,468.41	60.00	302,640.30	44.58	13,492,112.29
2002	12,854,649.64	60.00	214,243.57	45.57	9,762,578.73
2003	9,444,354.34	60.00	157,405.47	46.56	7,328,087.69
2004	8,641,691.02	60.00	144,027.79	47.55	6,847,894.43
2005	8,335,754.11	60.00	138,928.85	48.54	6,743,220.87
2006	23,833,049.15	60.00	397,216.39	49.53	19,674,151.61
2007	22,030,831.72	60.00	367,179.51	50.52	18,551,354.22
2008	18,183,576.99	60.00	303,058.78	51.52	15,613,274.55
2009	8,526,087.50	60.00	142,101.07	52.51	7,462,387.75
2010	5,280,614.41	60.00	88,010.00	53.51	4,709,528.28
2011	11,921,995.05	60.00	198,699.37	54.51	10,830,803.26
2012	16,424,158.61	60.00	273,735.22	55.51	15,193,998.42
2013	23,484,241.49	60.00	391,402.94	56.50	22,115,937.99
2014	27,603,404.27	60.00	460,055.47	57.50	26,454,467.21
2015	23,838,156.93	60.00	397,301.52	58.50	23,242,736.19
2016	37,257,037.92	60.00	620,948.91	59.50	36,946,810.78
Total	503,756,308.70	60.00	8,395,915.25	45.63	383,091,352.50

Composite Average Remaining Life ... 45.63 Years

WGL

Gas Division

376.30 Mains - Cast Iron

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 75 *Survivor Curve:* S1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1950	51,324.48	75.00	684.33	25.14	17,204.32
1951	28,001.87	75.00	373.36	25.60	9,556.49
1952	17,113.85	75.00	228.18	26.06	5,945.89
1953	41,705.18	75.00	556.07	26.53	14,750.07
1954	5,313.96	75.00	70.85	27.00	1,913.25
1955	31,267.57	75.00	416.90	27.49	11,459.25
1956	710.58	75.00	9.47	27.98	265.07
1957	7,700.34	75.00	102.67	28.48	2,923.93
1958	1,048.36	75.00	13.98	28.99	405.16
Total	184,186.19	75.00	2,455.82	26.23	64,423.43

Composite Average Remaining Life ... 26.23 Years

WGL
Gas Division
376.40 Mains - Copper

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 55 *Survivor Curve:* S2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1966	554.39	55.00	10.08	15.82	159.46
1967	662.95	55.00	12.05	16.26	196.05
Total	1,217.34	55.00	22.13	16.06	355.51

Composite Average Remaining Life ... 16.06 *Years*

WGL
Gas Division
378.00 Measuring and Regulating Equipment
Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* L1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1930	600.00	65.00	9.23	22.29	205.76
1935	3,042.89	65.00	46.81	23.57	1,103.50
1937	240.38	65.00	3.70	24.09	89.09
1938	1,353.31	65.00	20.82	24.35	507.00
1940	489.08	65.00	7.52	24.87	187.15
1941	5,386.21	65.00	82.86	25.13	2,082.61
1942	101.43	65.00	1.56	25.40	39.63
1943	3,854.80	65.00	59.30	25.66	1,521.55
1947	262.51	65.00	4.04	26.71	107.87
1948	4,887.13	65.00	75.18	26.97	2,028.07
1949	2,201.59	65.00	33.87	27.24	922.65
1951	4,311.13	65.00	66.32	27.77	1,842.11
1952	20,702.43	65.00	318.49	28.04	8,931.12
1953	49,361.88	65.00	759.39	28.31	21,500.77
1954	22,430.12	65.00	345.07	28.58	9,863.22
1955	16,823.54	65.00	258.82	28.86	7,468.88
1957	37,116.76	65.00	571.01	29.41	16,793.96
1958	31,629.46	65.00	486.59	29.69	14,447.04
1959	20,632.98	65.00	317.42	29.97	9,514.19
1960	53,002.09	65.00	815.39	30.26	24,674.49
1961	82,928.14	65.00	1,275.78	30.55	38,976.83
1962	33,098.57	65.00	509.19	30.85	15,707.10
1963	29,768.54	65.00	457.96	31.15	14,264.03
1964	9,118.04	65.00	140.27	31.45	4,411.90
1965	14,709.96	65.00	226.30	31.76	7,187.93
1966	27,486.45	65.00	422.86	32.08	13,565.26
1967	2,634.93	65.00	40.54	32.40	1,313.53

WGL
Gas Division
378.00 Measuring and Regulating Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* L1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1968	81,574.61	65.00	1,254.96	32.74	41,081.12
1969	22,232.81	65.00	342.03	33.07	11,312.51
1970	69,204.48	65.00	1,064.65	33.42	35,582.21
1971	8,540.09	65.00	131.38	33.78	4,437.87
1972	507.66	65.00	7.81	34.14	266.67
1973	21,123.87	65.00	324.97	34.52	11,218.26
1974	35,975.82	65.00	553.46	34.91	19,320.09
1975	21,648.60	65.00	333.05	35.31	11,758.32
1977	71,321.24	65.00	1,097.22	36.14	39,650.35
1978	28,278.97	65.00	435.05	36.57	15,911.05
1979	8,077.04	65.00	124.26	37.02	4,600.03
1980	5,996.20	65.00	92.25	37.48	3,457.77
1981	143,682.36	65.00	2,210.43	37.96	83,907.64
1982	3,637.27	65.00	55.96	38.46	2,151.84
1983	112,197.59	65.00	1,726.06	38.96	67,253.89
1984	103,991.52	65.00	1,599.82	39.49	63,183.55
1985	91,330.04	65.00	1,405.03	40.04	56,258.65
1986	161,441.59	65.00	2,483.64	40.60	100,843.36
1987	633,227.36	65.00	9,741.66	41.19	401,221.99
1988	6,539.01	65.00	100.60	41.78	4,203.40
1989	143,462.12	65.00	2,207.04	42.40	93,587.90
1990	34,363.51	65.00	528.65	43.04	22,752.17
1991	62,853.35	65.00	966.94	43.69	42,248.82
1993	1,480.66	65.00	22.78	45.05	1,026.15
1994	0.45	65.00	0.01	45.75	0.32
1995	34,830.29	65.00	535.83	46.47	24,897.56
1997	66,195.33	65.00	1,018.36	47.94	48,816.74

WGL
Gas Division
378.00 Measuring and Regulating Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 **Survivor Curve:** L1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1998	747,667.27	65.00	11,502.22	48.69	560,085.23
1999	9,229.49	65.00	141.99	49.46	7,023.05
2000	3,149.08	65.00	48.45	50.25	2,434.26
2001	8,585.24	65.00	132.08	51.04	6,741.60
2002	38,651.07	65.00	594.61	51.86	30,834.19
2003	33,306.01	65.00	512.38	52.68	26,992.11
2004	26,965.68	65.00	414.84	53.52	22,202.42
2005	132,849.63	65.00	2,043.78	54.37	111,121.43
2006	58,142.27	65.00	894.47	55.24	49,408.82
2007	22,618.18	65.00	347.96	56.11	19,525.83
2008	114,929.02	65.00	1,768.08	57.01	100,795.31
2009	127,803.48	65.00	1,966.15	57.91	113,858.79
2010	204,599.40	65.00	3,147.59	58.83	185,161.55
2011	46,611.52	65.00	717.08	59.75	42,847.58
2012	63.39	65.00	0.98	60.69	59.18
2013	51,684.26	65.00	795.12	61.63	49,006.54
2014	24,492.92	65.00	376.80	62.59	23,583.05
2015	34,652.94	65.00	533.11	63.55	33,878.39
2016	39,954.79	65.00	614.67	64.52	39,656.01
Total	4,177,843.83	65.00	64,272.53	44.43	2,855,422.80

Composite Average Remaining Life ... 44.43 Years

WGL
Gas Division
380.10 Services - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 *Survivor Curve:* R2.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1959	628,465.92	60.00	10,474.42	15.53	162,673.76
1960	865,105.55	60.00	14,418.41	16.03	231,181.19
1961	1,010,759.99	60.00	16,845.98	16.55	278,765.88
1962	1,107,662.85	60.00	18,461.03	17.08	315,314.69
1963	1,007,786.07	60.00	16,796.42	17.63	296,041.07
1964	1,227,472.29	60.00	20,457.85	18.18	371,991.31
1965	1,122,340.63	60.00	18,705.66	18.75	350,785.80
1966	1,172,081.14	60.00	19,534.66	19.34	377,755.51
1967	878,056.39	60.00	14,634.26	19.93	291,681.91
1968	613,605.61	60.00	10,226.75	20.54	210,074.38
1969	476,215.67	60.00	7,936.92	21.16	167,968.94
1970	392,587.33	60.00	6,543.11	21.80	142,608.11
1971	302,266.27	60.00	5,037.77	22.44	113,032.00
1972	86,510.28	60.00	1,441.84	23.09	33,294.56
1973	28,900.18	60.00	481.67	23.75	11,441.49
1974	38,685.96	60.00	644.77	24.43	15,751.70
1975	68,938.68	60.00	1,148.98	25.12	28,857.35
1976	9,231.47	60.00	153.86	25.81	3,971.12
1977	12,648.28	60.00	210.80	26.51	5,589.07
1978	16,310.42	60.00	271.84	27.23	7,401.37
1979	58,643.69	60.00	977.39	27.95	27,315.12
1980	394,501.12	60.00	6,575.01	28.68	188,565.84
1981	372,557.79	60.00	6,209.29	29.42	182,673.82
1982	242,512.47	60.00	4,041.87	30.17	121,933.50
1983	80,188.49	60.00	1,336.47	30.92	41,327.51
1984	34,070.01	60.00	567.83	31.69	17,993.40
1985	97,399.58	60.00	1,623.32	32.46	52,690.25

WGL
Gas Division
380.10 Services - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 **Survivor Curve:** R2.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1986	147,122.97	60.00	2,452.05	33.24	81,504.90
1987	203,301.56	60.00	3,388.36	34.03	115,298.84
1988	92,977.00	60.00	1,549.61	34.82	53,962.90
1989	188,418.39	60.00	3,140.30	35.63	111,873.95
1990	182,067.83	60.00	3,034.46	36.44	110,562.80
1991	327,563.12	60.00	5,459.38	37.25	203,367.92
1992	275,240.08	60.00	4,587.33	38.08	174,667.66
1993	647,425.17	60.00	10,790.41	38.91	419,827.30
1994	579,526.42	60.00	9,658.76	39.75	383,888.03
1995	1,028,568.62	60.00	17,142.79	40.59	695,795.99
1996	640,818.24	60.00	10,680.29	41.44	442,581.56
1997	809,428.60	60.00	13,490.46	42.29	570,568.55
1998	3,589,624.85	60.00	59,827.01	43.16	2,581,993.10
1999	1,481,877.44	60.00	24,697.93	44.03	1,087,364.79
2000	1,170,590.95	60.00	19,509.83	44.90	875,980.70
2001	1,027,867.17	60.00	17,131.10	45.78	784,260.87
2002	1,114,628.56	60.00	18,577.12	46.67	866,909.87
2003	1,046,526.46	60.00	17,442.09	47.55	829,451.84
2004	318,382.59	60.00	5,306.37	48.45	257,097.16
2005	1.00	60.00	0.02	49.35	0.82
2006	159,595.03	60.00	2,659.91	50.26	133,677.35
2007	22,407.86	60.00	373.46	51.17	19,108.36
2008	233,095.27	60.00	3,884.92	52.08	202,323.99
2009	125,759.32	60.00	2,095.99	53.00	111,079.92
2010	70,109.81	60.00	1,168.50	53.92	63,004.22
2011	93,142.68	60.00	1,552.38	54.85	85,140.54
2012	440,887.08	60.00	7,348.11	55.78	409,840.95

WGL
Gas Division
380.10 Services - Steel

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 *Survivor Curve:* R2.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2013	477,400.34	60.00	7,956.66	56.71	451,205.23
2014	625,186.37	60.00	10,419.76	57.64	600,644.04
2015	519,645.72	60.00	8,660.75	58.58	507,380.75
2016	308,503.99	60.00	5,141.73	59.53	306,073.26
Total	30,293,194.62	60.00	504,885.99	34.83	17,585,118.82

Composite Average Remaining Life ... 34.83 Years

WGL
Gas Division
380.20 Services - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 **Survivor Curve:** L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1965	112,680.40	65.00	1,733.57	22.70	39,355.62
1966	164,859.89	65.00	2,536.35	23.07	58,508.75
1967	299,625.86	65.00	4,609.70	23.46	108,161.42
1968	1,227,186.43	65.00	18,880.09	23.88	450,868.88
1969	1,964,784.56	65.00	30,227.93	24.33	735,464.85
1970	2,073,790.74	65.00	31,904.97	24.80	791,277.44
1971	2,832,620.09	65.00	43,579.46	25.31	1,102,889.09
1972	2,757,840.09	65.00	42,428.98	25.84	1,096,356.90
1973	1,428,754.70	65.00	21,981.19	26.40	580,228.63
1974	1,650,665.70	65.00	25,395.26	26.99	685,302.50
1975	2,621,244.23	65.00	40,327.47	27.60	1,112,920.28
1976	1,939,452.96	65.00	29,838.21	28.24	842,651.19
1977	1,369,294.78	65.00	21,066.40	28.90	608,917.52
1978	3,297,546.30	65.00	50,732.28	29.60	1,501,650.94
1979	3,276,568.08	65.00	50,409.53	30.31	1,528,009.93
1980	6,881,059.85	65.00	105,864.12	31.05	3,287,405.97
1981	6,706,826.82	65.00	103,183.57	31.81	3,282,140.01
1982	4,540,073.68	65.00	69,848.39	32.59	2,276,379.86
1983	4,420,728.88	65.00	68,012.28	33.38	2,270,481.41
1984	4,653,495.27	65.00	71,593.36	34.20	2,448,431.55
1985	4,699,494.08	65.00	72,301.05	35.03	2,532,536.55
1986	4,813,706.41	65.00	74,058.19	35.87	2,656,297.50
1987	5,867,420.61	65.00	90,269.43	36.72	3,314,894.24
1988	7,793,547.40	65.00	119,902.61	37.59	4,506,637.87
1989	5,253,256.57	65.00	80,820.60	38.46	3,108,521.78
1990	7,556,498.32	65.00	116,255.65	39.35	4,574,134.97
1991	6,489,300.18	65.00	99,836.96	40.24	4,017,465.45

WGL
Gas Division
380.20 Services - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1992	7,968,114.21	65.00	122,588.30	41.14	5,043,428.85
1993	9,560,070.96	65.00	147,080.33	42.05	6,185,120.80
1994	9,114,901.50	65.00	140,231.46	42.97	6,025,685.11
1995	10,330,665.80	65.00	158,935.82	43.90	6,976,743.75
1996	11,043,372.44	65.00	169,900.71	44.83	7,616,402.22
1997	11,624,870.85	65.00	178,846.98	45.77	8,185,888.87
1998	26,451,045.86	65.00	406,945.57	46.72	19,011,817.33
1999	13,281,632.51	65.00	204,336.02	47.67	9,741,139.34
2000	13,304,644.10	65.00	204,690.05	48.63	9,954,792.27
2001	13,924,469.73	65.00	214,225.98	49.60	10,625,589.49
2002	11,275,352.59	65.00	173,469.69	50.57	8,772,912.84
2003	9,489,724.72	65.00	145,998.06	51.55	7,526,295.67
2004	13,602,174.07	65.00	209,267.51	52.53	10,993,661.70
2005	22,020,844.18	65.00	338,787.55	53.52	18,132,117.73
2006	22,530,440.28	65.00	346,627.61	54.51	18,895,312.56
2007	19,984,607.54	65.00	307,460.34	55.51	17,065,677.82
2008	12,739,360.39	65.00	195,993.24	56.50	11,073,995.47
2009	7,893,525.61	65.00	121,440.77	57.50	6,982,812.92
2010	10,696,552.06	65.00	164,564.93	58.50	9,626,911.34
2011	11,985,272.30	65.00	184,391.70	59.50	10,971,121.68
2012	22,393,360.23	65.00	344,518.65	60.50	20,843,026.10
2013	26,652,871.03	65.00	410,050.62	61.50	25,217,693.87
2014	34,260,764.39	65.00	527,096.97	62.50	32,943,021.96
2015	40,319,841.89	65.00	620,315.01	63.50	39,389,369.37
2016	26,892,809.63	65.00	413,742.04	64.50	26,685,938.61

WGL
Gas Division
380.20 Services - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 **Survivor Curve:** L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	516,033,611.75	65.00	7,939,103.49	50.89	404,004,368.78

Composite Average Remaining Life ... 50.89 Years

WGL

Gas Division

380.30 Services - Copper

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1955	19.83	60.00	0.33	11.42	3.77
1956	48,826.53	60.00	813.78	11.87	9,662.00
1957	105,825.58	60.00	1,763.76	12.34	21,770.86
1958	161,644.69	60.00	2,694.08	12.83	34,563.10
1959	104,499.79	60.00	1,741.66	13.33	23,215.45
1960	231,556.47	60.00	3,859.28	13.85	53,442.24
1961	499,068.17	60.00	8,317.81	14.38	119,592.64
1962	730,102.06	60.00	12,168.38	14.93	181,651.93
1963	648,397.15	60.00	10,806.63	15.49	167,426.88
1964	718,476.98	60.00	11,974.62	16.07	192,455.38
1965	729,362.20	60.00	12,156.04	16.66	202,563.84
1966	793,896.94	60.00	13,231.62	17.27	228,540.33
1967	839,800.47	60.00	13,996.68	17.89	250,410.25
1968	48,271.69	60.00	804.53	18.53	14,905.96
1969	8,917.67	60.00	148.63	19.18	2,850.19
1970	11,957.60	60.00	199.29	19.84	3,953.52
1971	5,153.44	60.00	85.89	20.51	1,761.55
1972	254.68	60.00	4.24	21.20	89.97
1974	392.84	60.00	6.55	22.60	147.96
1975	631.34	60.00	10.52	23.32	245.36
1979	5.59	60.00	0.09	26.29	2.45
2005	1,220.90	60.00	20.35	48.85	993.93
2007	1,760.76	60.00	29.35	50.75	1,489.42
2008	7,605.96	60.00	126.77	51.71	6,555.58
2009	207.26	60.00	3.45	52.68	181.96
2010	57,022.69	60.00	950.38	53.64	50,982.75
2014	4,902.20	60.00	81.70	57.54	4,701.49

WGL
Gas Division
380.30 Services - Copper

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **60** *Survivor Curve:* **R3**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2015	0.01	60.00	0.00	58.52	0.01
Total	5,759,781.49	60.00	95,996.42	16.40	1,574,160.78

Composite Average Remaining Life ... **16.40 Years**

WGL
Gas Division
381.10 Meters - Tin Case

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **30** *Survivor Curve:* **S2**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1955	300.81	0.00	0.00	0.00	0.00
1958	286.46	30.00	9.55	0.50	4.77
1960	670.74	30.00	22.36	0.72	16.20
1962	1,005.91	30.00	33.53	1.08	36.26
1963	865.97	30.00	28.87	1.25	36.15
1964	9,435.01	30.00	314.50	1.45	455.65
1965	1,299.81	30.00	43.33	1.65	71.44
1966	4,247.72	30.00	141.59	1.84	260.89
1967	38.47	30.00	1.28	2.05	2.63
1968	4,575.43	30.00	152.51	2.27	345.99
Total	22,726.33	27.00	747.52	1.65	1,229.99

Composite Average Remaining Life ... **1.65** *Years*

WGL

Gas Division

381.20 Meters - Hard Case

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 25 *Survivor Curve:* S1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1969	6,501.06	25.00	260.04	0.75	194.57
1970	11,746.59	25.00	469.86	0.98	461.52
1971	1,352.02	25.00	54.08	1.23	66.27
1972	3,505.54	25.00	140.22	1.47	206.33
1973	10,286.67	25.00	411.47	1.72	707.13
1974	4,811.83	25.00	192.47	1.97	378.45
1980	9,030.86	25.00	361.23	3.50	1,263.14
1981	102,045.21	25.00	4,081.81	3.77	15,376.20
1984	5,522.17	25.00	220.89	4.62	1,020.87
1986	9,399.72	25.00	375.99	5.24	1,969.08
1987	27,130.41	25.00	1,085.22	5.56	6,035.16
1988	47,654.45	25.00	1,906.18	5.90	11,242.14
1989	225,614.21	25.00	9,024.57	6.25	56,381.70
1990	1,013,823.97	25.00	40,552.96	6.61	268,129.69
1991	521,995.37	25.00	20,879.81	6.99	145,984.39
1992	859,276.22	25.00	34,371.05	7.39	253,939.49
1993	1,293,019.80	25.00	51,720.79	7.80	403,559.25
1994	836,287.43	25.00	33,451.50	8.24	275,517.28
1995	1,191,339.08	25.00	47,653.56	8.69	414,133.23
1996	1,611,777.90	25.00	64,471.12	9.17	590,975.79
1997	1,523,720.46	25.00	60,948.82	9.67	589,115.29
1998	1,939,085.52	25.00	77,563.42	10.19	790,333.33
1999	1,316,835.70	25.00	52,673.43	10.74	565,669.51
2000	1,587,753.88	25.00	63,510.15	11.32	718,683.76
2001	1,757,521.85	25.00	70,300.87	11.92	838,079.29
2002	2,247,165.52	25.00	89,886.62	12.56	1,128,627.07
2003	2,350,860.90	25.00	94,034.43	13.22	1,243,265.18

WGL
Gas Division
381.20 Meters - Hard Case

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 25 **Survivor Curve:** S1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2004	1,365,455.94	25.00	54,618.24	13.92	760,168.66
2005	1,548,853.97	25.00	61,954.16	14.65	907,381.71
2006	2,102.06	25.00	84.08	15.41	1,295.38
2007	1,662,424.94	25.00	66,497.00	16.20	1,077,100.55
2008	165,117.02	25.00	6,604.68	17.02	112,414.89
2009	2,259,595.77	25.00	90,383.83	17.87	1,615,454.71
2010	2,869,438.44	25.00	114,777.54	18.75	2,152,603.49
2011	1,497,129.80	25.00	59,885.19	19.66	1,177,488.31
2012	3,661,714.01	25.00	146,468.56	20.59	3,016,435.46
2013	1,855,696.60	25.00	74,227.86	21.55	1,599,440.75
2014	2,237,144.58	25.00	89,485.78	22.52	2,015,133.73
2015	2,442,804.07	25.00	97,712.16	23.50	2,296,692.24
2016	283,545.87	25.00	11,341.83	24.50	277,877.43
Total	42,366,087.41	25.00	1,694,643.48	14.95	25,330,802.40

Composite Average Remaining Life ... *14.95 Years*

WGL
Gas Division
381.30 Meters - Electronic Devices

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 20 *Survivor Curve:* L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1982	7,258.54	20.00	362.93	2.70	979.51
1986	35,278.85	20.00	1,763.96	3.65	6,430.31
1987	2,207.16	20.00	110.36	3.90	429.96
1989	2,450.95	20.00	122.55	4.41	540.77
1990	41,098.74	20.00	2,054.95	4.67	9,601.65
1991	29,384.02	20.00	1,469.21	4.92	7,232.00
1992	1.00	20.00	0.05	5.16	0.26
1993	1.00	20.00	0.05	5.38	0.27
1994	1.00	20.00	0.05	5.59	0.28
1995	3,948.20	20.00	197.41	5.76	1,137.91
1996	56,087.56	20.00	2,804.40	5.93	16,636.13
1997	534,704.59	20.00	26,735.44	6.10	163,080.85
1998	688,079.55	20.00	34,404.25	6.28	216,221.77
1999	175,296.94	20.00	8,764.92	6.50	57,000.28
2000	64,133.62	20.00	3,206.71	6.78	21,728.50
2005	4,678.41	20.00	233.92	9.36	2,189.08
2008	95,681.47	20.00	4,784.11	11.80	56,455.96
2009	223,022.43	20.00	11,151.21	12.69	141,562.25
2010	60,355.37	20.00	3,017.79	13.61	41,084.45
2011	10,159.87	20.00	508.00	14.56	7,395.44
2012	326,235.75	20.00	16,311.92	15.52	253,215.78
2013	23,231.36	20.00	1,161.58	16.51	19,173.35
2014	448,280.89	20.00	22,414.22	17.50	392,257.33
2015	2,074.15	20.00	103.71	18.50	1,918.59

WGL

Gas Division

381.30 Meters - Electronic Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 20 *Survivor Curve:* L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	2,833,651.42	20.00	141,683.69	10.00	1,416,272.65

Composite Average Remaining Life ... 10.00 Years

WGL
Gas Division
381.50 Meters - Electronic Demand Recorders
Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 20 **Survivor Curve:** L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1956	554.47	0.00	0.00	0.00	0.00
1966	383.12	0.00	0.00	0.00	0.00
1967	430.17	0.00	0.00	0.00	0.00
1969	934.46	0.00	0.00	0.00	0.00
1970	951.47	20.00	47.57	0.50	23.79
1971	487.60	20.00	24.38	0.60	14.62
1973	1,874.94	20.00	93.75	0.91	85.05
1980	3,372.16	20.00	168.61	2.26	381.59
1983	2,479.95	20.00	124.00	2.92	362.46
1985	207,865.16	20.00	10,393.34	3.40	35,304.40
1987	45,087.74	20.00	2,254.40	3.90	8,783.19
1988	29,263.21	20.00	1,463.17	4.15	6,079.32
1990	1.00	20.00	0.05	4.67	0.23
1991	2,700.24	20.00	135.01	4.92	664.58
1992	3,656.34	20.00	182.82	5.16	943.98
1993	41,376.79	20.00	2,068.86	5.38	11,136.64
1994	21,608.59	20.00	1,080.44	5.59	6,034.92
1995	1.00	20.00	0.05	5.76	0.29
1996	1,663.78	20.00	83.19	5.93	493.49
1997	1.00	20.00	0.05	6.10	0.30
1998	1.00	20.00	0.05	6.28	0.31
2000	36,050.87	20.00	1,802.56	6.78	12,214.05
2001	87,198.09	20.00	4,359.94	7.12	31,041.84
2002	3,974.49	20.00	198.73	7.54	1,499.18
2003	69,855.83	20.00	3,492.82	8.06	28,156.37
2004	73,258.54	20.00	3,662.96	8.67	31,741.32
2005	2,779.57	20.00	138.98	9.36	1,300.59

WGL
Gas Division
381.50 Meters - Electronic Demand Recorders

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 20 *Survivor Curve:* L3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	637,811.58	17.04	31,775.72	5.55	176,262.53

Composite Average Remaining Life ... 5.55 Years

WGL
Gas Division
382.00 Meter Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 **Survivor Curve:** S4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1947	1.00	65.00	0.02	7.57	0.12
1948	0.06	65.00	0.00	7.88	0.01
1949	0.03	65.00	0.00	8.21	0.00
1950	146,967.12	65.00	2,261.03	8.55	19,328.83
1951	161,118.20	65.00	2,478.74	8.91	22,080.17
1952	111,603.53	65.00	1,716.98	9.28	15,938.58
1953	113,646.81	65.00	1,748.41	9.68	16,916.40
1954	131,598.71	65.00	2,024.60	10.09	20,422.36
1955	159,009.78	65.00	2,446.30	10.52	25,725.12
1956	151,190.32	65.00	2,326.01	10.97	25,511.63
1957	131,963.12	65.00	2,030.20	11.44	23,218.31
1958	154,060.41	65.00	2,370.16	11.93	28,281.12
1959	211,536.71	65.00	3,254.41	12.45	40,513.32
1960	195,898.51	65.00	3,013.82	12.99	39,135.55
1961	195,816.66	65.00	3,012.56	13.55	40,818.42
1962	225,601.82	65.00	3,470.80	14.13	49,053.69
1963	240,980.99	65.00	3,707.40	14.75	54,672.96
1964	279,550.60	65.00	4,300.78	15.38	66,145.60
1965	295,944.20	65.00	4,552.99	16.04	73,050.81
1966	310,207.79	65.00	4,772.43	16.73	79,830.59
1967	323,094.16	65.00	4,970.68	17.44	86,704.54
1968	306,260.70	65.00	4,711.70	18.18	85,638.60
1969	355,772.86	65.00	5,473.43	18.94	103,673.57
1970	356,106.28	65.00	5,478.56	19.72	108,047.06
1971	393,760.95	65.00	6,057.86	20.53	124,394.44
1972	355,668.45	65.00	5,471.82	21.37	116,910.48
1973	103,813.21	65.00	1,597.13	22.22	35,480.39

WGL
Gas Division
382.00 Meter Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* S4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1974	18,745.28	65.00	288.39	23.09	6,658.12
1976	6,361.75	65.00	97.87	24.88	2,435.20
1977	20,396.89	65.00	313.80	25.80	8,095.96
1978	54,849.83	65.00	843.84	26.74	22,560.53
1979	193,026.58	65.00	2,969.64	27.68	82,198.99
1980	679,751.73	65.00	10,457.72	28.64	299,483.07
1981	1,104,780.41	65.00	16,996.62	29.60	503,124.76
1982	705,883.37	65.00	10,859.74	30.58	332,040.93
1983	632,642.05	65.00	9,732.96	31.55	307,107.99
1984	651,850.61	65.00	10,028.47	32.54	326,310.93
1985	879,860.01	65.00	13,536.31	33.53	453,829.62
1986	1,044,236.30	65.00	16,065.17	34.52	554,538.10
1987	1,418,219.22	65.00	21,818.76	35.51	774,829.23
1988	1,861,405.99	65.00	28,637.02	36.51	1,045,470.57
1989	1,491,630.42	65.00	22,948.16	37.50	860,668.23
1990	2,035,987.35	65.00	31,322.88	38.50	1,206,021.73
1991	1,688,879.06	65.00	25,982.76	39.50	1,026,364.34
1992	2,287,628.15	65.00	35,194.28	40.50	1,425,401.99
1993	2,269,884.63	65.00	34,921.30	41.50	1,449,252.91
1994	2,104,323.78	65.00	32,374.21	42.50	1,375,912.60
1995	2,509,164.96	65.00	38,602.54	43.50	1,679,215.75
1996	2,071,845.07	65.00	31,874.54	44.50	1,418,418.79
1997	1,611,250.23	65.00	24,788.47	45.50	1,127,875.83
1998	3,607,119.04	65.00	55,494.14	46.50	2,580,478.18
1999	2,042,548.45	65.00	31,423.82	47.50	1,492,631.71
2000	1,932,854.93	65.00	29,736.23	48.50	1,442,207.29
2001	1,944,022.51	65.00	29,908.04	49.50	1,480,448.06

WGL
Gas Division
382.00 Meter Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65   *Survivor Curve:* S4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2002	2,114,330.29	65.00	32,528.16	50.50	1,642,671.97
2003	2,082,470.29	65.00	32,038.01	51.50	1,649,957.20
2004	2,334,570.14	65.00	35,916.47	52.50	1,885,614.32
2005	2,899,175.67	65.00	44,602.71	53.50	2,386,244.56
2006	798,183.38	65.00	12,279.75	54.50	669,246.06
2007	3,289,497.53	65.00	50,607.66	55.50	2,808,724.79
2008	2,034,677.94	65.00	31,302.74	56.50	1,768,604.66
2009	4,479,152.28	65.00	68,910.04	57.50	3,962,326.99
2010	1,364,407.66	65.00	20,990.89	58.50	1,227,966.89
2011	3,058,575.75	65.00	47,055.01	59.50	2,799,773.17
2012	4,733,299.28	65.00	72,819.99	60.50	4,405,609.31
2013	2,582,050.25	65.00	39,723.85	61.50	2,443,016.77
2014	2,844,686.28	65.00	43,764.41	62.50	2,735,275.26
2015	3,753,948.98	65.00	57,753.06	63.50	3,667,319.38
2016	1,381,459.75	65.00	21,253.23	64.50	1,370,833.14
Total	82,030,807.05	65.00	1,262,012.49	47.55	60,008,258.50

Composite Average Remaining Life ... 47.55 Years

WGL
Gas Division
383.00 House Regulators

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **58** *Survivor Curve:* **S4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1958	40,018.01	58.00	689.96	7.93	5,471.53
1959	61,714.90	58.00	1,064.05	8.31	8,837.20
1960	68,735.41	58.00	1,185.09	8.70	10,310.78
1961	59,975.54	58.00	1,034.06	9.11	9,425.45
1962	64,568.84	58.00	1,113.25	9.55	10,635.08
1963	66,167.97	58.00	1,140.83	10.01	11,424.40
1964	83,340.51	58.00	1,436.90	10.49	15,080.30
1965	86,046.91	58.00	1,483.57	11.01	16,327.88
1966	80,504.99	58.00	1,388.01	11.54	16,020.55
1967	60,301.04	58.00	1,039.67	12.10	12,584.36
1968	60,464.50	58.00	1,042.49	12.69	13,227.67
1969	63,472.39	58.00	1,094.35	13.31	14,562.80
1970	73,413.59	58.00	1,265.75	13.95	17,661.32
1971	68,665.30	58.00	1,183.88	14.63	17,316.19
1972	67,311.05	58.00	1,160.53	15.32	17,784.11
1973	13,944.02	58.00	240.41	16.06	3,859.96
1974	10,980.81	58.00	189.32	16.81	3,183.17
1975	36,187.34	58.00	623.92	17.59	10,976.07
1976	31,841.56	58.00	548.99	18.40	10,103.75
1977	24,697.90	58.00	425.83	19.24	8,192.70
1978	37,780.95	58.00	651.39	20.10	13,091.09
1979	66,183.16	58.00	1,141.09	20.97	23,931.24
1980	103,803.50	58.00	1,789.71	21.87	39,144.33
1981	174,938.69	58.00	3,016.18	22.79	68,732.99
1982	141,462.58	58.00	2,439.01	23.72	57,851.58
1983	122,872.40	58.00	2,118.49	24.66	52,247.59
1984	131,681.48	58.00	2,270.37	25.62	58,166.76

WGL
Gas Division
383.00 House Regulators

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 **Survivor Curve: S4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1985	173,149.34	58.00	2,985.33	26.59	79,369.73
1986	223,808.68	58.00	3,858.76	27.56	106,347.41
1987	187,284.10	58.00	3,229.03	28.54	92,161.98
1988	229,981.46	58.00	3,965.19	29.53	117,084.97
1989	154,274.24	58.00	2,659.90	30.52	81,176.13
1990	247,634.60	58.00	4,269.56	31.51	134,540.20
1991	229,734.81	58.00	3,960.94	32.51	128,759.11
1992	216,865.92	58.00	3,739.06	33.50	125,274.87
1993	367,065.99	58.00	6,328.71	34.50	218,355.83
1994	425,515.25	58.00	7,336.46	35.50	260,454.47
1995	365,820.74	58.00	6,307.24	36.50	230,219.39
1996	368,387.79	58.00	6,351.50	37.50	238,184.19
1997	458,954.23	58.00	7,912.99	38.50	304,652.09
1998	727,172.86	58.00	12,537.44	39.50	495,231.02
1999	305,212.02	58.00	5,262.27	40.50	213,122.48
2000	137,486.82	58.00	2,370.46	41.50	98,374.28
2001	363,184.70	58.00	6,261.80	42.50	266,126.91
2002	364,362.87	58.00	6,282.11	43.50	273,272.33
2003	320,909.99	58.00	5,532.92	44.50	246,215.55
2004	394,345.22	58.00	6,799.04	45.50	309,357.16
2005	279,385.55	58.00	4,816.98	46.50	223,990.23
2006	58,243.82	58.00	1,004.20	47.50	47,699.70
2007	564,614.67	58.00	9,734.72	48.50	472,134.83
2008	243,845.01	58.00	4,204.22	49.50	208,109.16
2009	680,941.76	58.00	11,740.36	50.50	592,889.09
2010	310,962.18	58.00	5,361.41	51.50	276,113.03
2011	423,823.70	58.00	7,307.29	52.50	383,633.59

WGL
Gas Division
383.00 House Regulators

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 **Survivor Curve: S4**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2012	700,032.81	58.00	12,069.51	53.50	645,720.01
2013	298,633.39	58.00	5,148.84	54.50	280,612.44
2014	620,996.78	58.00	10,706.82	55.50	594,229.72
2015	395,921.34	58.00	6,826.22	56.50	385,682.01
2016	97,749.36	58.00	1,685.33	57.50	96,906.69
Total	12,837,377.34	58.00	221,333.73	39.63	8,772,151.46

Composite Average Remaining Life ... 39.63 Years

WGL
Gas Division
384.00 House Regulator Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 50 **Survivor Curve: S2**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1933	386.63	50.00	7.73	3.18	24.57
1934	697.76	50.00	13.96	3.39	47.28
1935	1,188.92	50.00	23.78	3.60	85.64
1936	1,399.24	50.00	27.98	3.82	106.85
1937	2,148.85	50.00	42.98	4.04	173.54
1938	2,020.15	50.00	40.40	4.26	172.16
1939	2,290.08	50.00	45.80	4.49	205.54
1940	4,348.54	50.00	86.97	4.72	410.29
1941	7,882.45	50.00	157.65	4.95	780.54
1942	4,410.76	50.00	88.22	5.19	457.70
1943	3,588.30	50.00	71.77	5.43	389.67
1944	2,523.33	50.00	50.47	5.68	286.40
1945	2,128.67	50.00	42.57	5.92	252.23
1946	5,566.63	50.00	111.33	6.18	687.85
1947	13,804.42	50.00	276.09	6.44	1,777.07
1948	22,745.91	50.00	454.92	6.70	3,047.75
1949	22,680.83	50.00	453.62	6.97	3,160.52
1950	47,884.51	50.00	957.69	7.24	6,933.89
1951	54,227.81	50.00	1,084.56	7.52	8,154.02
1952	42,041.39	50.00	840.83	7.80	6,559.98
1953	42,369.58	50.00	847.39	8.09	6,856.22
1954	59,747.16	50.00	1,194.94	8.39	10,020.78
1955	52,094.46	50.00	1,041.89	8.69	9,051.00
1956	54,164.36	50.00	1,083.29	8.99	9,743.69
1957	43,106.79	50.00	862.14	9.31	8,025.28
1958	54,910.70	50.00	1,098.21	9.63	10,575.25
1959	76,863.92	50.00	1,537.28	9.96	15,307.47

WGL
Gas Division
384.00 House Regulator Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 50 *Survivor Curve:* S2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1960	67,886.73	50.00	1,357.73	10.29	13,975.07
1961	56,415.27	50.00	1,128.31	10.64	12,000.71
1962	57,163.69	50.00	1,143.27	10.99	12,561.35
1963	71,189.20	50.00	1,423.78	11.35	16,155.13
1964	73,691.82	50.00	1,473.84	11.71	17,265.56
1965	61,826.12	50.00	1,236.52	12.09	14,951.77
1966	54,556.78	50.00	1,091.14	12.48	13,615.42
1967	45,743.70	50.00	914.87	12.87	11,778.40
1968	43,720.64	50.00	874.41	13.28	11,612.67
1969	63,753.20	50.00	1,275.06	13.70	17,464.81
1970	69,516.85	50.00	1,390.34	14.12	19,638.12
1971	37,546.18	50.00	750.92	14.56	10,936.08
1972	27,877.92	50.00	557.56	15.01	8,371.17
1973	6,540.94	50.00	130.82	15.48	2,024.62
1974	2,378.28	50.00	47.57	15.95	758.75
1975	57.53	50.00	1.15	16.44	18.92
1976	1,067.33	50.00	21.35	16.94	361.64
1977	5,241.30	50.00	104.83	17.46	1,829.90
1978	15,660.17	50.00	313.20	17.99	5,633.32
1979	37,099.44	50.00	741.99	18.53	13,749.43
1980	105,420.28	50.00	2,108.41	19.09	40,249.56
1981	112,322.53	50.00	2,246.45	19.67	44,176.84
1982	105,997.46	50.00	2,119.95	20.26	42,942.36
1983	70,799.05	50.00	1,415.98	20.86	29,542.82
1984	69,565.80	50.00	1,391.32	21.49	29,896.84
1985	113,196.90	50.00	2,263.94	22.13	50,100.09
1986	105,140.47	50.00	2,102.81	22.79	47,919.91

WGL
Gas Division
384.00 House Regulator Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 50 *Survivor Curve:* S2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1987	119,890.88	50.00	2,397.82	23.47	56,265.10
1989	140,967.49	50.00	2,819.35	24.87	70,124.02
1990	158,842.72	50.00	3,176.85	25.60	81,338.21
1991	139,291.45	50.00	2,785.83	26.35	73,414.01
1992	156,413.81	50.00	3,128.28	27.12	84,839.64
1993	227,022.37	50.00	4,540.45	27.91	126,705.97
1994	214,271.64	50.00	4,285.43	28.71	123,034.31
1995	386,588.11	50.00	7,731.76	29.53	228,330.42
1996	349,108.23	50.00	6,982.17	30.37	212,051.63
1997	334,248.09	50.00	6,684.96	31.23	208,747.16
1998	247,688.23	50.00	4,953.76	32.10	159,009.07
1999	72,087.01	50.00	1,441.74	32.99	47,558.06
2000	38,579.65	50.00	771.59	33.89	26,148.81
2001	47,459.67	50.00	949.19	34.81	33,037.83
2003	17,591.67	50.00	351.83	36.68	12,904.52
2004	14,833.70	50.00	296.67	37.63	11,164.03
2005	36,114.77	50.00	722.30	38.59	27,875.58
2006	27,535.72	50.00	550.71	39.56	21,788.42
2007	106,656.20	50.00	2,133.12	40.54	86,481.23
2008	132,197.72	50.00	2,643.95	41.53	109,793.51
2009	116,969.10	50.00	2,339.38	42.52	99,459.62
2010	102,290.72	50.00	2,045.81	43.51	89,009.78
2011	140,479.63	50.00	2,809.59	44.50	125,037.97
2012	1.00	50.00	0.02	45.50	0.91
2013	12,535.39	50.00	250.71	46.50	11,658.04
2014	79,085.26	50.00	1,581.71	47.50	75,131.18
2015	274,286.14	50.00	5,485.72	48.50	266,057.60

WGL
Gas Division
384.00 House Regulator Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 50 **Survivor Curve: S2**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2016	82,606.04	50.00	1,652.12	49.50	81,779.98
Total	5,884,240.14	50.00	117,684.81	26.69	3,141,571.05

Composite Average Remaining Life ... 26.69 Years

WGL
Gas Division
387.00 Other Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 50 **Survivor Curve:** L1

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1965	1,100.64	50.00	22.01	22.95	505.13
1966	34,977.43	50.00	699.50	23.26	16,270.78
1967	71,031.58	50.00	1,420.54	23.58	33,490.19
1968	88,060.11	50.00	1,761.09	23.89	42,079.61
1969	97,548.88	50.00	1,950.85	24.22	47,241.40
1970	113,835.46	50.00	2,276.56	24.54	55,868.65
1971	103,803.75	50.00	2,075.94	24.87	51,626.95
1972	52,268.90	50.00	1,045.31	25.20	26,342.86
1988	5,803.16	50.00	116.06	31.03	3,600.75
1989	11,625.07	50.00	232.49	31.43	7,307.06
1990	45,946.53	50.00	918.87	31.84	29,260.64
1991	28,404.59	50.00	568.06	32.27	18,331.26
1992	54,882.25	50.00	1,097.58	32.71	35,901.83
1993	46,784.61	50.00	935.63	33.17	31,030.84
1994	45,063.13	50.00	901.21	33.64	30,314.89
1995	39,225.65	50.00	784.46	34.13	26,773.03
1996	35,656.62	50.00	713.09	34.64	24,701.09
1997	84,241.61	50.00	1,684.73	35.17	59,253.23
1998	292,766.73	50.00	5,854.96	35.72	209,160.58
1999	119,216.61	50.00	2,384.18	36.30	86,542.76
2000	145,324.88	50.00	2,906.31	36.90	107,233.60
2001	69,608.64	50.00	1,392.08	37.52	52,228.57
2002	18,109.68	50.00	362.17	38.16	13,821.68
2003	18,384.93	50.00	367.68	38.83	14,277.78
2004	12,448.03	50.00	248.94	39.53	9,839.71
2005	6,872.51	50.00	137.44	40.24	5,531.00
2006	40,114.30	50.00	802.24	40.98	32,878.13

WGL
Gas Division
387.00 Other Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 50 **Survivor Curve:** L1

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2007	15,172.57	50.00	303.43	41.75	12,667.36
2013	2,951.29	50.00	59.02	46.78	2,760.87
2015	18,245.42	50.00	364.89	48.60	17,733.16
2016	38,459.96	50.00	769.15	49.53	38,097.58
Total	1,757,935.52	50.00	35,156.48	32.50	1,142,672.94

Composite Average Remaining Life ... 32.50 Years

WGL
Gas Division
390.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* S0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1969	1,350.73	58.00	23.29	27.91	649.97
1970	176,124.91	58.00	3,036.63	28.39	86,207.56
1975	679,382.51	58.00	11,713.48	30.84	361,242.88
1976	85,340.07	58.00	1,471.38	31.34	46,115.98
1978	6,851.45	58.00	118.13	32.36	3,822.45
1979	37,295.23	58.00	643.02	32.87	21,137.67
1980	79,033.57	58.00	1,362.65	33.39	45,501.36
1981	60,566.11	58.00	1,044.24	33.92	35,416.46
1982	74,307.70	58.00	1,281.17	34.44	44,129.37
1983	201,327.24	58.00	3,471.16	34.98	121,413.50
1985	21,812.53	58.00	376.08	36.06	13,561.93
1986	25,901.89	58.00	446.58	36.61	16,349.62
1987	69,887.21	58.00	1,204.95	37.17	44,783.84
1988	77,017.83	58.00	1,327.89	37.73	50,099.35
1989	38,880.66	58.00	670.36	38.30	25,672.24
1990	16,074.76	58.00	277.15	38.87	10,772.80
1991	39,714.15	58.00	684.73	39.45	27,013.36
1992	308,534.22	58.00	5,319.55	40.04	212,992.88
1993	227,651.98	58.00	3,925.03	40.63	159,487.58
1994	2,811,728.18	58.00	48,478.02	41.24	1,999,089.53
1995	27,663.90	58.00	476.96	41.85	19,960.09
1996	24,783.60	58.00	427.30	42.47	18,146.50
1997	18,727.79	58.00	322.89	43.09	13,914.65
1998	90,641.55	58.00	1,562.78	43.73	68,342.24
1999	443,740.26	58.00	7,650.69	44.38	339,519.57
2000	47,516.94	58.00	819.26	45.03	36,894.28
2001	200,071.85	58.00	3,449.51	45.70	157,638.83

WGL
Gas Division
390.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2016
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 **Survivor Curve:** S0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2002	15,842.46	58.00	273.15	46.38	12,667.67
2003	1,125,319.18	58.00	19,402.04	47.07	913,182.08
2004	95,805.85	58.00	1,651.82	47.77	78,899.61
2005	584,042.12	58.00	10,069.68	48.48	488,179.95
2006	170,851.53	58.00	2,945.71	49.21	144,954.17
2007	268,041.87	58.00	4,621.41	49.95	230,843.86
2008	396,371.29	58.00	6,833.98	50.71	346,526.11
2009	540,429.37	58.00	9,317.74	51.48	479,692.48
2010	404,976.35	58.00	6,982.34	52.27	364,997.58
2011	887,487.95	58.00	15,301.50	53.09	812,293.51
2012	160,083.10	58.00	2,760.05	53.92	148,810.29
2013	197,728.93	58.00	3,409.12	54.77	186,725.30
2014	2,072,995.99	58.00	35,741.27	55.65	1,989,152.18
2015	3,789,074.03	58.00	65,328.80	56.56	3,695,004.65
2016	314,672.83	58.00	5,425.39	57.51	312,004.09
Total	16,915,651.67	58.00	291,648.87	48.63	14,183,810.03

Composite Average Remaining Life ... 48.63 Years