**BEFORE THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS**

In the Matter of the Application of Kansas Gas Service, a Division of ONE Gas, Inc. for Adjustment of its Natural Gas Rates in the State of Kansas	Docket 24-KGSG-610-RTS

DIRECT TESTIMONY OF

DAVID J. GARRETT

ON BEHALF OF

THE CITIZENS' UTILITY RATEPAYER BOARD

JULY 1, 2024

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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. My business address is 101 Park Avenue, Suite 1125, Oklahoma City, Oklahoma 73102. 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 of the Oklahoma commission 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. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of the State of Kansas, Citizens' Utility Ratepayer Board ("CURB").

Q. Please describe the purpose of your direct testimony.

A. My direct testimony addresses the direct testimony of Ronald E. White, who sponsors the 2023 Depreciation Study on behalf of Kansas Gas Service ("KGS" or the "Company"). I analyzed Dr. White's proposed depreciation rates for KGS, and I present my findings and proposed depreciation rate adjustments in my testimony and exhibits.

II. EXECUTIVE SUMMARY

Q. Summarize the key points of your testimony.

A. In this case, KGS is proposing a substantial increase in its annual depreciation accrual in the amount of $13.7 million, which represents a 19% increase.[2] I analyzed the depreciation study using the same historical service life and retirement data Dr. White used to conduct his analyses. The evidence presented in my testimony and exhibits demonstrates that the depreciation rates proposed by Dr. White for several of KGS's accounts are unreasonably high, which results in an unreasonably high proposed depreciation expense by the Company. Figure 1 below presents a summarized comparison of the proposed depreciation accruals based on plant balances as of the depreciation study date, December 31, 2022.[3]

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[2] *See* Exhibit DJG-2.

[3] *See also* Exhibit DJG-2; the totaled amounts in this figure do not reconcile with the subtotals for each plant function because production plant is not included in this figure. I am not proposing adjustments to any production plant account. For the complete table, see Exhibit DJG-2.

Figure 1:
Depreciation Accrual Comparison by Plant Function

Plant Function	Plant Balance 12/31/2022	KGS Proposed Accrual	CURB Proposed Accrual	CURB Adjustment
Transmission	309,179,563	8,181,753	7,331,247	(850,506)
Distribution	1,835,204,670	72,278,743	59,289,379	(12,989,364)
General	160,122,819	6,141,251	6,135,758	(5,493)
Total	**$ 2,304,507,052**	**$ 86,601,747**	**$ 72,756,384**	**$ (13,845,363)**

As shown in Figure 1, adopting my proposed depreciation rates would reduce the Company's proposed depreciation accrual by approximately $13.9 million. In my testimony, the term "accrual" refers to the annual depreciation accrual resulting from the application of proposed depreciation rates to plant balances as of December 31, 2022. For CURB's proposed adjustments to depreciation expense and their impact on the revenue requirement, please see the direct testimony of CURB witness Andrea Crane.

Q. Please summarize the primary factors driving CURB's adjustment.

A. CURB's total proposed depreciation adjustment is driven by two primary issues: (1) extending the proposed service lives for several accounts based on historical data analysis and professional judgement, and (2) proposing a more gradual approach to the Company's proposed negative net salvage rate increases. Out of the overall adjustment of $13.9 million shown in Figure 1 above, my proposed service life adjustments account for about $9.1 million, and my proposed net salvage rate adjustments account for about $4.8 million. These issues will be discussed in more detail in my testimony.

Q. Please summarize and compare the different service life and net salvage parameters proposed for KGS's mass property accounts.

A. Figure 2 below compares the different service life and net salvage parameters proposed for the Company's mass property accounts in dispute.[4] The parameters to which an adjustment is proposed are highlighted in green.

Figure 2:
Mass Property Parameter Comparison

		Company Proposal		CURB Proposal	
Account No.	Description	Net Salvage	Iowa Curve	Net Salvage	Iowa Curve
	Transmission Plant				
366.10	Compressor Station Structures	-50%	L1.5 - 50	-44%	L1.5 - 50
366.20	M&R Station Structures	-40%	S0.5 - 70	-38%	S0.5 - 70
367.00	Mains	-50%	R1.5 - 58	-44%	R1.5 - 62
	Distribution Plant				
376.10	Mains - Metallic	-80%	R1.5 - 70	-73%	R1.5 - 76
376.20	Mains - Plastic	-80%	R4 - 55	-66%	R4 - 60
378.00	M&R Station Equipment - General	-50%	S0.5 - 65	-45%	S0.5 - 65
379.00	M&R Station Equipment - City Gate	-60%	R2.5 - 70	-53%	R2.5 - 70
380.10	Services - Metallic	-80%	O3 - 27	-73%	O3 - 27
380.20	Services - Plastic	-80%	R3 - 45	-73%	R2 - 53
382.00	Meter Installations	-75%	R2.5 - 53	-69%	R2.5 - 57
383.00	House Regulators and Installations	-10%	R2 - 60	-9%	R2 - 60

[4] *See also* Exhibit DJG-3; this exhibit shows all of the Company's transmission, distribution, and general accounts. While there are some rate and/or accrual adjustments to almost every account, the only accounts to which I proposed an actual adjustment are the accounts that are highlighted. For the accounts that are not highlighted, any difference in the depreciation rate and/or accrual is due to rounding or some other immaterial factor, and not due to a difference in depreciation parameters. Please see the direct testimony of Andrea Crane for CURB's proposed depreciation expense.

The reasoning behind my proposed adjustments to KGS's mass property accounts is discussed in more detail in my testimony. The impacts to the annual accruals and depreciation rates for each individual account as a result of these parameter adjustments are described in detail in my exhibits.[5]

Q. Please 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. Depreciation systems are designed to 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 may incent economic inefficiency. When an asset is fully depreciated and no longer in rate base, but still used by a utility, a utility may be incented to retire and replace the asset to increase rate base, even though the retired asset may not have reached the end of its economic useful life. If, on the other hand, an asset must be retired before it is fully depreciated, there are regulatory mechanisms that can ensure the utility fully recovers its prudent investment in the retired asset. Thus, in my opinion, it is preferable for regulators to ensure that assets are not fully depreciated before the end of their economic useful lives.

[5] *See* Exhibit DJG-4 and Exhibit DJG-5.

III. REGULATORY STANDARDS AND SYSTEMS

Q. Discuss the standard by which regulated utilities are allowed to recover depreciation expense.

A. In *Lindheimer v. Illinois Bell Telephone Co.* ("*Lindheimer*"), 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."[6] 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.[7] Moreover, the *Lindheimer* Court found:

> [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.[8]

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

Q. Please discuss the definition and general purpose of a depreciation system, as well as the specific depreciation system you employed for this project.

A. The standards set forth above do not mandate a specific procedure for conducting depreciation analysis. These standards do, however, direct that analysts use a system for

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

[7] *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 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."

[8] *Id*. at 169.

estimating depreciation rates that will result in the "systematic and rational" allocation of capital recovery for the utility. Over the years, analysts have developed "depreciation systems" designed to analyze grouped property in accordance with this standard. A depreciation system may be defined by several primary parameters: 1) a method of allocation; 2) a procedure for applying the method of allocation; 3) a technique of applying the depreciation rate; and 4) a model for analyzing the characteristics of vintage property groups.[9] In this case, I used the straight-line method, the average life procedure, the remaining life technique, and the broad group model; 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 commonly used by depreciation analysts in regulatory proceedings. I provide a more detailed discussion of depreciation system parameters, theories, and equations in Appendix A.

IV. SERVICE LIFE ANALYSIS

Q. Describe the methodology used to estimate the service lives of grouped depreciable assets.

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

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

transfers, and other transactions, are organized by vintage and transaction year.[10] 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 OLT, however, must be fitted and smoothed with a complete curve in order to determine the ultimate average life of the group.[11] 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."[12] A more detailed explanation of how the Iowa curves are used in the actuarial analysis of depreciable property is set forth in Appendices B and C.

Q. Please describe the actuarial analysis process.

A. I used the Company's historical property data and created an OLT for each applicable 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" curve (i.e., it does not end at zero percent surviving). To calculate average life (the area under a curve), a complete survivor curve is required. The Iowa curves are empirically-derived curves

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

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

[12] *See* Appendix B for a more detailed discussion of the Iowa 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 visually 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 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. Ultimately, the selected Iowa curve is used to calculate the proposed remaining life for each account at issue.[13]

Q. Do you always select the mathematically best-fitting curve?

A. Not necessarily. While mathematical fitting is an important part of the curve fitting process, because it promotes objective, unbiased results, it may not always yield the optimum result. For example, if there is insufficient historical data in a particular account and the OLT curve derived from that data is relatively short and flat, the mathematically

[13] Exhibit DJG-12.

"best" curve may be one with a very long average life. However, when there are sufficient data available, mathematical curve fitting can be an important component 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."[14] 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. In my analysis, I considered both the entire and truncated portions of the OLT curve as part of a comprehensive process involving visual curve fitting, mathematical curve fitting, and professional judgement in order to recommend the most reasonable service lives. The accounts at issue are further discussed below.

A. Account 367.00 – Transmission Mains

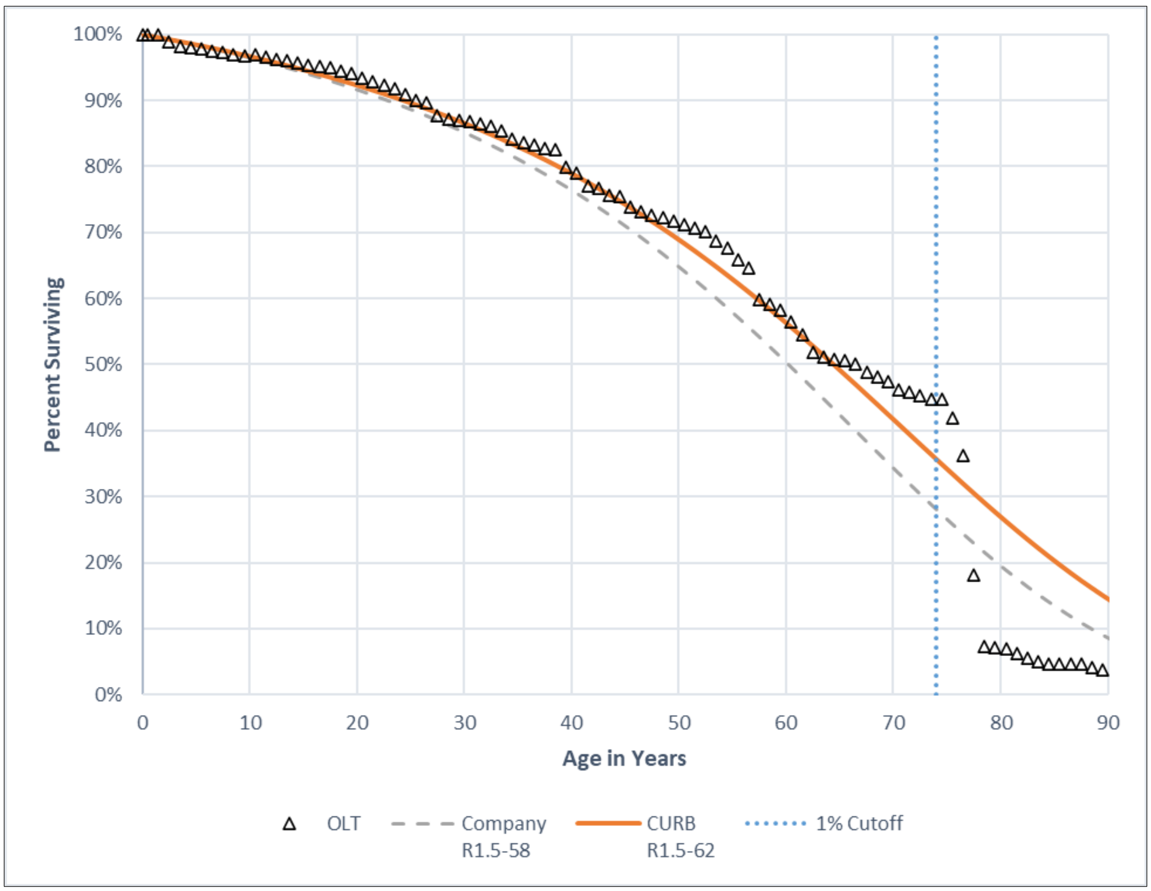
Q. Please describe your service life estimate for this account and compare it with the Company's estimate.

A. The OLT curve for this account is shown in the graph below. The graph also shows the Iowa curves that Dr. White and I selected to estimate the average life for this account. The average life is determined by calculating the area under the Iowa curves. Thus, a longer

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

curve will produce a longer average life, and it will also result in a lower depreciation rate. For this account, Dr. White selected the R1.5-58 Iowa curve, and I selected the R1.5-62 Iowa curve. The average lives resulting from each curve are indicated by the numbers after the dashes (58 and 62 years, respectively). Both Iowa curves are shown with the OLT curve in Figure 3 below.

Figure 3:
Account 367.00 – Transmission Mains



In Figure 3 above, the black triangles represent the historical retirement rate for the assets in this account. The vertical dotted line represents the truncation benchmark discussed above. In this graph (as well as the following graphs), the truncation line is drawn at a point in the OLT curve in which the dollars expose to retirement are only 1% of the total dollars exposed to retirement at age zero. For this account in particular, the value of 1% truncation benchmark can also be seen visually. Not far after the truncation line, it is clear that the OLT curve becomes unstable and shows a sudden decline around age 75. Along with the mathematical truncation, this OLT curve also displays a visual indication of a point after which the data points on the OLT curve are arguably less relevant from a statistical standpoint, and thus should not be given the same analytical weight or consideration as data points on the OLT curve that occur before the truncation line. Regardless, in this graph we see that the Iowa curve selected by Dr. White begins to deviate from the OLT curve around age 30 in a way that results in a shorter average life (i.e., the area under the curve) than what is otherwise indicated in the OLT curve. From a visual perspective, it is clear that the R1.5-62 Iowa curve results in a better fit to the OLT curve up to the truncation line. Mathematical curve fitting techniques can be used to further assess the results.

Q. Does that Iowa curve you selected provide a better mathematical fit to the OLT curve for this account?

A. Yes. While visual curve fitting techniques help identify the most statistically relevant portions of the OLT curve for this account, mathematical curve fitting techniques can also aid in determining which of the two Iowa curves provides the better fit. 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. For this account, the mathematical analyses demonstrates that the

R1.5-62 curve I selected results in a closer fit to the OLT curve, regardless of whether the entire OLT curve or truncated OLT curve is measured. Specifically, the SSD, or "distance" between the truncated OLT curve and the Company's curve is 0.2550, and the SSD between the truncated OLT curve and the R1.5-62 Iowa curve I selected is only 0.0414.[15] Thus, the R1.5-62 curve results in a closer mathematical fit. For this reason, along with the fact that the Company presented no convincing evidence beyond the statistical analysis to support its service life proposals, I believe the Commission should apply an even greater weight to the statistical analysis when determining the fairest and most reasonable service life proposals for this account. Based on the statistical analysis, the Iowa curve I propose for this account results in a more reasonable and accurate depreciation rate.

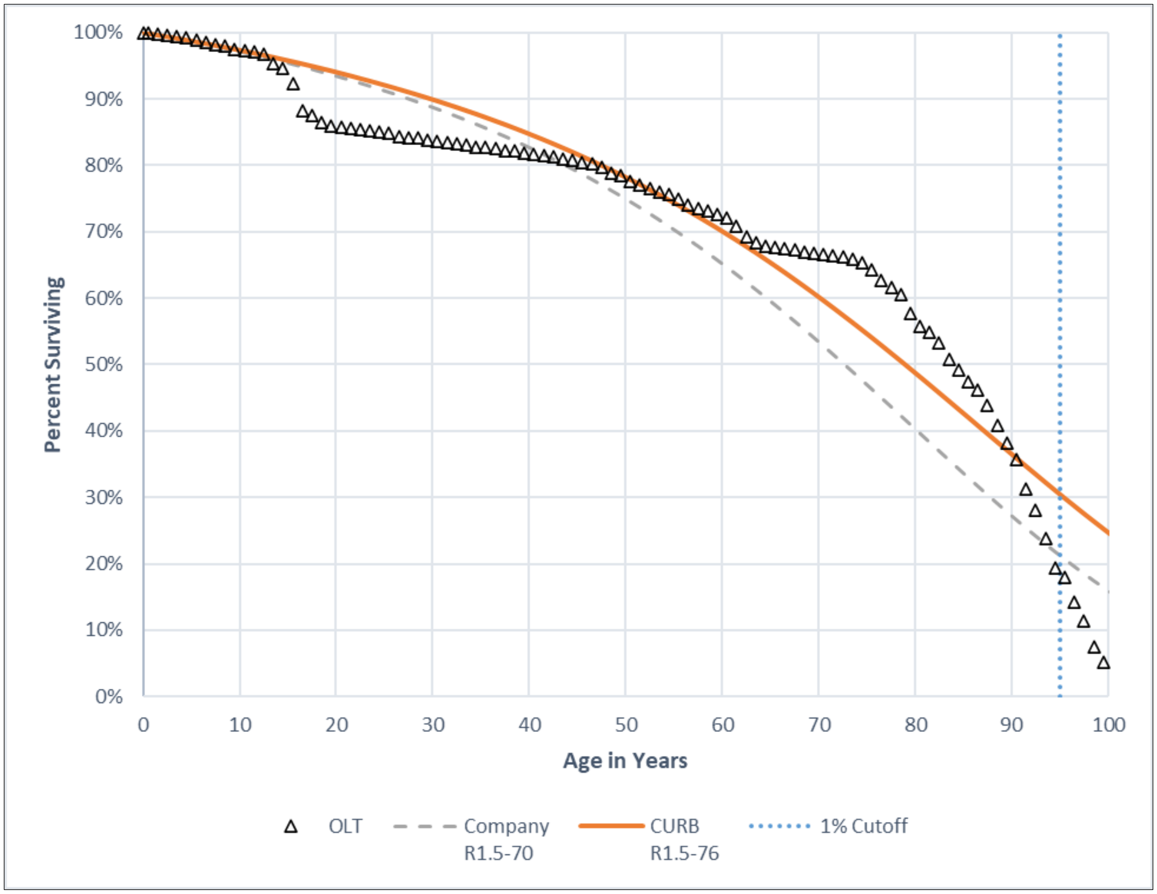
B. Account 376.10 – Mains – Metallic

Q. Please describe your service life estimate for this account and compare it with the Company's estimate.

A. For this account, Dr. White selected the R1.5-70 curve, and I selected the R1.5-76 curve. Both of these Iowa curves are shown with the OLT curve in Figure 4 below.

[15] Exhibit DJG-6.

Figure 4:
Account 376.10 – Mains – Metallic



As shown in Figure 4, although both Iowa curves have the same shape (R1.5), the longer average life of the R1.5-76 curve results in a better fit throughout most portions of the OLT curve. The truncation line for this OLT curve still results in most of the OLT curve being statistically relevant. Mathematical curve fitting can be used to further assess the results.

Q. Does the Iowa curve you selected provide a better mathematical fit to the OLT curve for this account?

A. Yes, regardless of whether the entire OLT curve or truncated OLT curve is measured, the R1.5-76 curve I selected results in a closer fit. Since the Company did not produce any convincing evidence outside of the statistical data to support its proposed service life for this account, the Commission should place a greater amount of weight on the results of the statistical analyses, which indicate that the Iowa curve I selected results in a more reasonable depreciation rate for this account. Specifically, the SSD between the Company's Iowa curve and the truncated OLT curve is 0.6933, and the SSD between the R1.5-76 Iowa curve I selected and the truncated OLT curve is 0.2616, which means it results in the closer fit.[16]

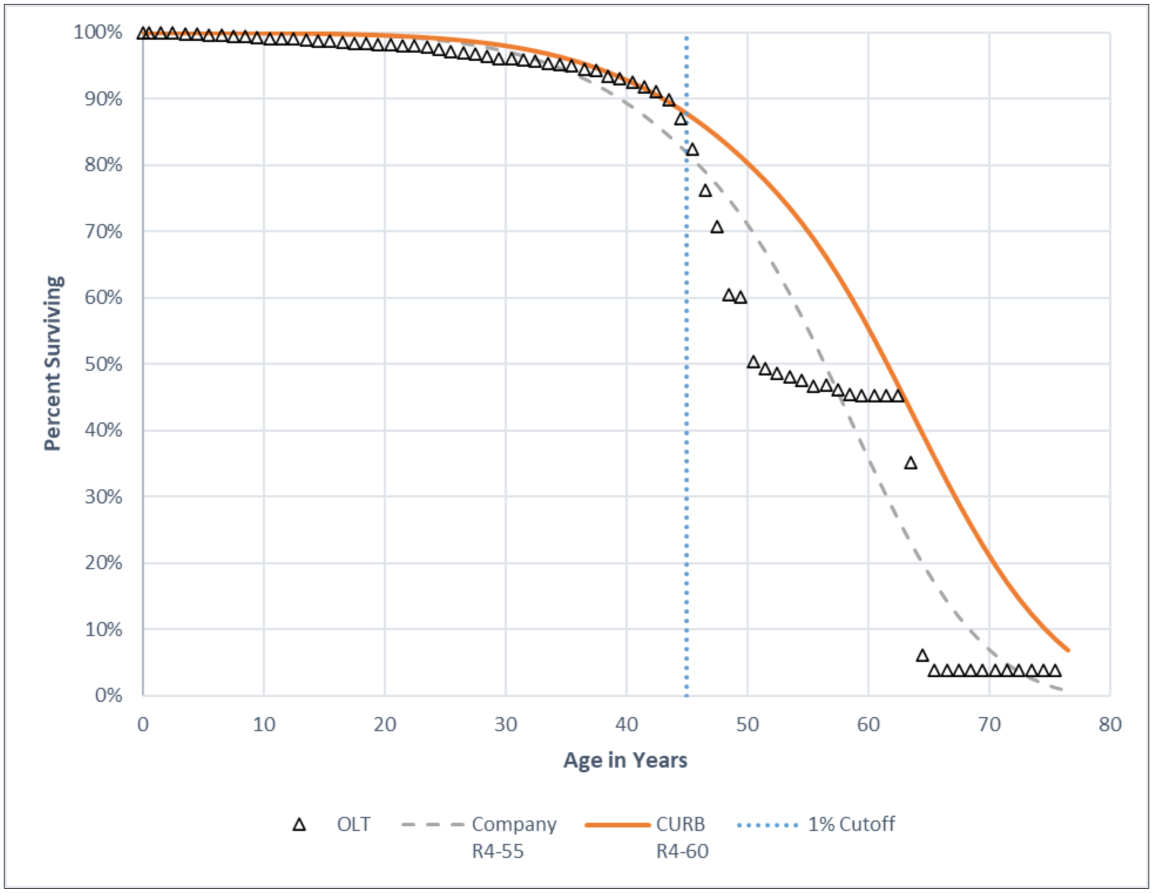
C. Account 376.20 – Mains – Plastic

Q. Please describe your service life estimate for this account and compare it with the Company's estimate.

A. For this account, Dr. White selected the R4-55 curve, and I selected the R4-60 curve. Both of these Iowa curves are shown with the OLT curve in the graph below.

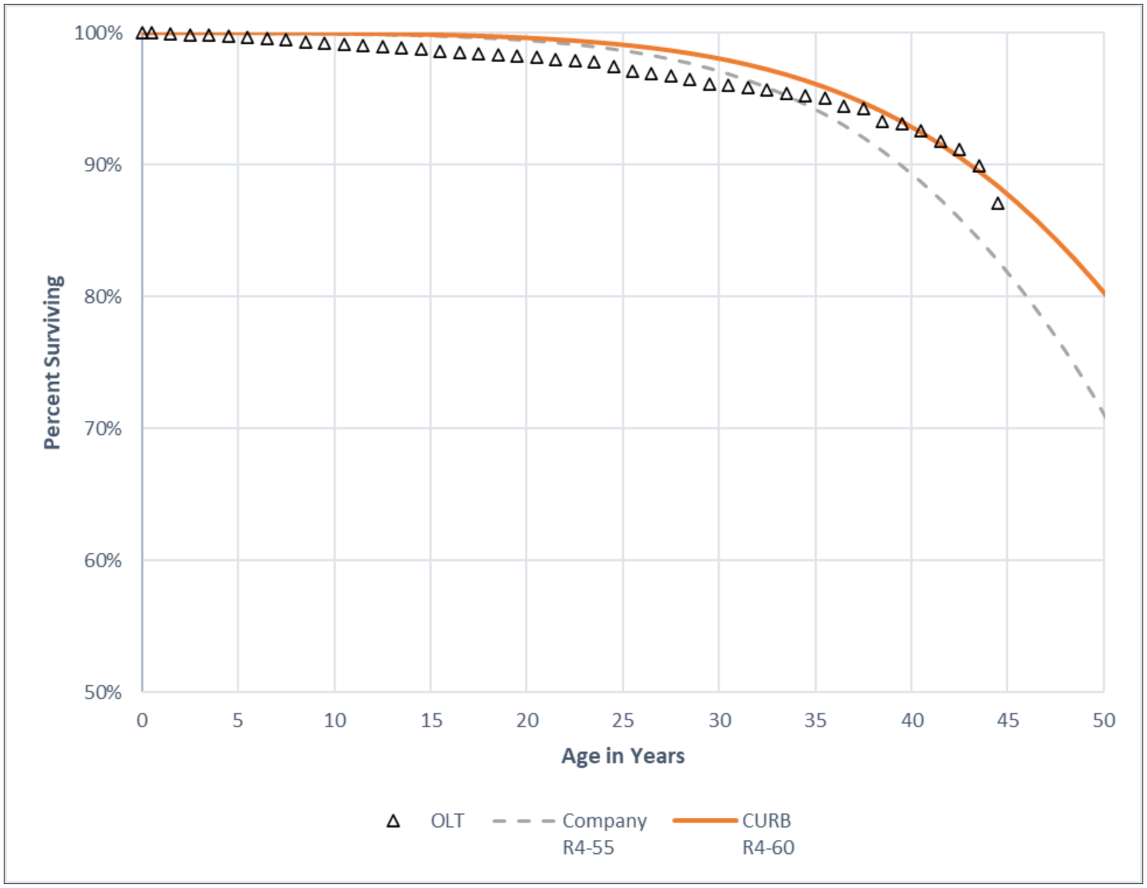
[16] Exhibit DJG-7.

Figure 5:
Account 376.20 – Mains – Plastic



As shown in Figure 5, the truncation line based on the 1% exposure benchmark would eliminate a good portion of this OLT curve from the analysis. The location of this truncation line also corresponds with a point in which the OLT curve visually becomes unstable and erratic, as indicated by the sudden decline in the OLT curve around the truncation line. The Figure 6 below shows only the truncated OLT curve and is focused in for a more detailed perspective.

Figure 6:
Account 376.20 – Mains – Plastic (Truncated)



From this perspective, it is clear that the R4-60 Iowa curve results in a closer fit to the truncated OLT curve. However, the truncated OLT curve for this account has a less than ideal amount of retirement experience (i.e., the OLT curve is not long enough) to provide a confident indication of a retirement dispersion pattern (i.e., curve shape). Under this circumstance, it can be beneficial to also consider the service lives estimated for other gas utilities as part of the overall curve selection process. Based on my experience, the service lives that are typically recommended and approved for plastic mains accounts are closer to 65 years, rather than the 55 years proposed by Dr. White, and it is not uncommon to see life estimates as high as 80 years for plastic mains. Thus, I would not be surprised to see longer average life indications than 55 years or even 60 years as KGS accumulates more retirement experience for this account (while considering the truncation benchmark). Based on the statistical analysis and a consideration of service lives observed in the industry for this account, I believe a 60-year life estimate is more appropriate and reasonable at this time.

Q. Does the Iowa curve you selected provide a better mathematical fit to the OLT curve for this account?

A. Yes, when applied to the truncated OLT curve based on the 1% of beginning exposure benchmark, but not when applied to the entire OLT curve. Specifically, the SSD between the Company's Iowa curve and the truncated OLT curve is 0.0165, and the SSD between the R4-60 Iowa curve I selected and the truncated OLT curve is 0.0062, which means it results in the closer fit.[17]

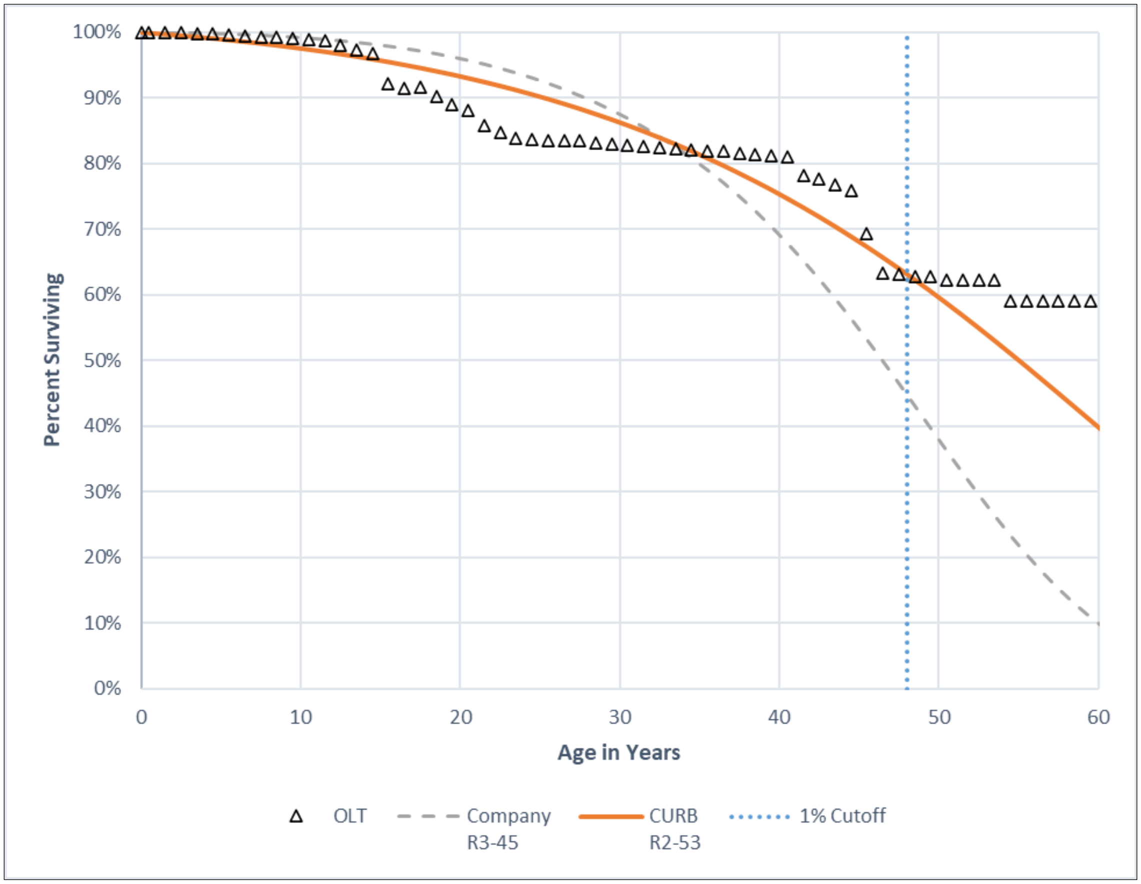
D. Account 380.20 – Services – Plastic

Q. Please 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 R2-53 curve. Both of these Iowa curves are shown with the OLT curve in Figure 7below.

[17] Exhibit DJG-8.

Figure 7:
Account 380.20 – Services – Plastic



As shown in Figure 7, the flatter trajectory of the R2 curve shape relative to the R3 curve shape results in the R2-53 curve having a closer fit to the OLT curve throughout nearly all portions of the curve. In short, the R3-45 Iowa curve proposed by Dr. White does not result in a good fit to the OLT curve relative to other, longer Iowa curves that could have been considered, such as the R2-53 curve. As a result, the depreciation rate proposed by Dr. White for this account is too high and is ultimately not supported by the evidence presented. Mathematical curve fitting can be used to further assess the results.

Q. Does the Iowa curve you selected provide a better mathematical fit to the OLT curve for this account?

A. Yes. The SSD between the Company's Iowa curve and the truncated OLT curve is 0.3153, and the SSD between the R2-53 Iowa curve I selected and the truncated OLT curve is 0.0708, which means it results in the closer fit.[18]

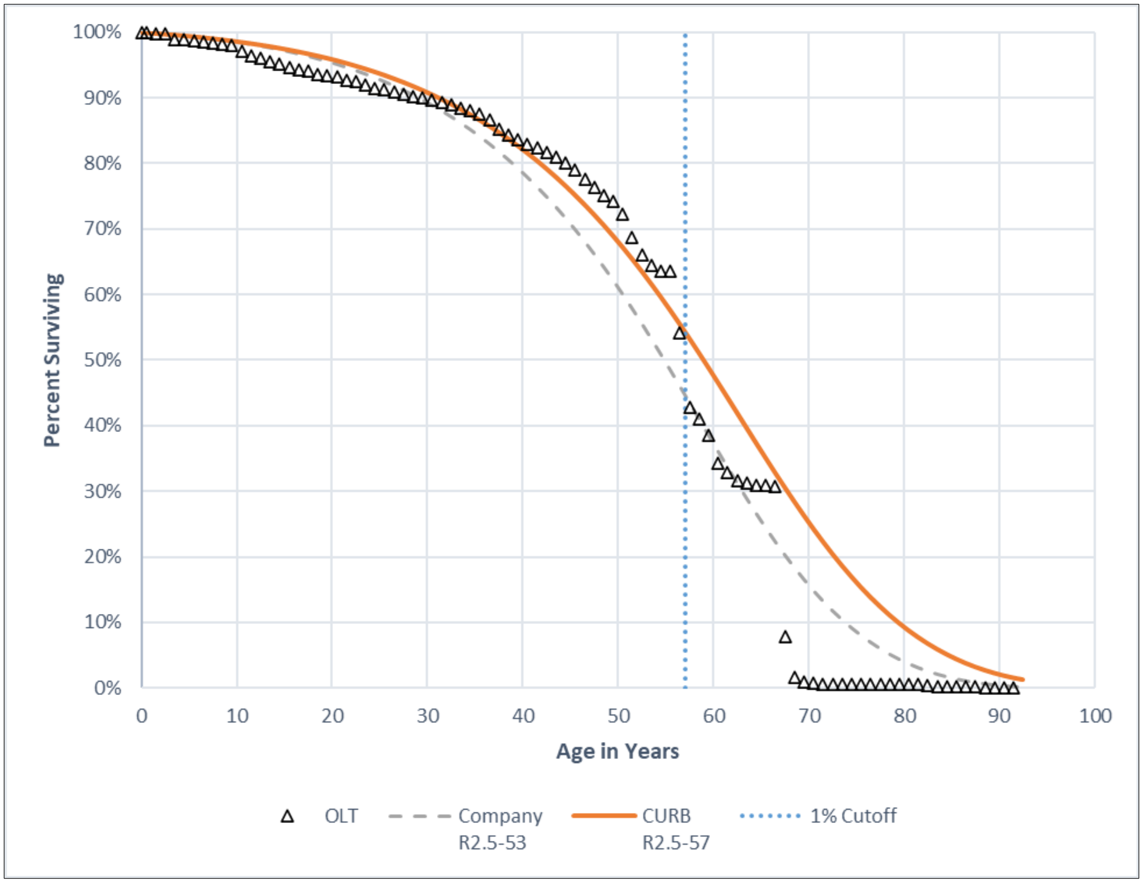
E. Account 382.00 – Meter Installations

Q. Please describe your service life estimate for this account and compare it with the Company's estimate.

A. For this account, Dr. White selected the R2.5-53 curve, and I selected the R2.5-57 curve. Both of these Iowa curves are shown with the OLT curve in Figure 8below.

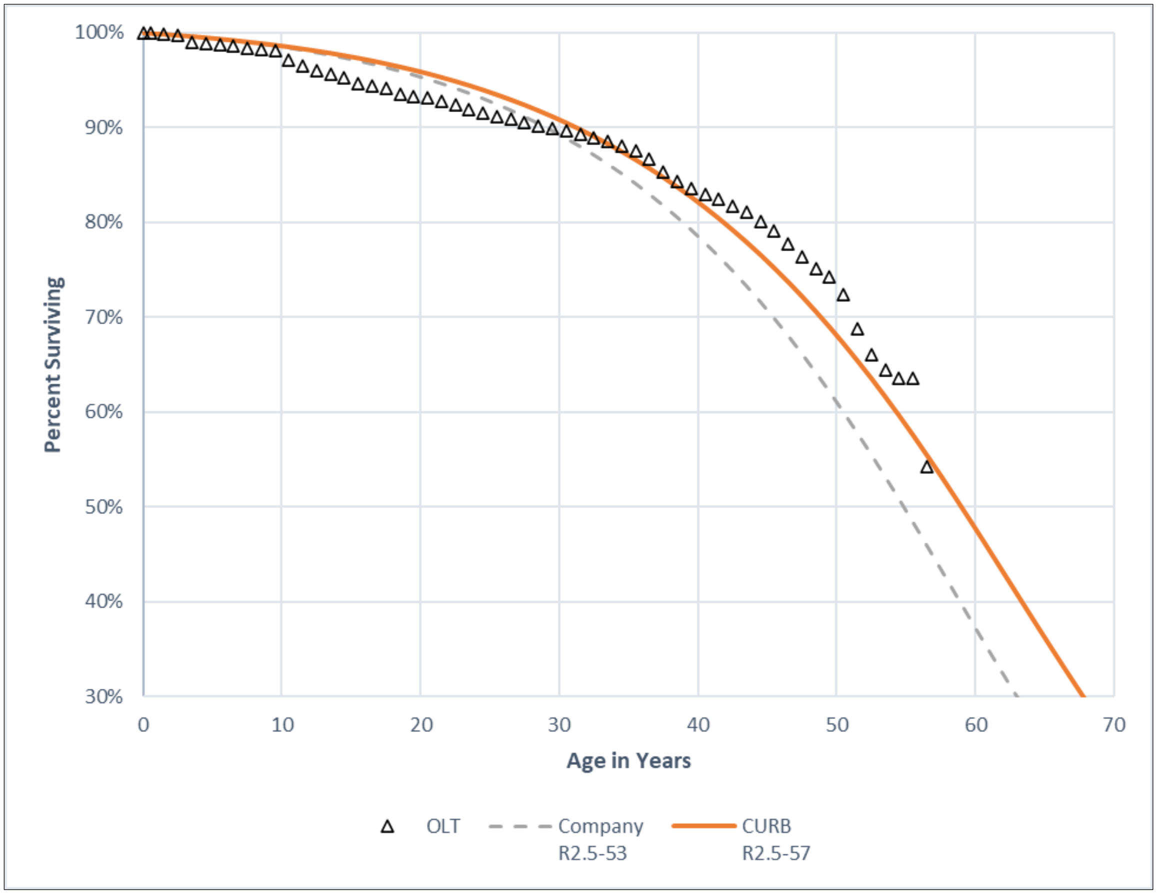
[18] Exhibit DJG-9.

Figure 8:
Account 382.00 – Installations



1 As shown in Figure 8, the truncation line based on the 1% exposure benchmark would eliminate a good portion of this OLT curve from the analysis. The location of this truncation line also corresponds with a point in which the OLT curve visually becomes unstable and erratic, as indicated by the sudden decline in the OLT curve around the truncation line. Figure 9 below shows only the truncated OLT curve and is focused in for a more detailed perspective.

Figure 9:
Account 382.00 – Meter Installations (Truncated)



From this perspective, it is clear that the R2.5-57 Iowa curve results in a closer fit to the truncated OLT curve. In addition, even the truncated OLT curve has an adequate amount of retirement experience for conventional Iowa curve fitting techniques and statistical analyses (i.e., the truncated OLT curve is long enough).

Q. Does the Iowa curve you selected provide a better mathematical fit to the OLT curve for this account?

A. Yes, when applied to the truncated OLT curve based on the 1% of beginning exposure benchmark, but not when applied to the entire OLT curve. Specifically, the SSD between the Company's Iowa curve and the truncated OLT curve is 0.1911, and the SSD between the R2.5-57 Iowa curve I selected and the truncated OLT curve is 0.0352, which means it results in the closer fit.[19]

V. NET SALVAGE 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 and increases the depreciation rate. Therefore, a greater negative net salvage rate equates to a higher depreciation rate and expense, all else held constant.

Q. Please describe the Company's proposal regarding its net salvage rates for mass property accounts.

A. The Company is proposing significant increases in negative net salvage for several of its mass property accounts. This has an increasing effect on depreciation rates and expense.

[19] Exhibit DJG-10.

Q. Did the Company provide evidence to support its proposed increases in negative net salvage rates?

A. Yes. Unlike the accounts discussed above regarding service life, the Company did provide evidence that was generally supportive of its proposed increase in negative net salvage for its mass property accounts. While I would agree that a general increase in negative net salvage is warranted at this time, I recommend the Commission adopt a policy that would take a more gradual approach with adopting these increases in order to mitigate the financial impact to customers. I will expand upon this recommendation below

Q. Has there been a trend in increasing negative net salvage in the utility industry?

A. Yes. Negative net salvage rates occur when the cost of removal exceeds the gross salvage of an asset when it is removed from service. Net salvage rates are calculated by considering gross salvage and removal costs as a percentage of the original cost of the assets retired. In other words, salvage and removal costs are based on current dollars, while retirements are based on historical dollars. Increasing labor costs associated with asset removal combined with the fact that original costs remain the same have contributed to increasing negative net salvage over time.

Q. Have other utility commissions expressed concern over increasing negative net salvage rates?

A. Yes. In Pacific Gas and Electric Company's ("PG&E") 2014 rate case, the California commission stated: "We remain concerned with the growing cost burden associated with increasing cost trends for negative net salvage."[20] The California commission also expressed an interest in the ratemaking concept of gradualism:

> In evaluating whether a proposed increase reflects gradualism, however, we believe the more appropriate measure is how the change affects customers' retail rates. The fact that PG&E previously proposed higher removal costs than adopted has no bearing on how a proposed change would impact current ratepayers. Accordingly, we apply the principle of gradualism based on how a proposed change in estimate compares to adopted costs reflected in current rates, irrespective of what PG&E may have forecasted in an earlier depreciation study.[21]

In PG&E's 2014 rate case, the California Office of Ratepayer Advocates proposed a 25% cap on increased net salvage rates to mitigate sudden increases in net salvage and instead provide for more gradual levels of increases.[22] The California commission ultimately found: "As a general approach, we adopt no more than 25% of PG&E's estimated increases in the accrual provision for removal costs. This limitation tempers the impacts on current ratepayers...."[23]

Q. Do you believe it would be appropriate for the Commission to consider a similar approach regarding net salvage increases?

A. Yes. I recommend the Commission consider gradualism regarding proposed increases to negative net salvage rates in general. This is a policy that could be reconsidered and applied as necessary on a case-by-case basis, based on the need to mitigate potential cost increases for current customers. Moreover, this approach regarding gradualism will not

[20] Decision Authorizing Pacific Gas and Electric Company's General Rate Case Revenue Requirement for 2014-2016, D.14-08-032, p. 597.

[21] *Id*. at 598.

[22] *Id*. at 592-93.

[23] *Id*. at 602.

result in financial harm, nor would it contemplate anything less than full cost recovery for the utility.

Q. Please summarize your proposed net salvage adjustments.

A. The benchmark for net salvage gradualism discussed above is 25% of the utility's proposed increase (assuming the increase is supported by evidence). In this case, I would propose a similar approach, but with a 75% limit. This approach, all else constant, would result in higher negative net salvage rates and depreciation rates than would a 25% limit. The current and proposed net salvage rates for the accounts at issue are presented in the tables in my Executive Summary above as well as my exhibits.[24]

VI. CONCLUSION

Q. Please summarize the key points of your testimony and recommendation.

A. Based on my review of the depreciation study, the Company has not made a convincing showing that its proposed depreciation rates for all its accounts are not excessive. An actuarial analysis of the Company's historical retirement rates and patterns shows that KGS's proposed service lives for the accounts in dispute are generally shorter than what the historical data otherwise indicate. An underestimated service life results in an unreasonably high depreciation rate and expense. In addition, the Commission should consider taking a gradual approach regarding the Company's proposed negative net salvage rate increases. My proposed depreciation rates would reduce the Company's proposed depreciation accrual by approximately $13.9 million. For CURB's proposed adjustments

[24] *See* Exhibit DJG-3.

to depreciation expense and its impact on the revenue requirement, please see the direct testimony of CURB witness Andrea Crane.

Q. Does this conclude your testimony?

A. Yes. To the extent I did not specifically address a position in the Company's testimony, it does not constitute my agreement with such position.

VERIFICATION

STATE OF OKLAHOMA)
)
COUNTY OF OKLAHOMA) ss:

David J. Garrett, being duly sworn upon his oath, deposes and states that he is a consultant for the Citizens' Utility Ratepayer Board, that he has read and is familiar with the foregoing *Direct Testimony*, and that the statements made herein are true and correct to the best of his knowledge, information, and belief.

David J. Garrett

SUBSCRIBED AND SWORN to before me this 1st day of July, 2024.

Notary Public

CHRISTINE GARRETT NOTARY PUBLIC Commission # 23010217 My Commission Expires 08-01-2027 STATE OF OKLAHOMA

My Commission expires: 8-1-27

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.[1] 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.[2] The figure below illustrates the basic concept of a depreciation system and includes some of the available parameters.[3]

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.

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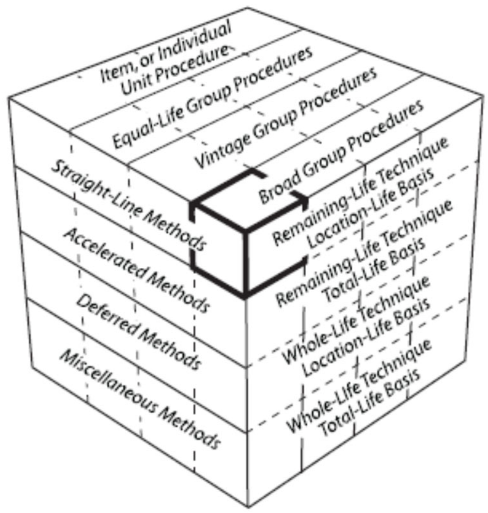
[1] Wolf & W. Chester Fitch, Depreciation Systems 69-70 (Iowa State University Press 1994).

[2] *Id.* at 70, 139–40.

[3] 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 because depreciation analysis is a relatively small and fragmented field. This diagram simply illustrates some of the available parameters of a depreciation system.

Figure 1:
The Depreciation System Cube



1. Allocation Methods

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.[4] 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.[5] The basic formula for the straight-line method is as follows:[6]

[4] National Association of Regulatory Utility Commissioners, Public Utility Depreciation Practices 56 (NARUC 1996).

[5] *Id*.

[6] *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.[7] 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:[8]

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.[9] 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 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

[7] *Id*. at 57.

[8] *Id*. at 56.

[9] Wolf *supra* n. 1, at 74-75.

described statistically.[10] 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.[11]

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.[12] Thus, the average life procedure treats each unit as though its life is equal to the average life of the group. By contrast, the equal life procedure treats each unit in the group as though its life was known.[13] Under the equal life procedure the property is divided into subgroups that each has a common life.[14]

3. Application Techniques

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 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.[15]

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

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[10] *Id*. at 74.

[11] NARUC *supra* n. 4, at 61–62.

[12] Wolf *supra* n. 1, at 74-75.

[13] *Id*. at 75.

[14] *Id*.

[15] NARUC *supra* n. 4, at 63–64.

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.[16] 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.[17] 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 in the annual accrual.[18] 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:[19]

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[16] Wolf *supra* n. 1, at 83.

[17] NARUC *supra* n. 4, at 325.

[18] NARUC *supra* n. 4, 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.").

[19] *Id*. at 64.

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.[20]

4. <u>Analysis Model</u>

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.[21] 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 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.

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[20] Wolf *supra* n. 1, at 178.

[21] *See* Wolf *supra* n. 1, at 139 (I added the term "model" to distinguish this fourth depreciation system parameter from the other three parameters).

By 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.[1] This history 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.[2] 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.[3] They generalized the 65 curves 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

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[1] Wolf & W. Chester Fitch, Depreciation Systems 276 (Iowa State University Press 1994).

[2] *Id*. at 23.

[3] *Id*. at 34.

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.[4] This research 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."[5] These curves are known as the "Iowa curves" and are used extensively in depreciation analysis in order 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.[6] Rather than using the original formulas, analysts typically rely on the published tables containing the percentages surviving. This reliance is necessary 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 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

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[4] *Id*.

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

[6] 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).

Winfrey published the original Iowa curves. Russo drew three major conclusions from his research:[7]

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.[8]

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 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. <u>Classification</u>

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

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[7] *See* Wolf *supra* n. 1, at 37.

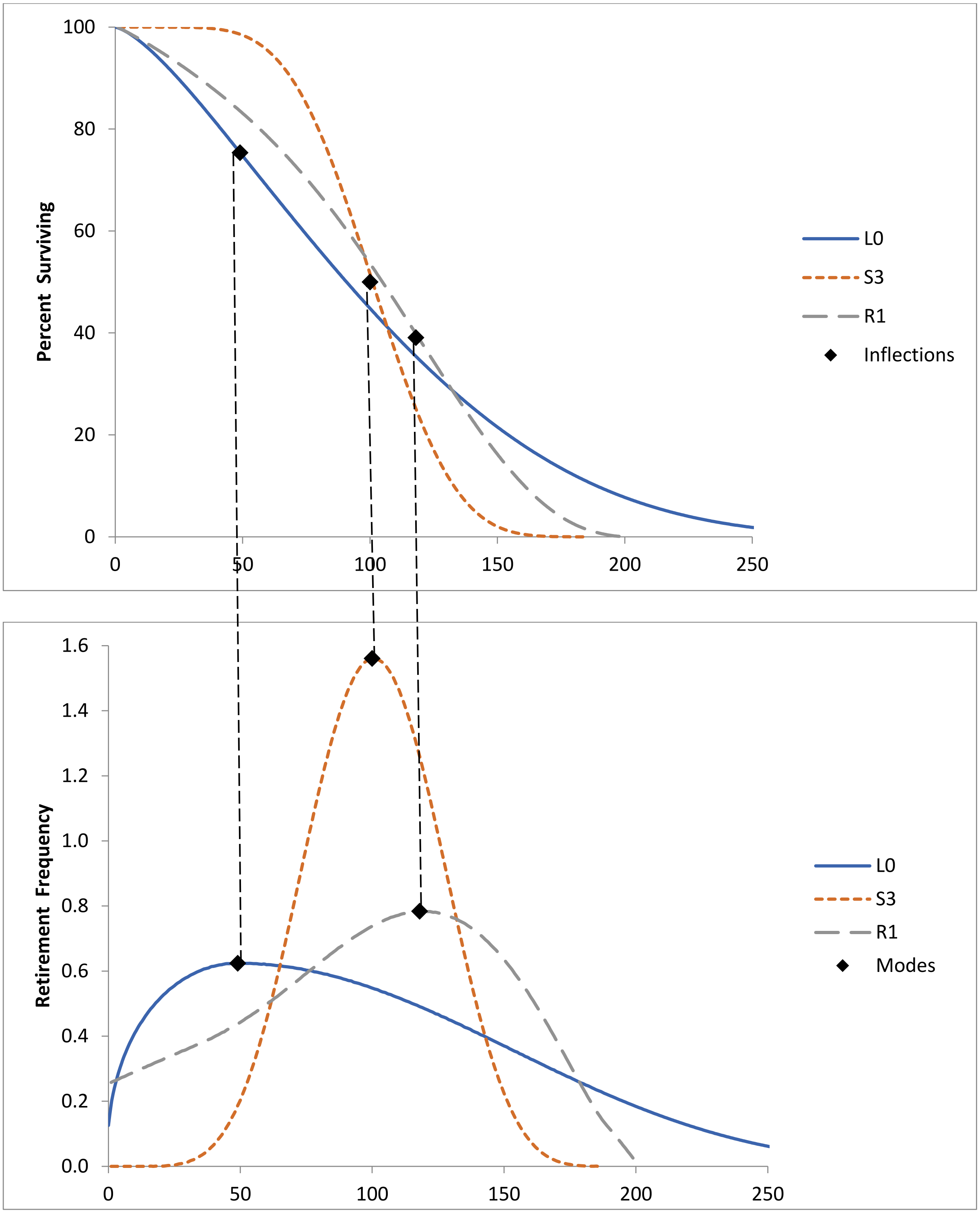
[8] *Id*.

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).[9] 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.

[9] 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.

**Figure 1:
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 design 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."[10]

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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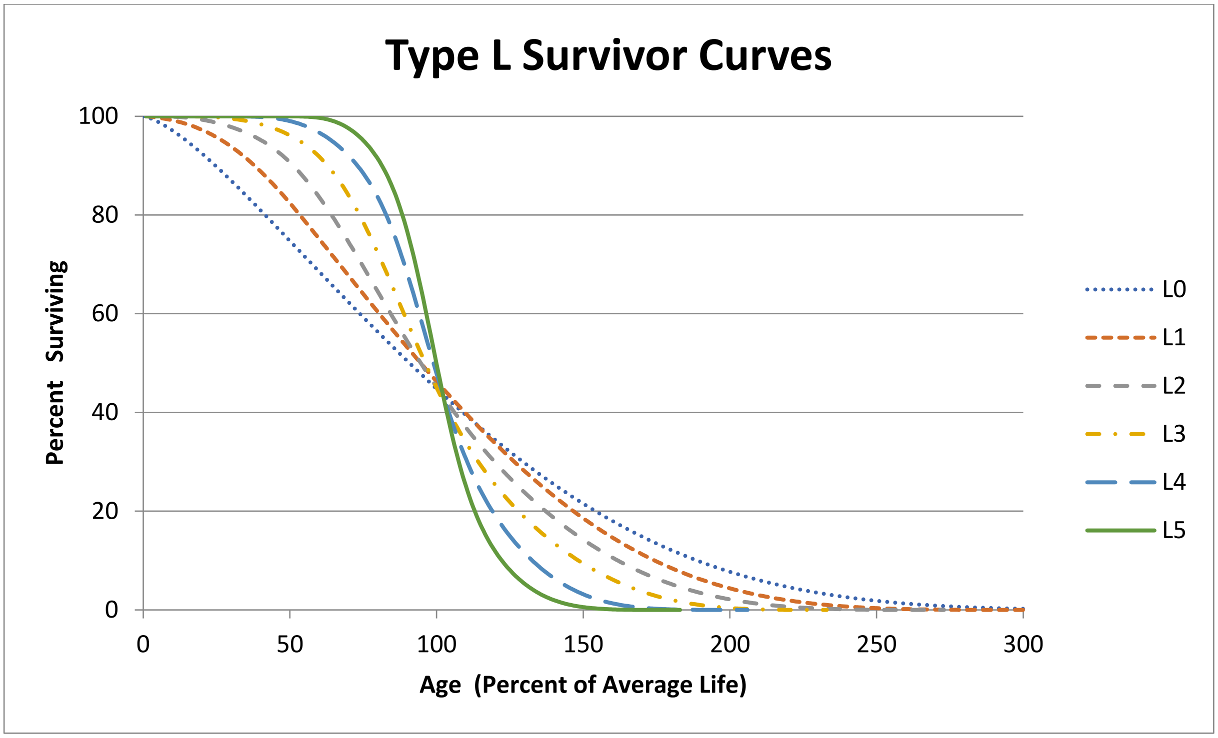
[10] Winfrey *supra* n. 6, at 60.

Figure 2:
Type L Survivor and Frequency Curves



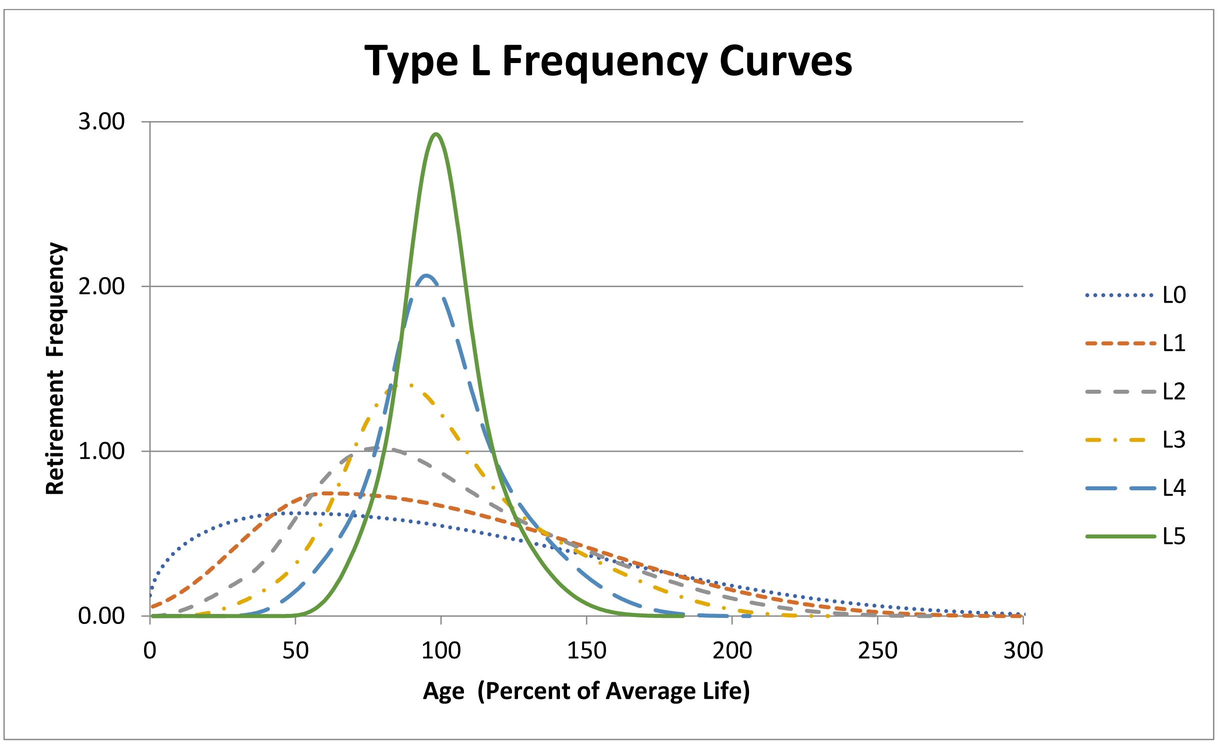
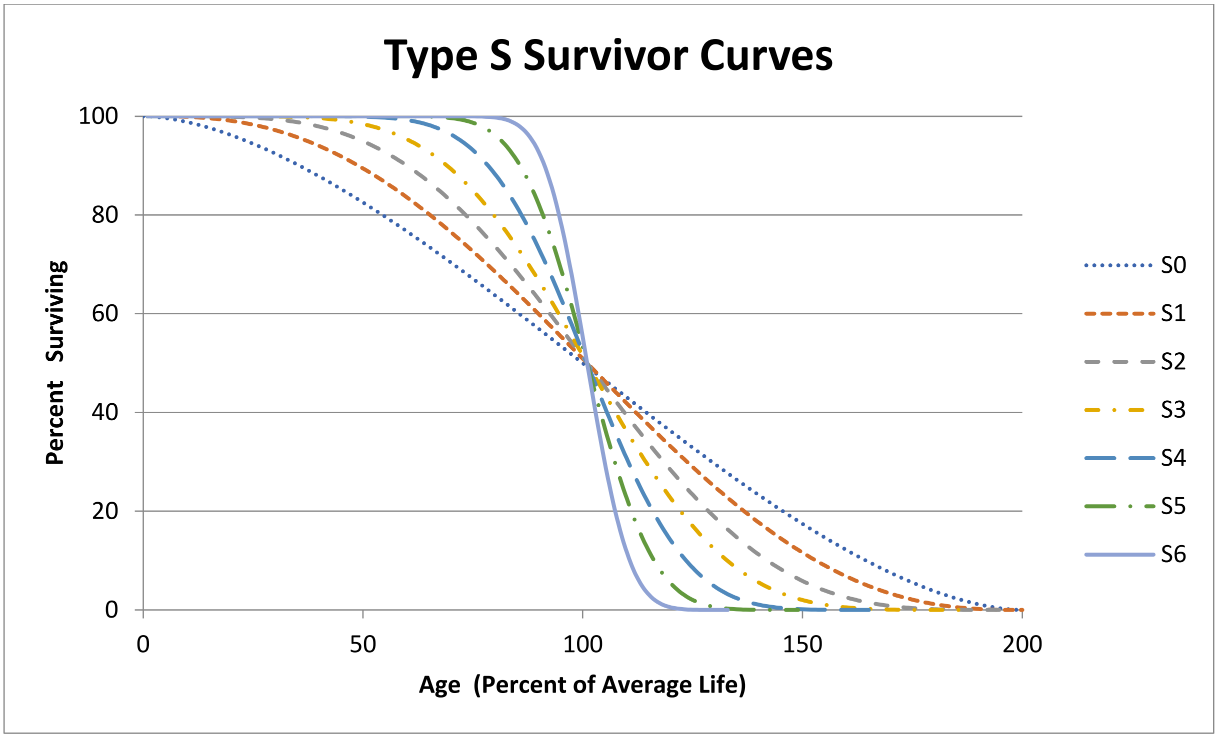


Figure 3:
Type S Survivor and Frequency Curves



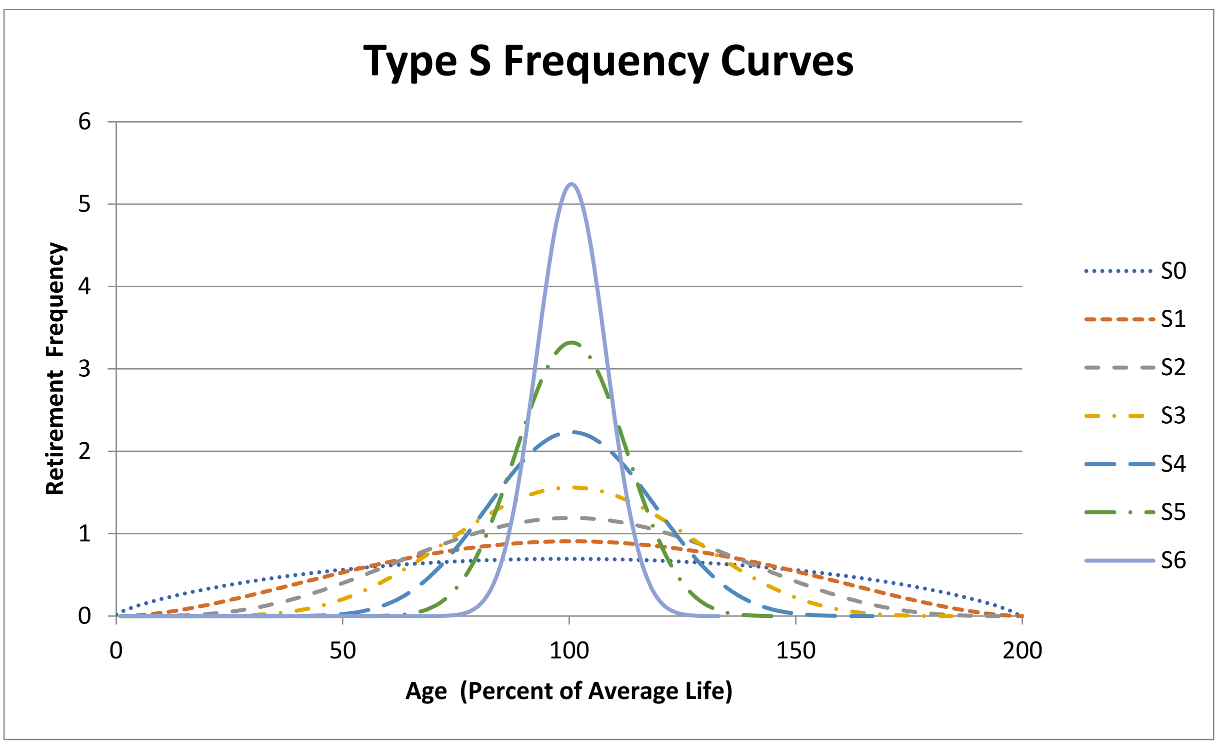
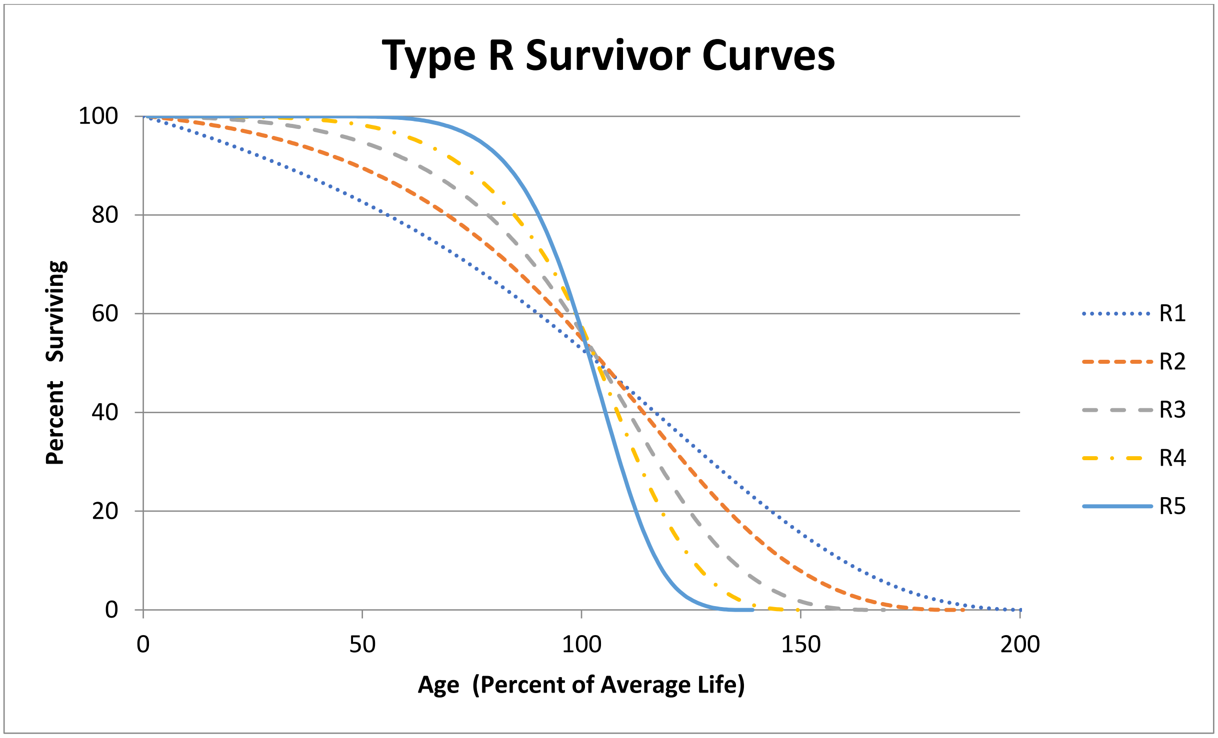
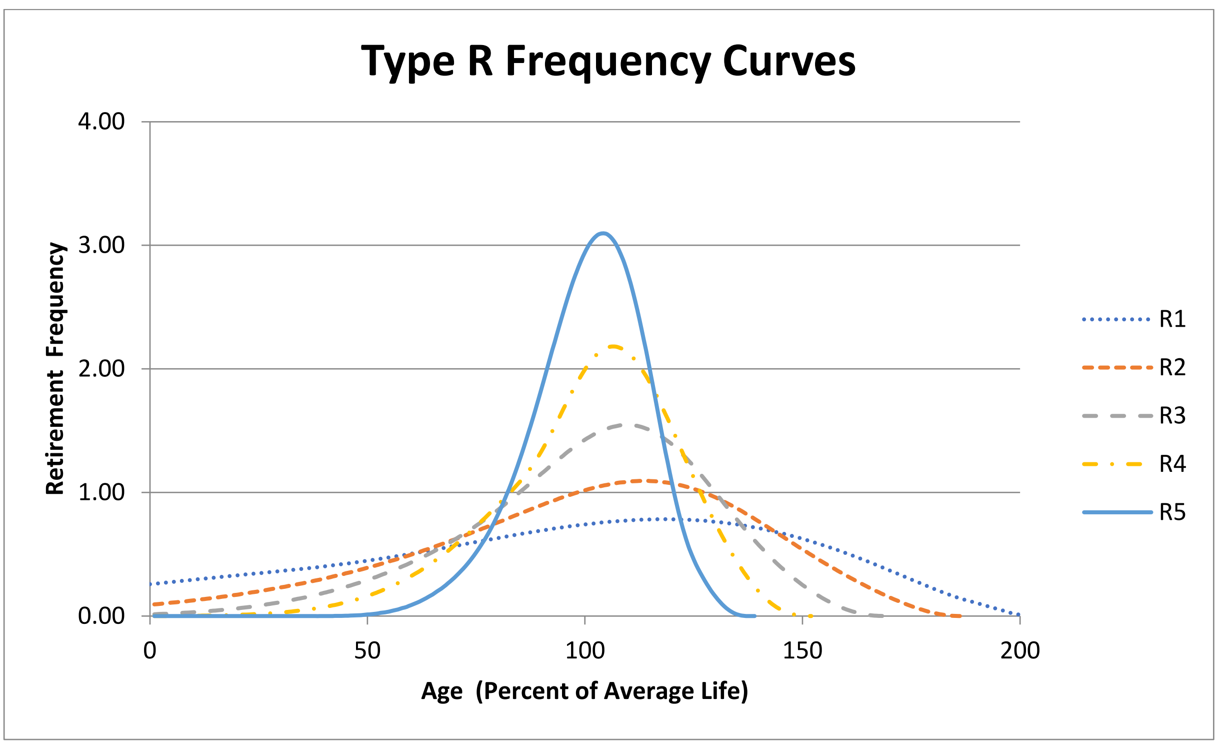


Figure 4:
Type R Survivor and Frequency Curves





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. <u>Types of Lives</u>

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.[11]

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:[12]

Equation 1:
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 dynamic results in a "stub" survivor curve. Iowa curves are used to extend stub curves to maximum life in order to make the average life calculation (see Appendix C).

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[11] 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.

[12] National Association of Regulatory Utility Commissioners, Public Utility Depreciation Practices 71 (NARUC 1996).

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.[13] 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.[14] 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 2:
Average Remaining Life

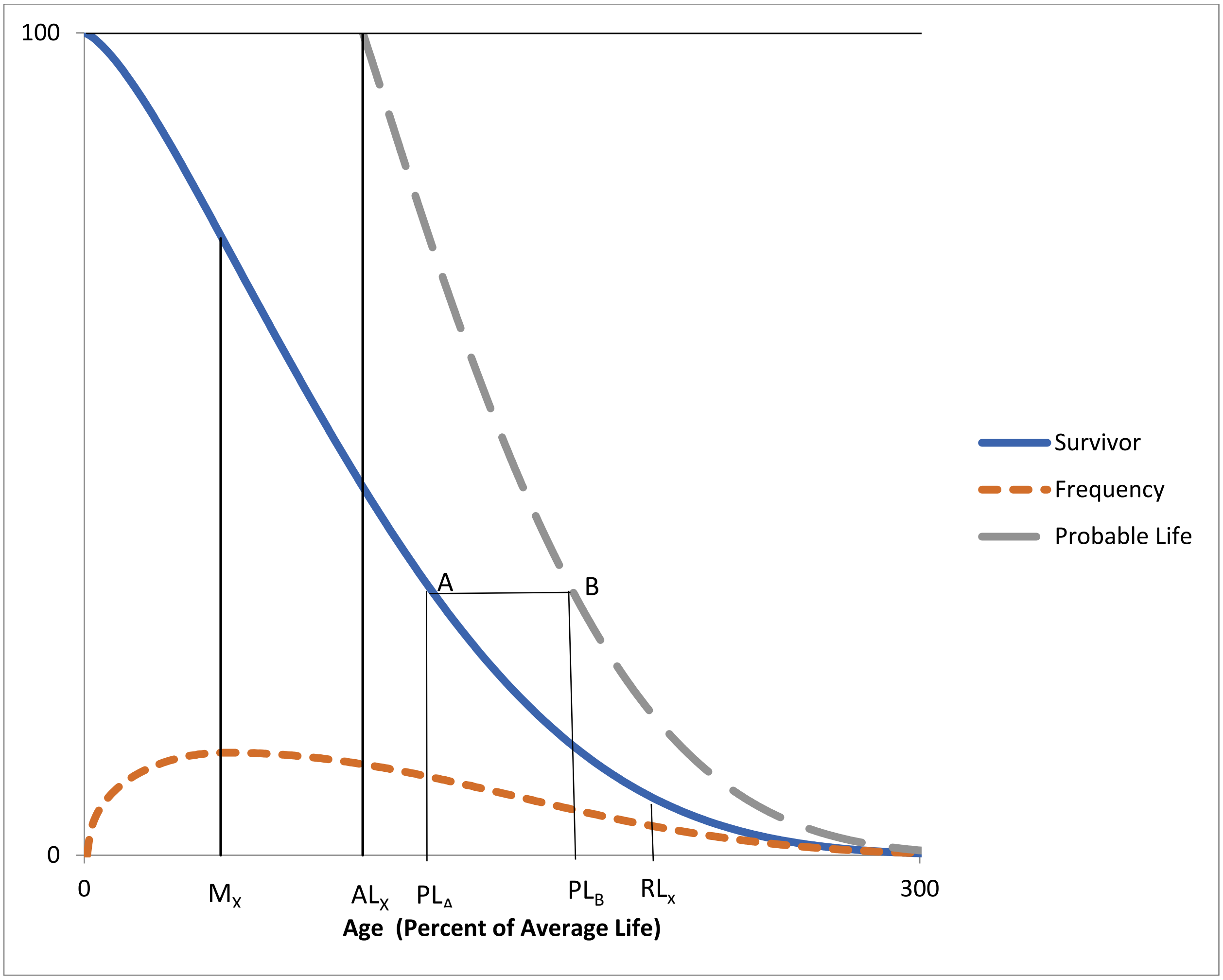
$$Average\ Remaining\ Life = \frac{Area\ Under\ Survivor\ Curve\ from\ Age\ x\ to\ Max\ Life}{S_X}$$

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

[13] *Id*. at 73.

[14] *Id*. at 74.

Figure 5:
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.[15] 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 corresponding point on the survivor curve above at point "A," then horizontally to point "B" on

[15] Wolf *supra* n. 1, at 28.

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 connection occurs 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.[1]

Figure 1:
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

[1] National Association of Regulatory Utility Commissioners, Public Utility Depreciation Practices 14-15 (NARUC 1996).

Property Records ("CPR"). Generally, a CPR should contain 1) an inventory of property record 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.[2] Historical data is used in the retirement rate actuarial method, which is discussed further below.

<u>The Retirement Rate Method</u>

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.[3] 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

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[2] *Id*. at 112–13.

[3] 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.[4] 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 2:
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	

[4] 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 3:
Retirement Matrix

	Experience Years Retirements During the Year (000's)									
Placement Years	2008	2009	2010	2011	2012	2013	2014	2015	Total at Start of 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.[5] 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).

[5] Frank K. Wolf & W. Chester Fitch, Depreciation Systems 22 (Iowa State University Press 1994).

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 4:
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			

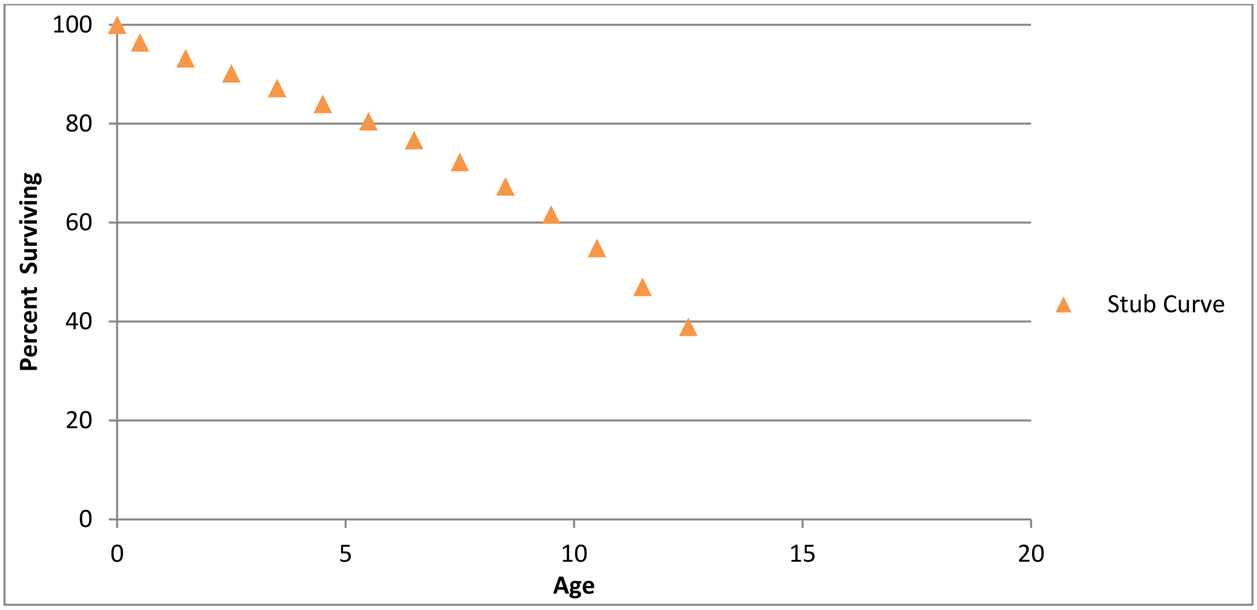
Column F on the right shows the percentages surviving at the beginning of each age interval. This column starts at 100 percent surviving. Each consecutive number below is calculated by multiplying the percent surviving from the previous age interval by the corresponding survivor ratio for that age interval. For example, the percent surviving at the start of age interval 1.5 is 93.21 percent, which was calculated by multiplying the percent surviving for age interval 0.5 (96.43 percent) by the survivor ratio for age interval 0.5 (0.967).[6]

The percentages surviving in Column F are the numbers that are used to form the original survivor curve. This particular curve starts at 100 percent surviving and ends at 38.91 percent surviving. An observed survivor curve such as this that does not reach zero percent surviving is

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

called a "stub" curve. The figure below illustrates the stub survivor curve derived from the OLT above.

Figure 5:
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.[7] 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.[8]

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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[7] NARUC *supra* n. 1, at 113.

[8] *Id*.

Figure 6:
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 use 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.[9] 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 placement bands are very useful in depreciation analysis, they also possess an intrinsic dilemma.

[9] Wolf *supra* n. 5, at 182.

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.[10]

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.

Figure 7:
Experience Bands

	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		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 4.5–5.5 ($1,237). The same experience band would be used for the retirement matrix

[10] NARUC *supra* n. 1, at 114.

covering the same experience years of 2011–2013. This use 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.[11] 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 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. They rarely reach zero percent because, as seen in the OLT above, relatively newer vintage groups have not yet been fully retired at the

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[11] *Id*.

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.

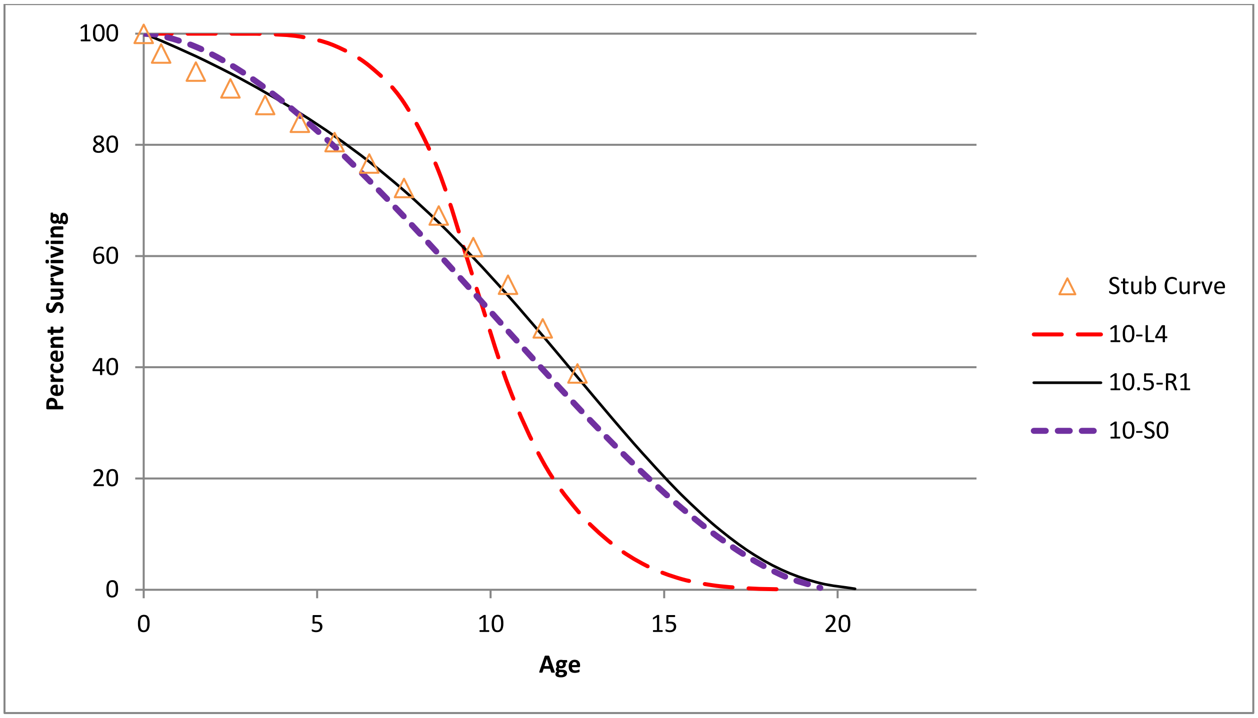
Curve Fitting

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."[12]

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, the 10.5-R1 curve is clearly a better fit than the other two curves.

[12] Wolf *supra* n. 5, at 46 (22 curves includes Winfrey's 18 original curves plus Cowles's four "O" type curves).

Figure 8:
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.[13]

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."[14]

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.

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[13] Wolf *supra* n. 5, at 47.

[14] *Id*. at 48.

Figure 9:
Mathematical Fitting

Age	Stub	Iowa Curves			Squared Differences		
Interval	**Curve**	**10-L4**	**10-S0**	**10.5-R1**	**10-L4**	**10-S0**	**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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Society of Utility and Regulatory Financial Analysts
Certified Rate of Return Analyst (CRRA)

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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.

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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
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Adjunct Instructor – "Ethics in Leadership"

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

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

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Utilities Commission of Nevada	Southwest Gas Corporation	23-09012	Depreciation rates, service lives, net salvage	Bureau of Consumer Protection
Public Utilities Commission of the State of California	Southern California Edison	A.23-05-010	Depreciation rates, service lives, net salvage	The Utility Reform Network
Pennsylvania Public Utility Commission	Pennsylvania-American Water Company	R-2023-3043189 R-2023-3043190	Cost of capital, depreciation rates, net salvage	Pennsylvania Office of Consumer Advocate
Indiana Utility Regulatory Commission	Northern Indiana Public Service Company	45967	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Massachusetts Department of Public Utilities	Massachusetts Electric Company and Nantucket Electric Company D/B/A National Grid	D.P.U. 23-150	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy
Iowa Utilities Board	Interstate Power and Light Company	RPU-2023-0002	Depreciation rates, service lives, net salvage	Office of Consumer Advocate
Public Service Commission of South Carolina	Duke Energy Carolinas	2023-388-E 2023-403-E	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Indiana Utility Regulatory Commission	Citizens Energy Group	45988	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Railroad Commission of Texas	CenterPoint Energy Resources Corp.	OS-23-00015513	Depreciation rates, service lives, net salvage	Alliance of CenterPoint Municipalities
Indiana Utility Regulatory Commission	CenterPoint Energy Indiana South	45990	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Delaware Public Service Commission	Artesian Water Company, Inc.	23-0601	Cost of capital, depreciation rates, net salvage	Division of the Public Advocate
Maryland Public Service Commission	Washington Gas Light Company	9704	Cost of capital, awarded rate of return, capital structure	Maryland Office of People's Counsel
Delaware Public Service Commission	Veolia Water Delaware Inc.	23-0598	Cost of capital, awarded rate of return, capital structure	Division of the Public Advocate
Connecticut Public Utilities Regulatory Authority	United Illuminating Company	22-08-08	Depreciation rates, service lives, net salvage	PURA Staff

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Utility Commission of Texas	Southwestern Public Service Company	PUC 54634	Depreciation rates, service lives, net salvage	Alliance of Xcel Municipalities
Railroad Commission of Texas	SiEnergy, LP	OS-23-00013504	Depreciation rates, service lives, net salvage	Texas municipal intervenor group
Pennsylvania Public Utility Commission	Aqua Pennsylvania, Inc.	A-2022-3034143	Fair market value review	Pennsylvania Office of Consumer Advocate
Wyoming Public Service Commission	Rocky Mountain Power	20000-633-ER-23	Cost of capital and authorized rate of return	Wyoming Industrial Energy Consumers
Maryland Public Service Commission	Potomac Electric Power Company	9702	Depreciation rates, service lives, net salvage	Maryland Office of People's Counsel
Public Utilities Commission of Nevada	Nevada Power Company d/b/a NV Energy	23-06007 23-06008	Depreciation rates, service lives, net salvage	Bureau of Consumer Protection
Public Utilities Commission of Ohio	Northeast Ohio Natural Gas Corp.	23-0154-GA-AIR	Cost of capital, awarded rate of return, capital structure	Office of the Ohio Consumers' Counsel
New York State Public Service Commission	The Brooklyn Untion Gas Company and Keyspan Gas East Corporation d/b/a Nation Grid	23-G-0225 23-G-0226	Depreciation rates, service lives, net salvage, depreciation reserve	The City of New York
Idaho Public Utilities Commission	Idaho Power Company	IPC-E-23-11	Cost of capital, awarded rate of return, capital structure	Micron Technology, Inc.
Indiana Utility Regulatory Commission	Indiana Michigan Power Company	45933	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Massachusetts Department of Public Utilities	Fitchburg Gas and Electric Company d/b/a Unitil	D.P.U. 23-80; D.P.U. 23-81	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy
Kansas Corporation Commission	Evergy Kansas Central, Evergy Kansas South, and Evergy Metro	23-EKCE-775-RTS	Depreciation rates, service lives, net salvage	The Citizens' Utility Ratepayer Board
Delaware Public Service Commission	Delmarva Power & Light Company	22-0897	Cost of capital, awarded rate of return, capital structure	Division of the Public Advocate
Connecticut Public Utilities Regulatory Authority	Connecticut Water Company	23-08-32	Depreciation rates, service lives, net salvage	PURA Staff

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Connecticut Public Utilities Regulatory Authority	Connecticut Natural Gas Corporation and The Southern Connecticut Gas Company	23-11-02	Depreciation rates, service lives, net salvage	PURA Staff
Railroad Commission of Texas	Atmos Pipeline – Texas	OS-23-00013758	Depreciation rates, service lives, net salvage	Atmos Texas Municipalities
Wyoming Public Service Commission	Black Hills Wyoming Gas	30026-78-GR-23	Depreciation rates, service lives, net salvage	Wyoming Office of Consumer Advocate
Indiana Utility Regulatory Commission	Indianapolis Power & Light Company d/b/a AES Indiana	45911	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
New Mexico Public Regulation Commission	Southwestern Public Service Company	22-00286-UT	Cost of capital, depreciation rates, net salvage	The New Mexico Large Customer Group; Occidental Permian
Public Utilities Commission of the State of California	Southern California Gas Company San Diego Gas & Electric Company	A.22-05-015 A.22-05-016	Depreciation rates, service lives, net salvage	The Utility Reform Network
Public Utilties Commission of the State of Colorado	Public Service Company of Colorado	22AL-0530E 22AL-0478E	Cost of capital, awarded rate of return, capital structure	Colorado Energy Consumers
New Mexico Public Regulatory Commission	Public Service Company of New Mexico	22-00270-UT	Cost of capital, depreciation rates, net salvage	The Albuquerque Bernalillo County Water Utility Authority
Florida Public Service Commission	Peoples Gas System	20230023-GU 20220219-GU 20220212-GU	Cost of capital, depreciation rates, net salvage	Florida Office of Public Counsel
Maryland Public Service Commission	Potomac Edison Company	9695	Cost of capital, depreciation rates, net salvage	Maryland Office of People's Counsel
Public Service Commission of the State of Montana	Montana-Dakota Utilities Company	2022.11.099	Depreciation rates, service lives, net salvage	Montana Consumer Counsel and Denbury Onshore
Indiana Utility Regulatory Commission	Indiana-American Water Company	45870	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Public Service Commission of South Carolina	Dominion Energy South Carolina	2023-70-G	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Maryland Public Service Commission	Columbia Gas of Maryland	9701	Cost of capital, awarded rate of return, capital structure	Maryland Office of People's Counsel

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Pennsylvania Public Utility Commission	Columbia Water Company	R-2023-3040258	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Maryland Public Service Commission	Baltimore Gas and Electric Company	9692	Depreciation rates, service lives, net salvage	Maryland Office of People's Counsel
Arizona Corporation Commission	Arizona Public Service Company	E-01345A-22-0144	Cost of capital, awarded rate of return, capital structure	Residential Utility Consumer Office
Oklahoma Corporation Commission	Public Service Company of Oklahoma	PUD 2022-000093	Cost of capital, depreciation rates, net salvage	Oklahoma Industrial Energy Consumers
Public Service Commission of the State of Montana	NorthWestern Energy	2022.07.078	Cost of capital, depreciation rates, net salvage	Montana Consumer Counsel and Montana Large Customer Group
Indiana Utility Regulatory Commission	Northern Indiana Public Service Company	45772	Cost of capital, depreciation rates, net salvage	Indiana Office of Utility Consumer Counselor
Public Service Commission of South Carolina	Duke Energy Progress	2022-254-E	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Wyoming Public Service Commission	Cheyenne Light, Fuel and Power Company D/B/A Black Hills Energy	20003-214-ER-22	Depreciation rates, service lives, net salvage	Wyoming Office of Consumer Advocate
Railroad Commission of Texas	Texas Gas Services Company	OS-22-00009896	Depreciation rates, service lives, net salvage	The City of El Paso
Public Utilities Commission of Nevada	Sierra Pacific Power Company	22-06014	Depreciation rates, service lives, net salvage	Bureau of Consumer Protection
Washington Utilities & Transportation Commission	Puget Sound Energy	UE-220066 UG-220067 UG-210918	Depreciation rates, service lives, net salvage	Washington Office of Attorney General
Public Utility Commission of Texas	Oncor Electric Delivery Company LLC	PUC 53601	Depreciation rates, service lives, net salvage	Alliance of Oncor Cities
Florida Public Service Commission	Florida Public Utilities Company	20220067-GU	Cost of capital, depreciation rates	Florida Office of Public Counsel
Public Utility Commission of Texas	Entergy Texas, Inc.	PUC 53719	Depreciation rates, decommissioning costs	Texas Municipal Group

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Florida Public Service Commission	Florida City Gas	2020069-GU	Cost of capital, depreciation rates	Florida Office of Public Counsel
Connecticut Public Utilities Regulatory Authority	Aquarion Water Company of Connecticut	22-07-01	Depreciation rates, service lives, net salvage	PURA Staff
Washington Utilities & Transportation Commission	Avista Corporation	UE-220053 UG-220054 UE-210854	Cost of capital, awarded rate of return, capital structure	Washington Office of Attorney General
Federal Energy Regulatory Commission	ANR Pipeline Company	RP22-501-000	Depreciation rates, service lives, net salvage	Ascent Resources - Utica, LLC
Pennsylvania Public Utility Commission	Columbia Gas of Pennsylvania, Inc.	R-2022-3031211	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Public Service Commission of South Carolina	Piedmont Natural Gas Company	2022-89-G	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Pennsylvania Public Utility Commission	UGI Utilities, Inc. - Gas Division	R-2021-3030218	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Public Utilities Commission of the State of California	Pacific Gas & Electric Company	A.21-06-021	Depreciation rates, service lives, net salvage	The Utility Reform Network
Pennsylvania Public Utility Commission	PECO Energy Company - Gas Division	R-2022-3031113	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Oklahoma Corporation Commission	Oklahoma Gas & Electric Company	PUD 202100164	Cost of capital, depreciation rates, net salvage	Oklahoma Industrial Energy Consumers
Massachusetts Department of Public Utilities	NSTAR Electric Company D/B/A Eversource Energy	D.P.U. 22-22	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy
Michigan Public Service Company	DTE Electric Company	U-20836	Cost of capital, awarded rate of return, capital structure	Michigan Environmental Council and Citizens Utility Board of Michigan
New York State Public Service Commission	Consolidated Edison Company of New York, Inc.	22-E-0064 22-G-0065	Depreciation rates, service lives, net salvage, depreciation reserve	The City of New York
Pennsylvania Public Utility Commission	Aqua Pennsylvania Wastewater / East Whiteland Township	A-2021-3026132	Fair market value estimates for wastewater assets	Pennsylvania Office of Consumer Advocate

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Service Commission of South Carolina	Kiawah Island Utility, Inc.	2021-324-WS	Cost of capital, awarded rate of return, capital structure	South Carolina Office of Regulatory Staff
Pennsylvania Public Utility Commission	Aqua Pennsylvania Wastewater / Willistown Township	A-2021-3027268	Fair market value estimates for wastewater assets	Pennsylvania Office of Consumer Advocate
Indiana Utility Regulatory Commission	Northern Indiana Public Service Company	45621	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Arkansas Public Service Commission	Southwestern Electric Power Company	21-070-U	Cost of capital, depreciation rates, net salvage	Western Arkansas Large Energy Consumers
Federal Energy Regulatory Commission	Southern Star Central Gas Pipeline	RP21-778-002	Depreciation rates, service lives, net salvage	Consumer-Owned Shippers
Railroad Commission of Texas	Participating Texas gas utilities in consolidated proceeding	OS-21-00007061	Securitization of extraordinary gas costs arising from winter storms	The City of El Paso
Public Service Commission of South Carolina	Palmetto Wastewater Reclamation, Inc.	2021-153-S	Cost of capital, awarded rate of return, capital structure, ring-fencing	South Carolina Office of Regulatory Staff
Public Utilties Commission of the State of Colorado	Public Service Company of Colorado	21AL-0317E	Cost of capital, depreciation rates, net salvage	Colorado Energy Consumers
Pennsylvania Public Utility Commission	City of Lancaster - Water Department	R-2021-3026682	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Public Utility Commission of Texas	Southwestern Public Service Company	PUC 51802	Depreciation rates, service lives, net salvage	The Alliance of Xcel Municipalities
Pennsylvania Public Utility Commission	The Borough of Hanover - Hanover Municipal Waterworks	R-2021-3026116	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Maryland Public Service Commission	Delmarva Power & Light Company	9670	Cost of capital and authorized rate of return	Maryland Office of People's Counsel
Oklahoma Corporation Commission	Oklahoma Natural Gas Company	PUD 202100063	Cost of capital, awarded rate of return, capital structure	Oklahoma Industrial Energy Consumers
Indiana Utility Regulatory Commission	Indiana Michigan Power Company	45576	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Utility Commission of Texas	El Paso Electric Company	PUC 52195	Depreciation rates, service lives, net salvage	The City of El Paso
Pennsylvania Public Utility Commission	Aqua Pennsylvania	R-2021-3027385	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Public Service Commission of the State of Montana	NorthWestern Energy	D2021.02.022	Cost of capital, awarded rate of return, capital structure	Montana Consumer Counsel
Pennsylvania Public Utility Commission	PECO Energy Company	R-2021-3024601	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
New Mexico Public Regulation Commission	Southwestern Public Service Company	20-00238-UT	Cost of capital and authorized rate of return	The New Mexico Large Customer Group; Occidental Permian
Oklahoma Corporation Commission	Public Service Company of Oklahoma	PUD 202100055	Cost of capital, depreciation rates, net salvage	Oklahoma Industrial Energy Consumers
Pennsylvania Public Utility Commission	Duquesne Light Company	R-2021-3024750	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Maryland Public Service Commission	Columbia Gas of Maryland	9664	Cost of capital and authorized rate of return	Maryland Office of People's Counsel
Indiana Utility Regulatory Commission	Southern Indiana Gas Company, d/b/a Vectren Energy Delivery of Indiana, Inc.	45447	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Public Utility Commission of Texas	Southwestern Electric Power Company	PUC 51415	Depreciation rates, service lives, net salvage	Cities Advocating Reasonable Deregulation
New Mexico Public Regulatory Commission	Avangrid, Inc., Avangrid Networks, Inc., NM Green Holdings, Inc., PNM, and PNM Resources	20-00222-UT	Ring fencing and capital structure	The Albuquerque Bernalillo County Water Utility Authority
Indiana Utility Regulatory Commission	Indiana Gas Company, d/b/a Vectren Energy Delivery of Indiana, Inc.	45468	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Public Utilities Commission of Nevada	Nevada Power Company and Sierra Pacific Power Company, d/b/a NV Energy	20-07023	Construction work in progress	MGM Resorts International, Caesars Enterprise Services, LLC, and the Southern Nevada Water Authority
Massachusetts Department of Public Utilities	Boston Gas Company, d/b/a National Grid	D.P.U. 20-120	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Service Commission of the State of Montana	ABACO Energy Services, LLC	D2020.07.082	Cost of capital and authorized rate of return	Montana Consumer Counsel
Maryland Public Service Commission	Washington Gas Light Company	9651	Cost of capital and authorized rate of return	Maryland Office of People's Counsel
Florida Public Service Commission	Utilities, Inc. of Florida	20200139-WS	Cost of capital and authorized rate of return	Florida Office of Public Counsel
New Mexico Public Regulatory Commission	El Paso Electric Company	20-00104-UT	Cost of capital, depreciation rates, net salvage	City of Las Cruces and Doña Ana County
Public Utilities Commission of Nevada	Nevada Power Company	20-06003	Cost of capital, awarded rate of return, capital structure, earnings sharing	MGM Resorts International, Caesars Enterprise Services, LLC, Wynn Las Vegas, LLC, Smart Energy Alliance, and Circus Circus Las Vegas, LLC
Wyoming Public Service Commission	Rocky Mountain Power	20000-578-ER-20	Cost of capital and authorized rate of return	Wyoming Industrial Energy Consumers
Florida Public Service Commission	Peoples Gas System	20200051-GU 20200166-GU	Cost of capital, depreciation rates, net salvage	Florida Office of Public Counsel
Wyoming Public Service Commission	Rocky Mountain Power	20000-539-EA-18	Depreciation rates, service lives, net salvage	Wyoming Industrial Energy Consumers
Public Service Commission of South Carolina	Dominion Energy South Carolina	2020-125-E	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Pennsylvania Public Utility Commission	The City of Bethlehem	2020-3020256	Cost of capital, awarded rate of return, capital structure	Pennsylvania Office of Consumer Advocate
Railroad Commission of Texas	Texas Gas Services Company	GUD 10928	Depreciation rates, service lives, net salvage	Gulf Coast Service Area Steering Committee
Public Utilities Commission of the State of California	Southern California Edison	A.19-08-013	Depreciation rates, service lives, net salvage	The Utility Reform Network
Massachusetts Department of Public Utilities	NSTAR Gas Company	D.P.U. 19-120	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy
Georgia Public Service Commission	Liberty Utilities (Peach State Natural Gas)	42959	Depreciation rates, service lives, net salvage	Public Interest Advocacy Staff

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Florida Public Service Commission	Florida Public Utilities Company	20190155-EI 20190156-EI 20190174-EI	Depreciation rates, service lives, net salvage	Florida Office of Public Counsel
Illinois Commerce Commission	Commonwealth Edison Company	20-0393	Depreciation rates, service lives, net salvage	The Office of the Illinois Attorney General
Public Utility Commission of Texas	Southwestern Public Service Company	PUC 49831	Depreciation rates, service lives, net salvage	Alliance of Xcel Municipalities
Public Service Commission of South Carolina	Blue Granite Water Company	2019-290-WS	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Railroad Commission of Texas	CenterPoint Energy Resources	GUD 10920	Depreciation rates and grouping procedure	Alliance of CenterPoint Municipalities
Pennsylvania Public Utility Commission	Aqua Pennsylvania Wastewater / East Norriton Township	A-2019-3009052	Fair market value estimates for wastewater assets	Pennsylvania Office of Consumer Advocate
New Mexico Public Regulation Commission	Southwestern Public Service Company	19-00170-UT	Cost of capital and authorized rate of return	The New Mexico Large Customer Group; Occidental Permian
Indiana Utility Regulatory Commission	Duke Energy Indiana	45253	Cost of capital, depreciation rates, net salvage	Indiana Office of Utility Consumer Counselor
Maryland Public Service Commission	Columbia Gas of Maryland	9609	Depreciation rates, service lives, net salvage	Maryland Office of People's Counsel
Washington Utilities & Transportation Commission	Avista Corporation	UE-190334	Cost of capital, awarded rate of return, capital structure	Washington Office of Attorney General
Indiana Utility Regulatory Commission	Indiana Michigan Power Company	45235	Cost of capital, depreciation rates, net salvage	Indiana Office of Utility Consumer Counselor
Public Utilities Commission of the State of California	Pacific Gas & Electric Company	18-12-009	Depreciation rates, service lives, net salvage	The Utility Reform Network
Oklahoma Corporation Commission	The Empire District Electric Company	PUD 201800133	Cost of capital, authorized ROE, depreciation rates	Oklahoma Industrial Energy Consumers and Oklahoma Energy Results
Arkansas Public Service Commission	Southwestern Electric Power Company	19-008-U	Cost of capital, depreciation rates, net salvage	Western Arkansas Large Energy Consumers

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Utility Commission of Texas	CenterPoint Energy Houston Electric	PUC 49421	Depreciation rates, service lives, net salvage	Texas Coast Utilities Coalition
Massachusetts Department of Public Utilities	Massachusetts Electric Company and Nantucket Electric Company	D.P.U. 18-150	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy
Oklahoma Corporation Commission	Oklahoma Gas & Electric Company	PUD 201800140	Cost of capital, authorized ROE, depreciation rates	Oklahoma Industrial Energy Consumers and Oklahoma Energy Results
Public Service Commission of the State of Montana	Montana-Dakota Utilities Company	D2018.9.60	Depreciation rates, service lives, net salvage	Montana Consumer Counsel and Denbury Onshore
Indiana Utility Regulatory Commission	Northern Indiana Public Service Company	45159	Depreciation rates, grouping procedure, demolition costs	Indiana Office of Utility Consumer Counselor
Public Service Commission of the State of Montana	NorthWestern Energy	D2018.2.12	Depreciation rates, service lives, net salvage	Montana Consumer Counsel
Oklahoma Corporation Commission	Public Service Company of Oklahoma	PUD 201800097	Depreciation rates, service lives, net salvage	Oklahoma Industrial Energy Consumers and Wal-Mart
Nevada Public Utilities Commission	Southwest Gas Corporation	18-05031	Depreciation rates, service lives, net salvage	Nevada Bureau of Consumer Protection
Public Utility Commission of Texas	Texas-New Mexico Power Company	PUC 48401	Depreciation rates, service lives, net salvage	Alliance of Texas-New Mexico Power Municipalities
Oklahoma Corporation Commission	Oklahoma Gas & Electric Company	PUD 201700496	Depreciation rates, service lives, net salvage	Oklahoma Industrial Energy Consumers and Oklahoma Energy Results
Maryland Public Service Commission	Washington Gas Light Company	9481	Depreciation rates, service lives, net salvage	Maryland Office of People's Counsel
Indiana Utility Regulatory Commission	Citizens Energy Group	45039	Depreciation rates, service lives, net salvage	Indiana Office of Utility 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

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
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 Company	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
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

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Railroad Commission of Texas	Atmos Pipeline - Texas	GUD 10580	Depreciation rates, grouping procedure	City of Dallas
Public Utility Commission of Texas	Sharyland Utility Company	PUC 45414	Depreciation rates, simulated analysis	City of Mission
Oklahoma Corporation Commission	Empire District Electric Company	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 Company	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 Company	E-01345A-16-0036	Cost of capital, depreciation rates, terminal salvage	Energy Freedom Coalition of America
Nevada Public Utilities Commission	Sierra Pacific Power Company	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 Company	PUD 201500213	Cost of capital, depreciation rates, net salvage	Public Utility Division

Summary Rate and Accrual Adjustment

Plant Function	Plant Balance 12/31/2022	Current Parameters		Company Proposal		CURB Proposal		CURB Adjustment	
		Rate	Accrual	Rate	Accrual	Rate	Accrual	Rate	Accrual
Transmission	309,179,563	2.48%	7,670,904	2.65%	8,181,753	2.37%	7,331,247	-0.28%	(850,506)
Distribution	1,835,204,670	3.18%	58,289,602	3.94%	72,278,743	3.23%	59,289,379	-0.71%	(12,989,364)
General	160,122,819	4.33%	6,938,843	3.84%	6,141,251	3.83%	6,135,758	0.00%	(5,493)
Total Plant Studied	**$ 2,304,507,052**	**3.16%**	**$ 72,899,349**	**3.76%**	**$ 86,601,747**	**3.16%**	**$ 72,756,384**	**-0.60%**	**$ (13,845,363)**

Depreciation Parameter Comparison

Account No.	Description	Current Parameters Net Salvage	Current Parameters Iowa Curve	Company Proposal Net Salvage	Company Proposal Iowa Curve	CURB Proposal Net Salvage	CURB Proposal Iowa Curve
	Transmission Plant						
366.10	Compressor Station Structures	-25%	L2 - 45	-50%	L1.5 - 50	-44%	L1.5 - 50
366.20	M&R Station Structures	-30%	S0.5 - 60	-40%	S0.5 - 70	-38%	S0.5 - 70
367.00	Mains	-25%	R1.5 - 52	-50%	R1.5 - 58	-44%	R1.5 - 62
	Distribution Plant						
376.10	Mains - Metallic	-50%	R1 - 65	-80%	R1.5 - 70	-73%	R1.5 - 76
376.20	Mains - Plastic	-25%	R3 - 50	-80%	R4 - 55	-66%	R4 - 60
378.00	M&R Station Equipment - General	-30%	R1.5 - 55	-50%	S0.5 - 65	-45%	S0.5 - 65
379.00	M&R Station Equipment - City Gate	-30%	R2.5 - 65	-60%	R2.5 - 70	-53%	R2.5 - 70
380.10	Services - Metallic	-50%	R1.5 - 50	-80%	O3 - 27	-73%	O3 - 27
380.20	Services - Plastic	-50%	R3 - 45	-80%	R3 - 45	-73%	R2 - 53
382.00	Meter Installations	-50%	R3 - 50	-75%	R2.5 - 53	-69%	R2.5 - 57
383.00	House Regulators and Installations	-5%	R2 - 55	-10%	R2 - 60	-9%	R2 - 60

Detailed Rate Comparison

Account No.	Description	[1] Plant 12/31/2022	[2] Current Parameters Rate	Current Parameters Annual Accrual	[3] Company Proposal Rate	Company Proposal Annual Accrual	[4] CURB Proposal Rate	CURB Proposal Annual Accrual	[5] CURB Adjustment Rate	CURB Adjustment Annual Accrual
	Transmission Plant									
365.20	Rights of Way	12,254,412	1.41%	172,788	1.43%	175,239	1.43%	175,581	0.00%	342
366.10	Compressor Station Structures	7,487,734	2.95%	220,888	3.13%	234,367	2.94%	220,393	-0.19%	-13,974
366.20	M&R Station Structures	2,159,961	2.18%	47,087	2.04%	44,063	2.00%	43,279	-0.04%	-784
367.00	Mains	245,112,042	2.38%	5,833,666	2.60%	6,372,913	2.26%	5,536,116	-0.34%	-836,797
368.00	Compressor Station Equipment	15,889,885	3.53%	560,913	3.70%	587,926	3.70%	588,403	0.00%	477
369.00	M&R Station Equipment	26,275,529	3.18%	835,562	2.92%	767,245	2.92%	767,475	0.00%	230
	Total Transmission Plant	**309,179,563**	**2.48%**	**7,670,904**	**2.65%**	**8,181,753**	**2.37%**	**7,331,247**	**-0.28%**	**-850,506**
	Distribution Plant									
374.20	Rights of Way	2,816,923	1.45%	40,845	1.53%	43,099	1.53%	42,995	0.00%	-104
375.00	Structures and Improvements	947,118	3.84%	36,369	3.62%	34,286	3.62%	34,292	0.00%	6
376.10	Mains - Metallic	342,102,486	2.46%	8,415,721	2.94%	10,057,813	2.54%	8,686,830	-0.40%	-1,370,983
376.20	Mains - Plastic	440,065,616	2.66%	11,705,746	3.73%	16,414,448	2.99%	13,171,871	-0.74%	-3,242,577
376.90	Mains - Cathodic Protection	27,321,545	6.67%	1,822,347	6.67%	1,822,347	6.66%	1,820,472	-0.01%	-1,875
378.00	M&R Station Equipment - General	29,279,961	2.44%	714,431	2.54%	743,711	2.44%	714,103	-0.10%	-29,608
379.00	M&R Station Equipment - City Gate	11,388,378	2.13%	242,572	2.56%	291,542	2.43%	276,707	-0.13%	-14,835
380.10	Services - Metallic	5,145,248	4.63%	238,225	10.38%	534,076	10.11%	520,007	-0.27%	-14,069
380.20	Services - Plastic	635,031,284	3.69%	23,432,655	4.67%	29,655,960	3.45%	21,912,185	-1.22%	-7,743,775
381.00	Meters	162,554,660	2.84%	4,616,552	3.05%	4,957,918	3.05%	4,957,368	0.00%	-550
381.50	AMR Communication Devices	46,478,519	6.67%	3,100,117	6.67%	3,100,117	6.67%	3,100,117	0.00%	0
382.00	Meter Installations	104,894,471	3.20%	3,356,623	3.85%	4,038,437	3.31%	3,472,491	-0.54%	-565,946
383.00	House Regulators and Installations	26,954,336	1.97%	531,001	2.04%	549,869	2.02%	544,821	-0.02%	-5,048
386.00	Other Property - Customer Premises	224,125	16.24%	36,398	15.67%	35,120	15.67%	35,121	0.00%	1
	Total Distribution Plant	**1,835,204,670**	**3.18%**	**58,289,602**	**3.94%**	**72,278,743**	**3.23%**	**59,289,379**	**-0.71%**	**-12,989,364**
	General Plant									
390.10	Structures and Improvements	52,714,425	1.57%	827,617	1.49%	785,445	1.49%	783,721	0.00%	-1,724
392.00	Transportation Equipment	53,228,038	4.91%	2,613,496	3.89%	2,070,571	3.89%	2,068,192	0.00%	-2,379
396.00	Power Operated Equipment	17,276,018	4.74%	818,883	3.51%	606,388	3.51%	606,085	0.00%	-303
391.10	Office Furniture and Equipment	6,015,382	5.00%	300,769	5.00%	300,769	5.00%	300,865	0.00%	96
391.25	Computer Equipment	4,278,880	14.29%	611,452	14.29%	611,452	14.30%	611,842	0.01%	390
393.00	Stores Equipment	145,980	5.00%	7,299	5.00%	7,299	5.00%	7,298	0.00%	-1
394.00	Tools, Shop and Garage Equipment	20,805,720	6.67%	1,387,742	6.67%	1,387,742	6.66%	1,386,287	-0.01%	-1,455
395.00	Laboratory Equipment	250,914	6.67%	16,736	6.67%	16,736	6.67%	16,729	0.00%	-7
397.00	Communication Equipment	5,058,477	6.67%	337,400	6.67%	337,400	6.67%	337,292	0.00%	-108
398.00	Miscellaneous Equipment	348,985	5.00%	17,449	5.00%	17,449	5.00%	17,447	0.00%	-2

Detailed Rate Comparison

		[1]	[2]		[3]		[4]		[5]	
			Current Parameters		Company Proposal		CURB Proposal		CURB Adjustment	
Account No.	Description	Plant 12/31/2022	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	Total General Plant	**160,122,819**	**4.33%**	**6,938,843**	**3.84%**	**6,141,251**	**3.83%**	**6,135,758**	**0.00%**	**-5,493**
	TOTAL PLANT STUDIED	**2,304,507,052**	**3.16%**	**72,899,349**	**3.76%**	**86,601,747**	**3.16%**	**72,756,384**	**-0.60%**	**-13,845,363**

[1], [2], [3] From Company depreciation study and workpapers
[4] From Exhibit DJG-5
[5] = [4] - [3]

Depreciation Rate Development

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]
Account No.	Description	Plant 12/31/2022	Iowa Curve Type	AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Remaining Life	Total Accrual	Total Rate
	Transmission Plant										
365.20	Rights of Way	12,254,412	R1.5	70	0%	12,254,412	3,103,133	9,151,279	52.12	175,581	**1.43%**
366.10	Compressor Station Structures	7,487,734	L1.5	50	-44%	10,782,337	3,864,189	6,918,148	31.39	220,393	**2.94%**
366.20	M&R Station Structures	2,159,961	S0.5	70	-38%	2,980,746	634,602	2,346,144	54.21	43,279	**2.00%**
367.00	Mains	245,112,042	R1.5	62	-44%	352,961,340	95,642,674	257,318,667	46.48	5,536,116	**2.26%**
368.00	Compressor Station Equipment	15,889,885	R0.5	35	-30%	20,656,851	8,147,399	12,509,452	21.26	588,403	**3.70%**
369.00	M&R Station Equipment	26,275,529	R0.5	45	-30%	34,158,188	6,682,592	27,475,596	35.80	767,475	**2.92%**
	Total Transmission Plant	**309,179,563**			**-40%**	**433,793,874**	**118,074,589**	**315,719,285**	**43.06**	**7,331,247**	**2.37%**
	Distribution Plant										
374.20	Rights of Way	2,816,923	R1.5	70	0%	2,816,923	388,572	2,428,351	56.48	42,995	**1.53%**
375.00	Structures and Improvements	947,118	R0.5	35	-15%	1,089,186	230,511	858,674	25.04	34,292	**3.62%**
376.10	Mains - Metallic	342,102,486	R1.5	76	-73%	591,837,301	101,118,275	490,719,026	56.49	8,686,830	**2.54%**
376.20	Mains - Plastic	440,065,616	R4	60	-66%	730,508,923	151,868,633	578,640,289	43.93	13,171,871	**2.99%**
376.90	Mains - Cathodic Protection	27,321,545	SQ	15	0%	27,321,545	14,814,904	12,506,641	6.87	1,820,472	**6.66%**
378.00	M&R Station Equipment - General	29,279,961	S0.5	65	-45%	42,455,943	7,479,168	34,976,775	48.98	714,103	**2.44%**
379.00	M&R Station Equipment - City Gate	11,388,378	R2.5	70	-53%	17,424,218	2,714,465	14,709,753	53.16	276,707	**2.43%**
380.10	Services - Metallic	5,145,248	O3	27	-73%	8,901,279	-4,228,887	13,130,166	25.25	520,007	**10.11%**
380.20	Services - Plastic	635,031,284	R2	53	-73%	1,098,604,121	220,363,763	878,240,358	40.08	21,912,185	**3.45%**
381.00	Meters	162,554,660	R1.5	38	-5%	170,682,393	31,677,795	139,004,598	28.04	4,957,368	**3.05%**
381.50	AMR Communication Devices	46,478,519	SQ	15	0%	46,478,519	24,604,454	21,874,065	7.64	3,100,117	**6.67%**
382.00	Meter Installations	104,894,471	R2.5	57	-69%	177,271,656	40,073,542	137,198,114	39.51	3,472,491	**3.31%**
383.00	House Regulators and Installations	26,954,336	R2	60	-9%	29,380,226	5,408,095	23,972,131	44.00	544,821	**2.02%**
386.00	Other Property - Customer Premises	224,125	S5	20	0%	224,125	133,513	90,612	2.58	35,121	**15.67%**
	Total Distribution Plant	**1,835,204,670**			**-60%**	**2,944,996,358**	**596,646,805**	**2,348,349,553**	**39.61**	**59,289,379**	**3.23%**
	General Plant										
390.10	Structures and Improvements	52,714,425	R1.5	60	-5%	55,350,146	19,165,726	36,184,420	46.17	783,721	**1.49%**
392.00	Transportation Equipment	53,228,038	L0.5	18	20%	42,582,430	13,772,522	28,809,909	13.93	2,068,192	**3.89%**
396.00	Power Operated Equipment	17,276,018	L0.5	18	20%	13,820,814	6,268,990	7,551,825	12.46	606,085	**3.51%**
391.10	Office Furniture and Equipment	6,015,382	SQ	20	0%	6,015,382	2,684,804	3,330,578	11.07	300,865	**5.00%**
391.25	Computer Equipment	4,278,880	SQ	7	0%	4,278,880	2,235,327	2,043,553	3.34	611,842	**14.30%**
393.00	Stores Equipment	145,980	SQ	20	0%	145,980	72,490	73,490	10.07	7,298	**5.00%**
394.00	Tools, Shop and Garage Equipment	20,805,720	SQ	15	0%	20,805,720	7,386,462	13,419,258	9.68	1,386,287	**6.66%**
395.00	Laboratory Equipment	250,914	SQ	15	0%	250,914	131,467	119,447	7.14	16,729	**6.67%**
397.00	Communication Equipment	5,058,477	SQ	15	0%	5,058,477	1,476,439	3,582,038	10.62	337,292	**6.67%**
398.00	Miscellaneous Equipment	348,985	SQ	20	0%	348,985	197,548	151,437	8.68	17,447	**5.00%**
	Total General Plant	**160,122,819**			**7%**	**148,657,729**	**53,391,775**	**95,265,954**	**15.53**	**6,135,758**	**3.83%**

Depreciation Rate Development

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]
Account No.	Description	Plant 12/31/2022	Iowa Curve Type	AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Remaining Life	Total Accrual	Rate
	TOTAL PLANT STUDIED	**2,304,507,052**			**-53%**	**3,527,447,961**	**768,113,168**	**2,759,334,793**	**37.93**	**72,756,384**	**3.16%**

[1] From Company depreciation study
[2] Average life and Iowa curve shape developed through actuarial analysis and professional judgment
[3] Net salvage rates for production plant from production net salvage exhibit; net salvage for mass property plant developed through statistical analysis and professional judgment
[4] = [1]*(1-[3])
[5] From depreciation study
[6] = [4] - [5]
[7] Composite remaining life based on Iowa cuve in [2]; see remaining life exhibit for detailed calculations
[8] = [6] / [7]; (some unadjusted figures may be hard coded to match Company proposal)
[9] = [8] / [1]; (some unadjusted figures may hard coded to match Company proposal)

Account 367.00 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**Company R1.5-58**	**CURB R1.5-62**	**Company SSD**	**CURB SSD**
0.0	248,287,528	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	251,999,632	100.00%	99.85%	99.86%	0.0000	0.0000
1.5	245,233,484	99.96%	99.54%	99.57%	0.0000	0.0000
2.5	239,628,912	98.95%	99.21%	99.27%	0.0000	0.0000
3.5	227,737,882	98.26%	98.88%	98.96%	0.0000	0.0000
4.5	224,063,872	98.01%	98.54%	98.64%	0.0000	0.0000
5.5	215,654,778	97.75%	98.18%	98.31%	0.0000	0.0000
6.5	211,152,432	97.55%	97.82%	97.97%	0.0000	0.0000
7.5	205,693,627	97.22%	97.44%	97.62%	0.0000	0.0000
8.5	200,417,415	96.94%	97.05%	97.26%	0.0000	0.0000
9.5	194,071,694	96.70%	96.65%	96.89%	0.0000	0.0000
10.5	186,094,855	96.88%	96.23%	96.51%	0.0000	0.0000
11.5	161,925,916	96.50%	95.81%	96.12%	0.0000	0.0000
12.5	158,535,047	96.18%	95.36%	95.72%	0.0001	0.0000
13.5	155,606,979	95.97%	94.91%	95.31%	0.0001	0.0000
14.5	149,763,242	95.65%	94.44%	94.88%	0.0001	0.0001
15.5	144,956,203	95.40%	93.96%	94.44%	0.0002	0.0001
16.5	139,962,124	95.11%	93.47%	93.99%	0.0003	0.0001
17.5	135,477,892	94.91%	92.96%	93.53%	0.0004	0.0002
18.5	130,957,985	94.42%	92.44%	93.06%	0.0004	0.0002
19.5	121,895,743	94.11%	91.90%	92.57%	0.0005	0.0002
20.5	103,496,012	93.44%	91.34%	92.07%	0.0004	0.0002
21.5	103,370,254	92.81%	90.77%	91.56%	0.0004	0.0002
22.5	96,740,515	92.33%	90.18%	91.03%	0.0005	0.0002
23.5	80,696,613	91.76%	89.57%	90.49%	0.0005	0.0002
24.5	73,757,335	90.91%	88.95%	89.93%	0.0004	0.0001
25.5	72,058,227	90.01%	88.31%	89.35%	0.0003	0.0000
26.5	71,654,523	89.66%	87.64%	88.76%	0.0004	0.0001
27.5	66,123,485	87.78%	86.96%	88.16%	0.0001	0.0000
28.5	59,726,920	87.22%	86.26%	87.54%	0.0001	0.0000
29.5	55,138,461	87.04%	85.53%	86.89%	0.0002	0.0000
30.5	53,254,301	86.82%	84.78%	86.23%	0.0004	0.0000
31.5	50,990,467	86.55%	84.01%	85.55%	0.0006	0.0001
32.5	49,509,817	86.12%	83.22%	84.85%	0.0008	0.0002
33.5	45,986,450	85.47%	82.40%	84.14%	0.0009	0.0002
34.5	42,735,432	84.08%	81.55%	83.40%	0.0006	0.0000
35.5	40,885,679	83.54%	80.68%	82.64%	0.0008	0.0001
36.5	36,321,487	83.25%	79.78%	81.85%	0.0012	0.0002
37.5	35,541,178	82.72%	78.86%	81.05%	0.0015	0.0003
38.5	30,957,083	82.48%	77.91%	80.22%	0.0021	0.0005
39.5	27,950,115	79.84%	76.93%	79.37%	0.0008	0.0000
40.5	24,909,859	78.97%	75.92%	78.49%	0.0009	0.0000
41.5	24,433,781	77.10%	74.88%	77.59%	0.0005	0.0000
42.5	26,734,953	76.68%	73.81%	76.67%	0.0008	0.0000
43.5	26,139,730	75.71%	72.71%	75.72%	0.0009	0.0000
44.5	25,896,008	75.39%	71.58%	74.74%	0.0014	0.0000
45.5	25,283,295	73.85%	70.42%	73.74%	0.0012	0.0000
46.5	24,612,993	73.20%	69.23%	72.71%	0.0016	0.0000
47.5	24,372,306	72.55%	68.01%	71.66%	0.0021	0.0001
48.5	23,774,055	72.23%	66.76%	70.57%	0.0030	0.0003
49.5	23,551,868	71.77%	65.48%	69.47%	0.0040	0.0005
50.5	22,652,865	71.20%	64.17%	68.33%	0.0049	0.0008
51.5	16,089,938	70.60%	62.83%	67.17%	0.0060	0.0012
52.5	15,948,594	70.06%	61.46%	65.98%	0.0074	0.0017
53.5	15,136,342	68.74%	60.07%	64.77%	0.0075	0.0016
54.5	14,649,325	67.68%	58.64%	63.53%	0.0082	0.0017
55.5	13,880,022	65.93%	57.19%	62.26%	0.0076	0.0013
56.5	13,534,946	64.69%	55.72%	60.97%	0.0081	0.0014
57.5	12,269,990	59.78%	54.22%	59.66%	0.0031	0.0000
58.5	11,788,837	59.16%	52.70%	58.32%	0.0042	0.0001

Account 367.00 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R1.5-58	[5] CURB R1.5-62	[6] Company SSD	[7] CURB SSD
59.5	11,025,793	58.19%	51.16%	56.96%	0.0049	0.0002
60.5	10,424,980	56.55%	49.60%	55.57%	0.0048	0.0001
61.5	10,037,717	54.54%	48.02%	54.17%	0.0042	0.0000
62.5	9,540,397	51.86%	46.43%	52.75%	0.0029	0.0001
63.5	9,345,935	51.22%	44.83%	51.31%	0.0041	0.0000
64.5	9,226,740	50.87%	43.23%	49.85%	0.0058	0.0001
65.5	9,141,253	50.54%	41.61%	48.38%	0.0080	0.0005
66.5	8,996,287	50.11%	40.00%	46.90%	0.0102	0.0010
67.5	8,601,272	48.84%	38.38%	45.40%	0.0109	0.0012
68.5	8,260,505	48.11%	36.77%	43.90%	0.0129	0.0018
69.5	6,797,263	47.38%	35.17%	42.39%	0.0149	0.0025
70.5	6,625,928	46.22%	33.57%	40.88%	0.0160	0.0028
71.5	6,505,536	45.87%	31.99%	39.37%	0.0193	0.0042
72.5	5,993,741	45.24%	30.43%	37.86%	0.0219	0.0054
73.5	2,434,646	44.76%	28.89%	36.36%	0.0252	0.0071
74.5	2,430,063	44.70%	27.37%	34.86%	0.0300	0.0097
75.5	2,279,934	41.95%	25.88%	33.37%	0.0258	0.0074
76.5	1,966,528	36.19%	24.42%	31.89%	0.0139	0.0018
77.5	987,258	18.17%	22.99%	30.43%	0.0023	0.0150
78.5	399,567	7.35%	21.60%	28.99%	0.0203	0.0468
79.5	302,530	7.13%	20.24%	27.56%	0.0172	0.0418
80.5	295,926	6.97%	18.92%	26.17%	0.0143	0.0368
81.5	248,406	6.20%	17.65%	24.79%	0.0131	0.0346
82.5	223,342	5.58%	16.42%	23.45%	0.0117	0.0319
83.5	202,059	5.05%	15.23%	22.13%	0.0104	0.0292
84.5	185,106	4.67%	14.09%	20.85%	0.0089	0.0262
85.5	185,106	4.67%	13.00%	19.60%	0.0069	0.0223
86.5	184,058	4.65%	11.95%	18.38%	0.0053	0.0189
87.5	180,795	4.65%	10.95%	17.21%	0.0040	0.0158
88.5	163,448	4.20%	10.00%	16.07%	0.0034	0.0141
89.5	126,648	3.76%	9.10%	14.97%	0.0028	0.0126
90.5	123,552	3.67%	8.24%	13.91%	0.0021	0.0105
91.5	105,684	3.67%	7.44%	12.89%	0.0014	0.0085
92.5	43,150	3.65%	6.68%	11.92%	0.0009	0.0068
93.5	6,959	3.52%	5.97%	10.98%	0.0006	0.0056
94.5			5.30%	10.09%		
Sum of Squared Differences (SSD)				[8]	0.4504	0.4376
SSD - Truncated OLT Curve				[9]	0.2550	0.0414

[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. The smallest SSD represents the best mathematical fit.

Account 376.10 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R1.5-70	[5] CURB R1.5-76	[6] Company SSD	[7] CURB SSD
0.0	170,557,086	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	171,253,169	99.90%	99.87%	99.88%	0.0000	0.0000
1.5	172,408,685	99.80%	99.62%	99.65%	0.0000	0.0000
2.5	165,495,740	99.60%	99.35%	99.41%	0.0000	0.0000
3.5	158,872,576	99.34%	99.08%	99.16%	0.0000	0.0000
4.5	160,532,294	99.18%	98.80%	98.90%	0.0000	0.0000
5.5	162,375,245	98.86%	98.52%	98.64%	0.0000	0.0000
6.5	168,309,541	98.53%	98.22%	98.38%	0.0000	0.0000
7.5	177,575,991	98.26%	97.92%	98.10%	0.0000	0.0000
8.5	176,642,075	97.93%	97.61%	97.82%	0.0000	0.0000
9.5	181,138,002	97.54%	97.30%	97.53%	0.0000	0.0000
10.5	178,210,368	97.28%	96.97%	97.24%	0.0000	0.0000
11.5	178,418,343	97.05%	96.63%	96.94%	0.0000	0.0000
12.5	176,670,393	96.74%	96.29%	96.63%	0.0000	0.0000
13.5	173,426,736	95.36%	95.94%	96.32%	0.0000	0.0001
14.5	168,852,704	94.58%	95.58%	95.99%	0.0001	0.0002
15.5	164,965,188	92.31%	95.21%	95.66%	0.0008	0.0011
16.5	152,383,028	88.29%	94.83%	95.32%	0.0043	0.0049
17.5	146,261,228	87.46%	94.44%	94.98%	0.0049	0.0057
18.5	140,020,047	86.42%	94.05%	94.62%	0.0058	0.0067
19.5	134,694,245	86.00%	93.64%	94.26%	0.0058	0.0068
20.5	124,681,597	85.78%	93.22%	93.89%	0.0055	0.0066
21.5	119,162,404	85.56%	92.80%	93.51%	0.0052	0.0063
22.5	105,526,679	85.36%	92.36%	93.13%	0.0049	0.0060
23.5	99,039,265	85.17%	91.91%	92.73%	0.0045	0.0057
24.5	100,721,427	85.08%	91.45%	92.33%	0.0041	0.0053
25.5	100,158,260	84.93%	90.98%	91.92%	0.0037	0.0049
26.5	96,114,326	84.39%	90.50%	91.50%	0.0037	0.0050
27.5	89,374,066	84.24%	90.01%	91.06%	0.0033	0.0047
28.5	81,421,948	84.12%	89.50%	90.62%	0.0029	0.0042
29.5	76,079,540	83.88%	88.99%	90.17%	0.0026	0.0040
30.5	74,276,298	83.59%	88.45%	89.71%	0.0024	0.0037
31.5	69,242,359	83.46%	87.91%	89.24%	0.0020	0.0033
32.5	66,495,859	83.23%	87.35%	88.76%	0.0017	0.0031
33.5	62,939,975	83.01%	86.78%	88.26%	0.0014	0.0028
34.5	62,301,684	82.81%	86.19%	87.76%	0.0011	0.0024
35.5	57,865,775	82.71%	85.59%	87.24%	0.0008	0.0021
36.5	55,040,719	82.54%	84.98%	86.71%	0.0006	0.0017
37.5	53,455,653	82.28%	84.34%	86.17%	0.0004	0.0015
38.5	51,928,333	82.13%	83.70%	85.62%	0.0002	0.0012
39.5	51,922,106	81.88%	83.03%	85.05%	0.0001	0.0010
40.5	51,066,610	81.66%	82.35%	84.47%	0.0000	0.0008
41.5	50,172,066	81.47%	81.65%	83.88%	0.0000	0.0006
42.5	47,384,353	81.23%	80.93%	83.27%	0.0000	0.0004
43.5	45,516,379	81.01%	80.20%	82.65%	0.0001	0.0003
44.5	43,897,712	80.85%	79.44%	82.01%	0.0002	0.0001
45.5	43,449,063	80.49%	78.67%	81.36%	0.0003	0.0001
46.5	43,105,678	80.18%	77.88%	80.69%	0.0005	0.0000
47.5	42,893,370	79.64%	77.07%	80.01%	0.0007	0.0000
48.5	42,112,191	78.86%	76.24%	79.31%	0.0007	0.0000
49.5	41,226,020	78.47%	75.39%	78.60%	0.0010	0.0000
50.5	39,949,535	77.51%	74.51%	77.87%	0.0009	0.0000
51.5	36,880,111	77.09%	73.62%	77.12%	0.0012	0.0000
52.5	34,941,767	76.59%	72.71%	76.36%	0.0015	0.0000
53.5	33,089,960	76.06%	71.78%	75.58%	0.0018	0.0000
54.5	30,554,717	75.59%	70.82%	74.78%	0.0023	0.0001
55.5	29,078,929	74.88%	69.85%	73.97%	0.0025	0.0001
56.5	26,249,194	74.11%	68.85%	73.13%	0.0028	0.0001
57.5	24,444,978	73.55%	67.84%	72.28%	0.0033	0.0002
58.5	23,279,699	73.08%	66.80%	71.42%	0.0039	0.0003
59.5	20,703,347	72.66%	65.74%	70.53%	0.0048	0.0005
60.5	19,922,314	72.10%	64.66%	69.63%	0.0055	0.0006
61.5	17,473,079	70.84%	63.56%	68.71%	0.0053	0.0005
62.5	15,775,131	69.27%	62.44%	67.77%	0.0047	0.0002
63.5	14,578,363	68.43%	61.31%	66.81%	0.0051	0.0003

Account 376.10 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R1.5-70	[5] CURB R1.5-76	[6] Company SSD	[7] CURB SSD
64.5	14,480,337	67.91%	60.15%	65.84%	0.0060	0.0004
65.5	14,138,657	67.65%	58.97%	64.85%	0.0075	0.0008
66.5	12,952,420	67.44%	57.78%	63.84%	0.0093	0.0013
67.5	11,631,105	67.27%	56.56%	62.82%	0.0115	0.0020
68.5	9,464,046	67.02%	55.33%	61.77%	0.0137	0.0028
69.5	8,521,554	66.78%	54.09%	60.71%	0.0161	0.0037
70.5	7,881,615	66.65%	52.83%	59.64%	0.0191	0.0049
71.5	7,121,725	66.41%	51.55%	58.55%	0.0221	0.0062
72.5	6,692,794	66.23%	50.27%	57.44%	0.0255	0.0077
73.5	6,668,322	65.94%	48.97%	56.32%	0.0288	0.0093
74.5	6,879,506	65.40%	47.66%	55.19%	0.0315	0.0104
75.5	7,052,616	64.30%	46.34%	54.04%	0.0322	0.0105
76.5	7,498,678	62.70%	45.02%	52.88%	0.0313	0.0096
77.5	7,237,845	61.69%	43.69%	51.71%	0.0324	0.0100
78.5	7,117,333	60.64%	42.35%	50.52%	0.0334	0.0102
79.5	6,682,409	57.73%	41.01%	49.33%	0.0279	0.0071
80.5	8,820,796	55.84%	39.67%	48.13%	0.0261	0.0059
81.5	8,456,956	54.89%	38.34%	46.92%	0.0274	0.0064
82.5	8,069,353	53.32%	37.00%	45.70%	0.0266	0.0058
83.5	7,567,422	50.73%	35.67%	44.48%	0.0227	0.0039
84.5	7,225,034	49.16%	34.35%	43.25%	0.0219	0.0035
85.5	6,718,758	47.38%	33.03%	42.02%	0.0206	0.0029
86.5	6,320,653	46.25%	31.72%	40.78%	0.0211	0.0030
87.5	5,807,730	43.80%	30.43%	39.55%	0.0179	0.0018
88.5	5,408,549	40.87%	29.15%	38.32%	0.0137	0.0007
89.5	5,037,113	38.20%	27.89%	37.09%	0.0106	0.0001
90.5	4,631,118	35.67%	26.64%	35.86%	0.0081	0.0000
91.5	3,745,431	31.35%	25.42%	34.64%	0.0035	0.0011
92.5	3,030,688	28.11%	24.21%	33.43%	0.0015	0.0028
93.5	2,434,431	23.78%	23.03%	32.22%	0.0001	0.0071
94.5	1,798,053	19.40%	21.87%	31.02%	0.0006	0.0135
95.5	1,069,477	17.89%	20.74%	29.84%	0.0008	0.0143
96.5	678,124	14.30%	19.63%	28.67%	0.0028	0.0206
97.5	356,934	11.42%	18.56%	27.51%	0.0051	0.0259
98.5	364,919	7.51%	17.51%	26.37%	0.0100	0.0356
99.5	242,575	5.13%	16.49%	25.24%	0.0129	0.0404
100.5	152,595	3.23%	15.50%	24.13%	0.0151	0.0437
101.5	129,293	2.74%	14.54%	23.04%	0.0139	0.0412
102.5	48,137	2.68%	13.62%	21.98%	0.0120	0.0372
103.5	32,479	1.81%	12.72%	20.93%	0.0119	0.0366
104.5			11.86%	19.91%		
Sum of Squared Differences (SSD)				[8]	0.7777	0.5571
SSD - Truncated OLT Curve				[9]	0.6933	0.2616

[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. The smallest SSD represents the best mathematical fit.

Account 376.20 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R4-55	[5] CURB R4-60	[6] Company SSD	[7] CURB SSD
0.0	291,880,634	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	294,440,973	99.99%	100.00%	100.00%	0.0000	0.0000
1.5	286,239,002	99.94%	100.00%	100.00%	0.0000	0.0000
2.5	265,260,353	99.88%	100.00%	100.00%	0.0000	0.0000
3.5	250,218,287	99.80%	99.99%	99.99%	0.0000	0.0000
4.5	243,967,580	99.74%	99.99%	99.99%	0.0000	0.0000
5.5	241,675,155	99.68%	99.98%	99.99%	0.0000	0.0000
6.5	243,610,555	99.59%	99.98%	99.98%	0.0000	0.0000
7.5	240,997,113	99.48%	99.97%	99.97%	0.0000	0.0000
8.5	236,077,284	99.34%	99.96%	99.97%	0.0000	0.0000
9.5	235,255,853	99.23%	99.95%	99.96%	0.0001	0.0001
10.5	230,307,340	99.15%	99.93%	99.94%	0.0001	0.0001
11.5	226,730,018	99.06%	99.91%	99.93%	0.0001	0.0001
12.5	221,806,663	98.98%	99.89%	99.91%	0.0001	0.0001
13.5	218,719,172	98.90%	99.86%	99.89%	0.0001	0.0001
14.5	211,213,970	98.77%	99.82%	99.86%	0.0001	0.0001
15.5	203,226,245	98.63%	99.78%	99.83%	0.0001	0.0001
16.5	196,122,157	98.53%	99.73%	99.80%	0.0001	0.0002
17.5	186,038,636	98.42%	99.67%	99.75%	0.0002	0.0002
18.5	177,678,198	98.33%	99.60%	99.70%	0.0002	0.0002
19.5	168,878,517	98.26%	99.51%	99.64%	0.0002	0.0002
20.5	152,012,416	98.12%	99.41%	99.57%	0.0002	0.0002
21.5	144,445,979	98.01%	99.29%	99.49%	0.0002	0.0002
22.5	122,143,465	97.93%	99.15%	99.39%	0.0001	0.0002
23.5	109,462,725	97.83%	98.99%	99.28%	0.0001	0.0002
24.5	107,893,300	97.41%	98.80%	99.16%	0.0002	0.0003
25.5	103,271,119	97.10%	98.58%	99.01%	0.0002	0.0004
26.5	92,942,099	96.90%	98.33%	98.84%	0.0002	0.0004
27.5	81,854,069	96.73%	98.04%	98.65%	0.0002	0.0004
28.5	68,721,765	96.49%	97.71%	98.43%	0.0001	0.0004
29.5	57,819,806	96.13%	97.34%	98.18%	0.0001	0.0004
30.5	52,716,026	96.02%	96.91%	97.89%	0.0001	0.0004
31.5	46,070,325	95.83%	96.43%	97.58%	0.0000	0.0003
32.5	40,736,308	95.68%	95.89%	97.22%	0.0000	0.0002
33.5	36,601,880	95.42%	95.28%	96.82%	0.0000	0.0002
34.5	33,196,117	95.22%	94.60%	96.36%	0.0000	0.0001
35.5	28,686,627	95.07%	93.85%	95.87%	0.0001	0.0001
36.5	24,961,797	94.46%	93.01%	95.31%	0.0002	0.0001
37.5	21,118,305	94.23%	92.09%	94.69%	0.0005	0.0000
38.5	18,172,609	93.32%	91.08%	94.01%	0.0005	0.0000
39.5	16,550,237	93.08%	89.96%	93.27%	0.0010	0.0000
40.5	14,649,511	92.56%	88.74%	92.45%	0.0015	0.0000
41.5	12,198,591	91.82%	87.41%	91.55%	0.0019	0.0000
42.5	9,410,644	91.19%	85.98%	90.58%	0.0027	0.0000
43.5	6,799,124	89.93%	84.42%	89.51%	0.0030	0.0000
44.5	4,276,627	87.12%	82.75%	88.36%	0.0019	0.0002
45.5	2,773,899	82.45%	80.96%	87.12%	0.0002	0.0022
46.5	1,412,656	76.24%	79.05%	85.79%	0.0008	0.0091
47.5	474,405	70.73%	77.00%	84.36%	0.0039	0.0186
48.5	29,358	60.44%	74.80%	82.82%	0.0206	0.0501
49.5	27,555	60.19%	72.42%	81.19%	0.0150	0.0441

Account 376.20 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R4-55	[5] CURB R4-60	[6] Company SSD	[7] CURB SSD
50.5	23,221	50.47%	69.83%	79.46%	0.0375	0.0840
51.5	15,066	49.30%	67.01%	77.62%	0.0314	0.0802
52.5	13,846	48.71%	63.96%	75.64%	0.0233	0.0725
53.5	13,667	48.08%	60.68%	73.53%	0.0159	0.0648
54.5	13,366	47.64%	57.20%	71.26%	0.0091	0.0558
55.5	13,777	46.77%	53.52%	68.79%	0.0046	0.0485
56.5	13,461	46.78%	49.70%	66.15%	0.0009	0.0375
57.5	13,251	46.15%	45.78%	63.30%	0.0000	0.0294
58.5	11,162	45.47%	41.82%	60.26%	0.0013	0.0219
59.5	11,095	45.20%	37.86%	57.04%	0.0054	0.0140
60.5	10,191	45.20%	33.97%	53.67%	0.0126	0.0072
61.5	10,035	45.20%	30.21%	50.18%	0.0225	0.0025
62.5	3,637	45.20%	26.59%	46.60%	0.0346	0.0002
63.5	2,138	35.14%	23.18%	42.97%	0.0143	0.0061
64.5	243	6.17%	19.99%	39.34%	0.0191	0.1100
65.5	12	3.91%	17.04%	35.75%	0.0172	0.1014
66.5	12	3.91%	14.35%	32.23%	0.0109	0.0802
67.5	12	3.91%	11.93%	28.83%	0.0064	0.0621
68.5	12	3.91%	9.78%	25.57%	0.0034	0.0469
69.5	12	3.91%	7.88%	22.49%	0.0016	0.0345
70.5	12	3.91%	6.22%	19.61%	0.0005	0.0246
71.5	12	3.91%	4.80%	16.92%	0.0001	0.0169
72.5	12	3.91%	3.62%	14.46%	0.0000	0.0111
73.5	12	3.91%	2.64%	12.22%	0.0002	0.0069
74.5	12	3.91%	1.85%	10.20%	0.0004	0.0040
75.5	12	3.91%	1.24%	8.40%	0.0007	0.0020
76.5			0.78%	6.82%		
Sum of Squared Differences (SSD)				[8]	0.3309	1.1556
SSD - Truncated OLT Curve				[9]	0.0165	0.0062

[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. The smallest SSD represents the best mathematical fit.

Account 380.20 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R3-45	[5] CURB R2-53	[6] Company SSD	[7] CURB SSD
0.0	448,281,236	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	418,454,857	99.99%	99.98%	99.91%	0.0000	0.0000
1.5	394,145,530	99.95%	99.94%	99.72%	0.0000	0.0000
2.5	362,241,082	99.90%	99.90%	99.52%	0.0000	0.0000
3.5	338,167,308	99.84%	99.84%	99.31%	0.0000	0.0000
4.5	323,395,752	99.78%	99.77%	99.08%	0.0000	0.0000
5.5	303,612,451	99.57%	99.69%	98.84%	0.0000	0.0001
6.5	278,112,075	99.41%	99.60%	98.59%	0.0000	0.0001
7.5	282,768,694	99.31%	99.49%	98.32%	0.0000	0.0001
8.5	270,009,946	99.20%	99.37%	98.03%	0.0000	0.0001
9.5	266,785,103	99.08%	99.22%	97.73%	0.0000	0.0002
10.5	264,992,415	98.92%	99.06%	97.41%	0.0000	0.0002
11.5	265,691,963	98.67%	98.87%	97.07%	0.0000	0.0003
12.5	258,698,292	97.95%	98.66%	96.71%	0.0000	0.0002
13.5	255,587,365	97.30%	98.41%	96.33%	0.0001	0.0001
14.5	247,300,579	96.80%	98.14%	95.93%	0.0002	0.0001
15.5	231,559,536	92.13%	97.83%	95.50%	0.0033	0.0011
16.5	224,267,733	91.49%	97.49%	95.06%	0.0036	0.0013
17.5	216,708,102	91.63%	97.10%	94.59%	0.0030	0.0009
18.5	205,595,755	90.18%	96.68%	94.10%	0.0042	0.0015
19.5	195,456,452	88.91%	96.20%	93.58%	0.0053	0.0022
20.5	188,153,003	88.06%	95.68%	93.03%	0.0058	0.0025
21.5	183,395,008	85.74%	95.10%	92.45%	0.0088	0.0045
22.5	179,814,275	84.65%	94.47%	91.85%	0.0096	0.0052
23.5	178,176,853	83.81%	93.77%	91.22%	0.0099	0.0055
24.5	178,528,565	83.65%	93.01%	90.55%	0.0088	0.0048
25.5	174,475,011	83.57%	92.18%	89.86%	0.0074	0.0040
26.5	166,408,882	83.51%	91.28%	89.13%	0.0060	0.0032
27.5	155,618,740	83.42%	90.30%	88.36%	0.0047	0.0024
28.5	145,589,841	83.18%	89.23%	87.56%	0.0037	0.0019
29.5	131,936,914	83.02%	88.08%	86.72%	0.0026	0.0014
30.5	121,365,905	82.73%	86.84%	85.84%	0.0017	0.0010
31.5	104,093,039	82.61%	85.49%	84.93%	0.0008	0.0005
32.5	90,564,720	82.41%	84.04%	83.97%	0.0003	0.0002
33.5	75,954,931	82.28%	82.47%	82.97%	0.0000	0.0000
34.5	68,748,970	82.11%	80.79%	81.93%	0.0002	0.0000
35.5	62,442,798	81.91%	78.98%	80.84%	0.0009	0.0001
36.5	56,967,391	81.84%	77.04%	79.71%	0.0023	0.0005
37.5	50,925,283	81.52%	74.96%	78.53%	0.0043	0.0009
38.5	45,705,844	81.33%	72.73%	77.31%	0.0074	0.0016
39.5	41,125,511	81.23%	70.36%	76.03%	0.0118	0.0027
40.5	36,463,894	81.10%	67.84%	74.71%	0.0176	0.0041
41.5	30,421,155	78.27%	65.17%	73.33%	0.0172	0.0024
42.5	25,386,407	77.65%	62.36%	71.91%	0.0234	0.0033
43.5	20,132,836	76.78%	59.41%	70.44%	0.0302	0.0040
44.5	15,678,447	75.80%	56.33%	68.91%	0.0379	0.0047
45.5	9,710,199	69.25%	53.13%	67.34%	0.0260	0.0004
46.5	6,462,714	63.39%	49.84%	65.71%	0.0184	0.0005

Account 380.20 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R3-45	[5] CURB R2-53	[6] Company SSD	[7] CURB SSD
47.5	4,619,400	63.20%	46.47%	64.04%	0.0280	0.0001
48.5	3,429,091	62.82%	43.05%	62.32%	0.0391	0.0000
49.5	1,461,882	62.79%	39.62%	60.55%	0.0537	0.0005
50.5	834,179	62.21%	36.20%	58.74%	0.0677	0.0012
51.5	834,111	62.20%	32.82%	56.88%	0.0863	0.0028
52.5	834,111	62.20%	29.52%	54.99%	0.1068	0.0052
53.5	834,111	62.20%	26.33%	53.05%	0.1287	0.0084
54.5	0	59.02%	23.28%	51.09%	0.1278	0.0063
55.5	0	59.02%	20.39%	49.09%	0.1492	0.0099
56.5	0	59.02%	17.70%	47.08%	0.1707	0.0143
57.5	0	59.02%	15.21%	45.04%	0.1920	0.0196
58.5	0	59.02%	12.92%	42.98%	0.2125	0.0257
59.5	0	59.02%	10.87%	40.92%	0.2319	0.0328
60.5			9.03%	38.86%		
Sum of Squared Differences (SSD)				[8]	1.8815	0.1974
SSD - Truncated OLT Curve				[9]	0.3153	0.0708

[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. The smallest SSD represents the best mathematical fit.

Account 382.00 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R2.5-53	[5] CURB R2.5-57	[6] Company SSD	[7] CURB SSD
0.0	110,882,848	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	108,445,773	99.99%	99.95%	99.95%	0.0000	0.0000
1.5	105,801,756	99.84%	99.84%	99.85%	0.0000	0.0000
2.5	104,538,535	99.69%	99.72%	99.74%	0.0000	0.0000
3.5	102,385,914	98.97%	99.59%	99.62%	0.0000	0.0000
4.5	97,662,441	98.83%	99.45%	99.50%	0.0000	0.0000
5.5	96,462,998	98.69%	99.30%	99.36%	0.0000	0.0000
6.5	95,574,776	98.54%	99.14%	99.21%	0.0000	0.0000
7.5	94,886,204	98.37%	98.97%	99.06%	0.0000	0.0000
8.5	93,405,798	98.22%	98.78%	98.89%	0.0000	0.0000
9.5	91,921,370	98.05%	98.58%	98.71%	0.0000	0.0000
10.5	89,444,916	97.09%	98.36%	98.52%	0.0002	0.0002
11.5	87,636,746	96.44%	98.12%	98.31%	0.0003	0.0004
12.5	84,112,407	96.01%	97.87%	98.09%	0.0003	0.0004
13.5	78,603,612	95.57%	97.60%	97.86%	0.0004	0.0005
14.5	73,140,229	95.18%	97.31%	97.61%	0.0005	0.0006
15.5	67,974,891	94.63%	97.00%	97.34%	0.0006	0.0007
16.5	62,765,065	94.32%	96.67%	97.05%	0.0006	0.0007
17.5	56,812,853	94.07%	96.31%	96.75%	0.0005	0.0007
18.5	55,665,852	93.50%	95.93%	96.42%	0.0006	0.0009
19.5	51,637,441	93.30%	95.52%	96.07%	0.0005	0.0008
20.5	44,157,135	93.12%	95.08%	95.70%	0.0004	0.0007
21.5	42,353,192	92.72%	94.62%	95.31%	0.0004	0.0007
22.5	37,564,686	92.42%	94.12%	94.89%	0.0003	0.0006
23.5	33,976,050	91.90%	93.59%	94.45%	0.0003	0.0006
24.5	31,941,790	91.48%	93.03%	93.98%	0.0002	0.0006
25.5	30,215,337	91.19%	92.43%	93.48%	0.0002	0.0005
26.5	27,802,166	90.93%	91.80%	92.95%	0.0001	0.0004
27.5	26,265,083	90.53%	91.12%	92.39%	0.0000	0.0003
28.5	24,886,307	90.15%	90.40%	91.80%	0.0000	0.0003
29.5	22,091,687	89.93%	89.64%	91.17%	0.0000	0.0002
30.5	19,903,794	89.63%	88.84%	90.51%	0.0001	0.0001
31.5	16,004,119	89.24%	87.99%	89.81%	0.0002	0.0000
32.5	14,617,248	88.89%	87.09%	89.07%	0.0003	0.0000
33.5	12,943,410	88.49%	86.13%	88.29%	0.0006	0.0000
34.5	11,864,279	88.07%	85.13%	87.47%	0.0009	0.0000
35.5	10,238,492	87.49%	84.07%	86.61%	0.0012	0.0001
36.5	9,597,303	86.72%	82.95%	85.70%	0.0014	0.0001
37.5	8,469,084	85.31%	81.77%	84.75%	0.0013	0.0000
38.5	7,585,777	84.36%	80.53%	83.74%	0.0015	0.0000
39.5	6,946,717	83.62%	79.22%	82.69%	0.0019	0.0001
40.5	6,378,936	82.96%	77.85%	81.58%	0.0026	0.0002
41.5	5,789,232	82.41%	76.40%	80.42%	0.0036	0.0004
42.5	4,871,194	81.74%	74.89%	79.20%	0.0047	0.0006
43.5	4,094,880	81.05%	73.30%	77.92%	0.0060	0.0010
44.5	3,885,453	80.13%	71.63%	76.59%	0.0072	0.0013
45.5	3,478,938	79.05%	69.88%	75.18%	0.0084	0.0015
46.5	3,103,847	77.66%	68.06%	73.72%	0.0092	0.0016
47.5	2,976,326	76.31%	66.16%	72.19%	0.0103	0.0017
48.5	2,936,301	75.13%	64.18%	70.60%	0.0120	0.0021
49.5	2,653,055	74.26%	62.13%	68.93%	0.0147	0.0028
50.5	2,426,177	72.32%	60.00%	67.20%	0.0152	0.0026
51.5	2,394,527	68.80%	57.80%	65.40%	0.0121	0.0012
52.5	2,201,457	66.06%	55.54%	63.54%	0.0111	0.0006
53.5	1,907,203	64.37%	53.21%	61.61%	0.0124	0.0008
54.5	1,766,947	63.61%	50.84%	59.62%	0.0163	0.0016
55.5	1,634,696	63.51%	48.42%	57.56%	0.0228	0.0035
56.5	1,294,597	54.22%	45.97%	55.46%	0.0068	0.0002
57.5	924,357	42.83%	43.49%	53.30%	0.0000	0.0110

Account 382.00 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] Company R2.5-53	[5] CURB R2.5-57	[6] Company SSD	[7] CURB SSD
58.5	802,125	41.09%	41.01%	51.09%	0.0000	0.0100
59.5	679,772	38.57%	38.53%	48.85%	0.0000	0.0106
60.5	532,285	34.33%	36.06%	46.57%	0.0003	0.0150
61.5	439,944	32.89%	33.62%	44.28%	0.0001	0.0130
62.5	387,534	31.56%	31.22%	41.97%	0.0000	0.0108
63.5	384,807	31.33%	28.88%	39.66%	0.0006	0.0069
64.5	380,930	30.99%	26.60%	37.35%	0.0019	0.0041
65.5	379,185	30.83%	24.40%	35.07%	0.0041	0.0018
66.5	378,388	30.75%	22.29%	32.82%	0.0072	0.0004
67.5	95,551	7.76%	20.28%	30.60%	0.0157	0.0522
68.5	20,382	1.65%	18.36%	28.43%	0.0279	0.0717
69.5	11,054	0.89%	16.55%	26.33%	0.0245	0.0647
70.5	9,295	0.75%	14.85%	24.29%	0.0199	0.0554
71.5	9,698	0.60%	13.27%	22.33%	0.0160	0.0472
72.5	9,350	0.58%	11.79%	20.45%	0.0126	0.0395
73.5	9,145	0.57%	10.43%	18.65%	0.0097	0.0327
74.5	9,055	0.56%	9.18%	16.96%	0.0074	0.0269
75.5	8,971	0.56%	8.03%	15.35%	0.0056	0.0219
76.5	8,801	0.55%	6.98%	13.84%	0.0041	0.0177
77.5	8,614	0.54%	6.03%	12.43%	0.0030	0.0141
78.5	8,552	0.53%	5.17%	11.11%	0.0022	0.0112
79.5	8,407	0.52%	4.40%	9.89%	0.0015	0.0088
80.5	8,212	0.51%	3.72%	8.76%	0.0010	0.0068
81.5	8,021	0.50%	3.12%	7.72%	0.0007	0.0052
82.5	5,492	0.34%	2.59%	6.77%	0.0005	0.0041
83.5	2,929	0.18%	2.13%	5.90%	0.0004	0.0033
84.5	2,797	0.17%	1.73%	5.11%	0.0002	0.0024
85.5	2,643	0.16%	1.40%	4.40%	0.0002	0.0018
86.5	2,469	0.15%	1.11%	3.76%	0.0001	0.0013
87.5	2,122	0.13%	0.87%	3.20%	0.0001	0.0009
88.5	155	0.01%	0.67%	2.69%	0.0000	0.0007
89.5	137	0.01%	0.50%	2.25%	0.0000	0.0005
90.5	137	0.01%	0.36%	1.87%	0.0000	0.0003
91.5	127	0.01%	0.25%	1.53%	0.0000	0.0002
92.5			0.16%	1.25%		
Sum of Squared Differences (SSD)				[8]	0.3587	0.6104
SSD - Truncated OLT Curve				[9]	0.1911	0.0352

[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. The smallest SSD represents the best mathematical fit.

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Observed Life Table
Retirement Expr. 1972 TO 2022
Placement Years 1927 TO 2022

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	$248,287,527.92	$4,732.40	0.00002	100.00
0.5 - 1.5	$251,999,631.99	$100,202.14	0.00040	100.00
1.5 - 2.5	$245,233,484.09	$2,479,282.93	0.01011	99.96
2.5 - 3.5	$239,628,911.68	$1,657,063.34	0.00692	98.95
3.5 - 4.5	$227,737,881.65	$594,123.54	0.00261	98.26
4.5 - 5.5	$224,063,872.16	$590,600.62	0.00264	98.01
5.5 - 6.5	$215,654,778.05	$439,545.22	0.00204	97.75
6.5 - 7.5	$211,152,431.66	$723,265.65	0.00343	97.55
7.5 - 8.5	$205,693,626.90	$575,459.00	0.00280	97.22
8.5 - 9.5	$200,417,414.54	$494,290.99	0.00247	96.94
9.5 - 10.5	$194,071,694.49	($360,904.61)	-0.00186	96.70
10.5 - 11.5	$186,094,855.42	$741,943.84	0.00399	96.88
11.5 - 12.5	$161,925,915.82	$525,622.14	0.00325	96.50
12.5 - 13.5	$158,535,047.47	$357,058.93	0.00225	96.18
13.5 - 14.5	$155,606,979.39	$513,329.03	0.00330	95.97
14.5 - 15.5	$149,763,242.06	$393,241.71	0.00263	95.65
15.5 - 16.5	$144,956,202.75	$436,434.91	0.00301	95.40
16.5 - 17.5	$139,962,123.67	$293,933.87	0.00210	95.11
17.5 - 18.5	$135,477,892.19	$705,462.69	0.00521	94.91
18.5 - 19.5	$130,957,984.67	$429,717.97	0.00328	94.42
19.5 - 20.5	$121,895,743.49	$864,620.39	0.00709	94.11
20.5 - 21.5	$103,496,011.68	$698,135.71	0.00675	93.44
21.5 - 22.5	$103,370,253.97	$540,634.10	0.00523	92.81
22.5 - 23.5	$96,740,515.30	$589,788.23	0.00610	92.33
23.5 - 24.5	$80,696,613.00	$747,342.64	0.00926	91.76
24.5 - 25.5	$73,757,335.30	$735,973.26	0.00998	90.91
25.5 - 26.5	$72,058,227.14	$280,165.52	0.00389	90.01
26.5 - 27.5	$71,654,523.28	$1,501,661.12	0.02096	89.66
27.5 - 28.5	$66,123,485.34	$418,504.90	0.00633	87.78
28.5 - 29.5	$59,726,920.26	$125,882.79	0.00211	87.22
29.5 - 30.5	$55,138,461.13	$139,292.24	0.00253	87.04
30.5 - 31.5	$53,254,301.04	$161,893.24	0.00304	86.82
31.5 - 32.5	$50,990,466.92	$255,246.51	0.00501	86.55
32.5 - 33.5	$49,509,817.08	$371,679.21	0.00751	86.12
33.5 - 34.5	$45,986,449.87	$748,772.00	0.01628	85.47
34.5 - 35.5	$42,735,432.43	$274,993.95	0.00643	84.08
35.5 - 36.5	$40,885,678.64	$142,227.32	0.00348	83.54

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Observed Life Table
Retirement Expr. 1972 TO 2022
Placement Years 1927 TO 2022

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	$36,321,486.83	$232,939.16	0.00641	83.25
37.5 - 38.5	$35,541,178.44	$100,004.95	0.00281	82.72
38.5 - 39.5	$30,957,082.96	$991,190.98	0.03202	82.48
39.5 - 40.5	$27,950,115.44	$307,075.78	0.01099	79.84
40.5 - 41.5	$24,909,859.24	$587,445.91	0.02358	78.97
41.5 - 42.5	$24,433,781.01	$133,930.82	0.00548	77.10
42.5 - 43.5	$26,734,953.36	$338,167.52	0.01265	76.68
43.5 - 44.5	$26,139,729.66	$110,462.66	0.00423	75.71
44.5 - 45.5	$25,896,008.05	$529,071.09	0.02043	75.39
45.5 - 46.5	$25,283,294.96	$221,399.73	0.00876	73.85
46.5 - 47.5	$24,612,993.23	$218,512.96	0.00888	73.20
47.5 - 48.5	$24,372,306.27	$108,601.39	0.00446	72.55
48.5 - 49.5	$23,774,054.88	$151,361.15	0.00637	72.23
49.5 - 50.5	$23,551,867.73	$188,399.41	0.00800	71.77
50.5 - 51.5	$22,652,865.32	$190,961.45	0.00843	71.20
51.5 - 52.5	$16,089,937.87	$123,129.09	0.00765	70.60
52.5 - 53.5	$15,948,593.78	$300,815.75	0.01886	70.06
53.5 - 54.5	$15,136,342.03	$232,414.33	0.01535	68.74
54.5 - 55.5	$14,649,324.70	$379,320.88	0.02589	67.68
55.5 - 56.5	$13,880,021.82	$260,667.75	0.01878	65.93
56.5 - 57.5	$13,534,946.07	$1,026,526.51	0.07584	64.69
57.5 - 58.5	$12,269,989.56	$127,988.06	0.01043	59.78
58.5 - 59.5	$11,788,836.50	$193,303.06	0.01640	59.16
59.5 - 60.5	$11,025,793.44	$310,838.75	0.02819	58.19
60.5 - 61.5	$10,424,979.69	$370,388.40	0.03553	56.55
61.5 - 62.5	$10,037,717.29	$492,799.20	0.04909	54.54
62.5 - 63.5	$9,540,397.09	$118,622.50	0.01243	51.86
63.5 - 64.5	$9,345,934.59	$62,888.45	0.00673	51.22
64.5 - 65.5	$9,226,740.14	$59,708.12	0.00647	50.87
65.5 - 66.5	$9,141,253.02	$78,601.09	0.00860	50.54
66.5 - 67.5	$8,996,286.93	$228,235.75	0.02537	50.11
67.5 - 68.5	$8,601,272.18	$128,109.70	0.01489	48.84
68.5 - 69.5	$8,260,505.48	$124,735.36	0.01510	48.11
69.5 - 70.5	$6,797,263.12	$167,240.45	0.02460	47.38
70.5 - 71.5	$6,625,927.67	$49,654.28	0.00749	46.22
71.5 - 72.5	$6,505,536.39	$89,644.08	0.01378	45.87
72.5 - 73.5	$5,993,741.31	$63,197.02	0.01054	45.24

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Observed Life Table
Retirement Expr. 1972 TO 2022
Placement Years 1927 TO 2022

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	$2,434,646.29	$3,453.15	0.00142	44.76
74.5 - 75.5	$2,430,063.14	$149,219.83	0.06141	44.70
75.5 - 76.5	$2,279,934.31	$313,406.04	0.13746	41.95
76.5 - 77.5	$1,966,528.27	$979,210.83	0.49794	36.19
77.5 - 78.5	$987,258.44	$587,691.43	0.59528	18.17
78.5 - 79.5	$399,567.01	$12,096.82	0.03027	7.35
79.5 - 80.5	$302,530.19	$6,603.82	0.02183	7.13
80.5 - 81.5	$295,926.37	$33,001.23	0.11152	6.97
81.5 - 82.5	$248,406.14	$24,816.87	0.09990	6.20
82.5 - 83.5	$223,342.27	$21,283.54	0.09530	5.58
83.5 - 84.5	$202,058.73	$15,128.85	0.07487	5.05
84.5 - 85.5	$185,105.88	$0.00	0.00000	4.67
85.5 - 86.5	$185,105.88	$874.60	0.00472	4.67
86.5 - 87.5	$184,058.28	$0.00	0.00000	4.65
87.5 - 88.5	$180,795.28	$17,347.40	0.09595	4.65
88.5 - 89.5	$163,447.88	$17,165.10	0.10502	4.20
89.5 - 90.5	$126,647.78	$3,095.57	0.02444	3.76
90.5 - 91.5	$123,552.21	$0.00	0.00000	3.67
91.5 - 92.5	$105,684.21	$450.34	0.00426	3.67
92.5 - 93.5	$43,149.87	$1,607.87	0.03726	3.65
93.5 - 94.5	$6,959.00	$0.00	0.00000	3.52

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1902 TO 2022

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	$170,557,086.46	$167,000.73	0.00098	100.00
0.5 - 1.5	$171,253,169.06	$178,106.67	0.00104	99.90
1.5 - 2.5	$172,408,684.72	$334,149.22	0.00194	99.80
2.5 - 3.5	$165,495,740.24	$443,779.58	0.00268	99.60
3.5 - 4.5	$158,872,575.53	$259,592.20	0.00163	99.34
4.5 - 5.5	$160,532,293.59	$509,693.39	0.00318	99.18
5.5 - 6.5	$162,375,244.56	$538,315.17	0.00332	98.86
6.5 - 7.5	$168,309,541.48	$458,255.95	0.00272	98.53
7.5 - 8.5	$177,575,991.11	$612,749.93	0.00345	98.26
8.5 - 9.5	$176,642,074.86	$691,612.02	0.00392	97.93
9.5 - 10.5	$181,138,001.68	$486,887.88	0.00269	97.54
10.5 - 11.5	$178,210,367.79	$416,482.21	0.00234	97.28
11.5 - 12.5	$178,418,342.61	$569,319.92	0.00319	97.05
12.5 - 13.5	$176,670,392.77	$2,525,676.80	0.01430	96.74
13.5 - 14.5	$173,426,735.93	$1,417,835.95	0.00818	95.36
14.5 - 15.5	$168,852,704.19	$4,044,059.26	0.02395	94.58
15.5 - 16.5	$164,965,188.44	$7,186,241.13	0.04356	92.31
16.5 - 17.5	$152,383,027.72	$1,440,894.13	0.00946	88.29
17.5 - 18.5	$146,261,228.35	$1,742,950.60	0.01192	87.46
18.5 - 19.5	$140,020,046.83	$675,436.19	0.00482	86.42
19.5 - 20.5	$134,694,245.30	$342,368.84	0.00254	86.00
20.5 - 21.5	$124,681,596.64	$321,680.56	0.00258	85.78
21.5 - 22.5	$119,162,403.66	$279,440.67	0.00235	85.56
22.5 - 23.5	$105,526,679.23	$231,144.51	0.00219	85.36
23.5 - 24.5	$99,039,265.25	$112,376.23	0.00113	85.17
24.5 - 25.5	$100,721,427.05	$175,100.68	0.00174	85.08
25.5 - 26.5	$100,158,259.60	$638,123.60	0.00637	84.93
26.5 - 27.5	$96,114,325.95	$161,681.83	0.00168	84.39
27.5 - 28.5	$89,374,065.58	$129,504.79	0.00145	84.24
28.5 - 29.5	$81,421,948.47	$238,097.41	0.00292	84.12
29.5 - 30.5	$76,079,540.02	$261,049.43	0.00343	83.88
30.5 - 31.5	$74,276,297.64	$114,152.57	0.00154	83.59
31.5 - 32.5	$69,242,359.19	$192,140.15	0.00277	83.46
32.5 - 33.5	$66,495,859.05	$172,842.78	0.00260	83.23
33.5 - 34.5	$62,939,975.46	$156,322.97	0.00248	83.01
34.5 - 35.5	$62,301,684.12	$69,189.43	0.00111	82.81
35.5 - 36.5	$57,865,775.30	$118,464.91	0.00205	82.71

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1902 TO 2022

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	$55,040,719.01	$174,386.51	0.00317	82.54
37.5 - 38.5	$53,455,653.01	$100,072.22	0.00187	82.28
38.5 - 39.5	$51,928,333.23	$158,267.98	0.00305	82.13
39.5 - 40.5	$51,922,105.71	$139,775.74	0.00269	81.88
40.5 - 41.5	$51,066,610.10	$116,530.88	0.00228	81.66
41.5 - 42.5	$50,172,065.50	$151,277.43	0.00302	81.47
42.5 - 43.5	$47,384,352.76	$126,589.17	0.00267	81.23
43.5 - 44.5	$45,516,378.59	$92,031.90	0.00202	81.01
44.5 - 45.5	$43,897,712.12	$190,993.80	0.00435	80.85
45.5 - 46.5	$43,449,062.70	$171,399.53	0.00394	80.49
46.5 - 47.5	$43,105,678.35	$289,488.31	0.00672	80.18
47.5 - 48.5	$42,893,370.44	$416,688.17	0.00971	79.64
48.5 - 49.5	$42,112,191.12	$209,041.24	0.00496	78.86
49.5 - 50.5	$41,226,019.76	$507,696.85	0.01231	78.47
50.5 - 51.5	$39,949,534.84	$213,737.51	0.00535	77.51
51.5 - 52.5	$36,880,111.27	$240,382.23	0.00652	77.09
52.5 - 53.5	$34,941,767.21	$243,100.00	0.00696	76.59
53.5 - 54.5	$33,089,959.59	$202,235.80	0.00611	76.06
54.5 - 55.5	$30,554,716.64	$289,584.39	0.00948	75.59
55.5 - 56.5	$29,078,929.19	$297,133.91	0.01022	74.88
56.5 - 57.5	$26,249,194.18	$197,380.14	0.00752	74.11
57.5 - 58.5	$24,444,978.26	$158,157.99	0.00647	73.55
58.5 - 59.5	$23,279,698.90	$133,132.71	0.00572	73.08
59.5 - 60.5	$20,703,346.86	$160,302.61	0.00774	72.66
60.5 - 61.5	$19,922,313.73	$348,140.93	0.01747	72.10
61.5 - 62.5	$17,473,078.51	$387,001.00	0.02215	70.84
62.5 - 63.5	$15,775,131.22	$190,989.13	0.01211	69.27
63.5 - 64.5	$14,578,363.24	$111,139.67	0.00762	68.43
64.5 - 65.5	$14,480,336.61	$54,264.74	0.00375	67.91
65.5 - 66.5	$14,138,656.74	$44,912.95	0.00318	67.65
66.5 - 67.5	$12,952,419.88	$31,282.19	0.00242	67.44
67.5 - 68.5	$11,631,104.83	$44,748.95	0.00385	67.27
68.5 - 69.5	$9,464,046.46	$33,804.22	0.00357	67.02
69.5 - 70.5	$8,521,554.43	$16,583.32	0.00195	66.78
70.5 - 71.5	$7,881,614.67	$28,199.86	0.00358	66.65
71.5 - 72.5	$7,121,725.18	$19,521.65	0.00274	66.41
72.5 - 73.5	$6,692,794.34	$28,611.10	0.00427	66.23

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1902 TO 2022

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	$6,668,322.33	$55,123.37	0.00827	65.94
74.5 - 75.5	$6,879,505.92	$115,146.79	0.01674	65.40
75.5 - 76.5	$7,052,615.57	$175,908.38	0.02494	64.30
76.5 - 77.5	$7,498,677.89	$120,932.06	0.01613	62.70
77.5 - 78.5	$7,237,844.53	$122,720.64	0.01696	61.69
78.5 - 79.5	$7,117,332.64	$342,196.94	0.04808	60.64
79.5 - 80.5	$6,682,408.62	$217,900.19	0.03261	57.73
80.5 - 81.5	$8,820,796.05	$151,339.89	0.01716	55.84
81.5 - 82.5	$8,456,956.16	$241,407.25	0.02855	54.89
82.5 - 83.5	$8,069,352.91	$391,633.13	0.04853	53.32
83.5 - 84.5	$7,567,421.78	$235,176.58	0.03108	50.73
84.5 - 85.5	$7,225,034.20	$261,186.05	0.03615	49.16
85.5 - 86.5	$6,718,757.96	$160,528.89	0.02389	47.38
86.5 - 87.5	$6,320,653.07	$334,903.64	0.05299	46.25
87.5 - 88.5	$5,807,730.43	$387,645.97	0.06675	43.80
88.5 - 89.5	$5,408,549.46	$353,139.89	0.06529	40.87
89.5 - 90.5	$5,037,112.57	$333,929.67	0.06629	38.20
90.5 - 91.5	$4,631,117.90	$560,462.60	0.12102	35.67
91.5 - 92.5	$3,745,431.30	$388,140.94	0.10363	31.35
92.5 - 93.5	$3,030,688.36	$466,508.28	0.15393	28.11
93.5 - 94.5	$2,434,431.08	$448,211.94	0.18411	23.78
94.5 - 95.5	$1,798,053.14	$140,192.50	0.07797	19.40
95.5 - 96.5	$1,069,477.33	$214,733.39	0.20078	17.89
96.5 - 97.5	$678,123.94	$136,211.73	0.20087	14.30
97.5 - 98.5	$356,934.21	$122,262.72	0.34254	11.42
98.5 - 99.5	$364,918.52	$115,848.04	0.31746	7.51
99.5 - 100.5	$242,575.48	$89,980.28	0.37094	5.13
100.5 - 101.5	$152,595.20	$22,981.35	0.15060	3.23
101.5 - 102.5	$129,292.85	$2,983.78	0.02308	2.74
102.5 - 103.5	$48,137.07	$15,657.96	0.32528	2.68
103.5 - 104.5	$32,479.11	$24,320.19	0.74879	1.81

Kansas Gas Service
Gas Division
376.20 Mains - Plastic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1945 TO 2022

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	$291,880,633.57	$15,616.48	0.00005	100.00
0.5 - 1.5	$294,440,973.19	$155,768.13	0.00053	99.99
1.5 - 2.5	$286,239,002.34	$187,295.51	0.00065	99.94
2.5 - 3.5	$265,260,352.70	$200,373.72	0.00076	99.88
3.5 - 4.5	$250,218,286.87	$162,665.36	0.00065	99.80
4.5 - 5.5	$243,967,579.54	$145,169.17	0.00060	99.74
5.5 - 6.5	$241,675,154.54	$208,071.28	0.00086	99.68
6.5 - 7.5	$243,610,555.24	$282,977.39	0.00116	99.59
7.5 - 8.5	$240,997,112.99	$331,164.99	0.00137	99.48
8.5 - 9.5	$236,077,283.66	$267,782.09	0.00113	99.34
9.5 - 10.5	$235,255,852.94	$185,983.48	0.00079	99.23
10.5 - 11.5	$230,307,339.55	$193,673.14	0.00084	99.15
11.5 - 12.5	$226,730,018.30	$195,140.45	0.00086	99.06
12.5 - 13.5	$221,806,662.77	$171,238.51	0.00077	98.98
13.5 - 14.5	$218,719,172.36	$294,186.83	0.00135	98.90
14.5 - 15.5	$211,213,969.59	$287,533.48	0.00136	98.77
15.5 - 16.5	$203,226,245.28	$208,225.09	0.00102	98.63
16.5 - 17.5	$196,122,156.73	$230,237.92	0.00117	98.53
17.5 - 18.5	$186,038,635.90	$166,251.28	0.00089	98.42
18.5 - 19.5	$177,678,197.81	$128,507.51	0.00072	98.33
19.5 - 20.5	$168,878,517.09	$239,746.45	0.00142	98.26
20.5 - 21.5	$152,012,416.37	$172,823.02	0.00114	98.12
21.5 - 22.5	$144,445,979.12	$113,406.60	0.00079	98.01
22.5 - 23.5	$122,143,464.94	$130,035.97	0.00106	97.93
23.5 - 24.5	$109,462,724.55	$467,823.47	0.00427	97.83
24.5 - 25.5	$107,893,299.51	$342,057.66	0.00317	97.41
25.5 - 26.5	$103,271,119.30	$210,178.69	0.00204	97.10
26.5 - 27.5	$92,942,099.10	$167,324.83	0.00180	96.90
27.5 - 28.5	$81,854,069.48	$199,252.88	0.00243	96.73
28.5 - 29.5	$68,721,764.84	$255,795.66	0.00372	96.49
29.5 - 30.5	$57,819,805.53	$70,238.36	0.00121	96.13
30.5 - 31.5	$52,716,025.99	$103,424.10	0.00196	96.02
31.5 - 32.5	$46,070,324.67	$72,261.51	0.00157	95.83
32.5 - 33.5	$40,736,307.79	$108,495.80	0.00266	95.68
33.5 - 34.5	$36,601,880.14	$77,811.35	0.00213	95.42
34.5 - 35.5	$33,196,117.35	$51,915.61	0.00156	95.22
35.5 - 36.5	$28,686,626.70	$183,273.89	0.00639	95.07

Kansas Gas Service
Gas Division
376.20 Mains - Plastic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1945 TO 2022

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	$24,961,797.08	$61,382.76	0.00246	94.46
37.5 - 38.5	$21,118,304.77	$203,648.17	0.00964	94.23
38.5 - 39.5	$18,172,609.21	$48,219.62	0.00265	93.32
39.5 - 40.5	$16,550,236.75	$91,447.68	0.00553	93.08
40.5 - 41.5	$14,649,511.48	$117,300.48	0.00801	92.56
41.5 - 42.5	$12,198,591.21	$83,673.99	0.00686	91.82
42.5 - 43.5	$9,410,644.35	$130,184.51	0.01383	91.19
43.5 - 44.5	$6,799,124.05	$211,968.03	0.03118	89.93
44.5 - 45.5	$4,276,627.02	$229,626.51	0.05369	87.12
45.5 - 46.5	$2,773,899.17	$208,938.75	0.07532	82.45
46.5 - 47.5	$1,412,656.42	$102,030.24	0.07223	76.24
47.5 - 48.5	$474,405.18	$69,032.91	0.14551	70.73
48.5 - 49.5	$29,358.27	$118.81	0.00405	60.44
49.5 - 50.5	$27,555.46	$4,449.09	0.16146	60.19
50.5 - 51.5	$23,221.14	$540.88	0.02329	50.47
51.5 - 52.5	$15,066.26	$180.03	0.01195	49.30
52.5 - 53.5	$13,846.23	$178.94	0.01292	48.71
53.5 - 54.5	$13,667.29	$123.95	0.00907	48.08
54.5 - 55.5	$13,366.34	$244.74	0.01831	47.64
55.5 - 56.5	$13,776.76	($1.90)	-0.00014	46.77
56.5 - 57.5	$13,460.66	$181.73	0.01350	46.78
57.5 - 58.5	$13,250.93	$193.21	0.01458	46.15
58.5 - 59.5	$11,161.72	$66.58	0.00597	45.47
59.5 - 60.5	$11,095.14	$0.00	0.00000	45.20
60.5 - 61.5	$10,191.14	$0.00	0.00000	45.20
61.5 - 62.5	$10,035.14	$0.00	0.00000	45.20
62.5 - 63.5	$3,637.14	$809.33	0.22252	45.20
63.5 - 64.5	$2,137.81	$1,762.37	0.82438	35.14
64.5 - 65.5	$243.44	$89.21	0.36646	6.17
65.5 - 66.5	$12.23	$0.00	0.00000	3.91
66.5 - 67.5	$12.23	$0.00	0.00000	3.91
67.5 - 68.5	$12.23	$0.00	0.00000	3.91
68.5 - 69.5	$12.23	$0.00	0.00000	3.91
69.5 - 70.5	$12.23	$0.00	0.00000	3.91
70.5 - 71.5	$12.23	$0.00	0.00000	3.91
71.5 - 72.5	$12.23	$0.00	0.00000	3.91
72.5 - 73.5	$12.23	$0.00	0.00000	3.91

Kansas Gas Service
Gas Division
376.20 Mains - Plastic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1945 TO 2022

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	$12.23	$0.00	0.00000	3.91
74.5 - 75.5	$12.23	$0.00	0.00000	3.91
75.5 - 76.5	$12.23	$6.73	0.55029	3.91

Kansas Gas Service
Gas Division
380.20 Services - Plastic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1962 TO 2022

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	$448,281,236.05	$59,393.90	0.00013	100.00
0.5 - 1.5	$418,454,857.41	$138,464.23	0.00033	99.99
1.5 - 2.5	$394,145,529.79	$199,388.61	0.00051	99.95
2.5 - 3.5	$362,241,082.49	$219,540.76	0.00061	99.90
3.5 - 4.5	$338,167,307.88	$207,817.39	0.00061	99.84
4.5 - 5.5	$323,395,752.16	$682,959.38	0.00211	99.78
5.5 - 6.5	$303,612,450.53	$499,375.42	0.00164	99.57
6.5 - 7.5	$278,112,075.38	$267,136.16	0.00096	99.41
7.5 - 8.5	$282,768,694.07	$303,556.64	0.00107	99.31
8.5 - 9.5	$270,009,946.08	$339,410.76	0.00126	99.20
9.5 - 10.5	$266,785,103.33	$417,336.87	0.00156	99.08
10.5 - 11.5	$264,992,414.93	$689,714.79	0.00260	98.92
11.5 - 12.5	$265,691,962.50	$1,927,854.55	0.00726	98.67
12.5 - 13.5	$258,698,291.82	$1,716,593.96	0.00664	97.95
13.5 - 14.5	$255,587,365.37	$1,322,540.64	0.00517	97.30
14.5 - 15.5	$247,300,578.68	$11,934,013.85	0.04826	96.80
15.5 - 16.5	$231,559,535.83	$1,598,281.68	0.00690	92.13
16.5 - 17.5	$224,267,732.58	($338,603.92)	-0.00151	91.49
17.5 - 18.5	$216,708,102.18	$3,435,597.21	0.01585	91.63
18.5 - 19.5	$205,595,754.58	$2,896,379.88	0.01409	90.18
19.5 - 20.5	$195,456,451.50	$1,869,739.45	0.00957	88.91
20.5 - 21.5	$188,153,003.48	$4,957,333.40	0.02635	88.06
21.5 - 22.5	$183,395,007.64	$2,327,112.23	0.01269	85.74
22.5 - 23.5	$179,814,275.10	$1,779,123.71	0.00989	84.65
23.5 - 24.5	$178,176,852.81	$332,904.77	0.00187	83.81
24.5 - 25.5	$178,528,564.62	$174,566.00	0.00098	83.65
25.5 - 26.5	$174,475,011.32	$133,697.75	0.00077	83.57
26.5 - 27.5	$166,408,881.87	$179,591.32	0.00108	83.51
27.5 - 28.5	$155,618,739.61	$446,329.95	0.00287	83.42
28.5 - 29.5	$145,589,841.11	$271,701.59	0.00187	83.18
29.5 - 30.5	$131,936,914.17	$469,944.79	0.00356	83.02
30.5 - 31.5	$121,365,905.32	$167,171.55	0.00138	82.73
31.5 - 32.5	$104,093,038.58	$254,586.34	0.00245	82.61
32.5 - 33.5	$90,564,720.17	$141,014.97	0.00156	82.41
33.5 - 34.5	$75,954,930.61	$161,088.89	0.00212	82.28
34.5 - 35.5	$68,748,970.19	$163,783.49	0.00238	82.11
35.5 - 36.5	$62,442,797.70	$52,593.83	0.00084	81.91

Kansas Gas Service
Gas Division
380.20 Services - Plastic

Observed Life Table
Retirement Expr. 2001 TO 2022
Placement Years 1962 TO 2022

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	$56,967,390.89	$223,500.42	0.00392	81.84
37.5 - 38.5	$50,925,283.47	$118,802.89	0.00233	81.52
38.5 - 39.5	$45,705,843.72	$59,663.46	0.00131	81.33
39.5 - 40.5	$41,125,511.26	$65,075.61	0.00158	81.23
40.5 - 41.5	$36,463,893.65	$1,272,472.28	0.03490	81.10
41.5 - 42.5	$30,421,155.37	$241,437.70	0.00794	78.27
42.5 - 43.5	$25,386,406.67	$283,112.39	0.01115	77.65
43.5 - 44.5	$20,132,836.28	$257,411.94	0.01279	76.78
44.5 - 45.5	$15,678,447.34	$1,355,187.80	0.08644	75.80
45.5 - 46.5	$9,710,198.54	$820,984.37	0.08455	69.25
46.5 - 47.5	$6,462,714.17	$19,899.12	0.00308	63.39
47.5 - 48.5	$4,619,400.05	$27,845.36	0.00603	63.20
48.5 - 49.5	$3,429,090.69	$1,513.19	0.00044	62.82
49.5 - 50.5	$1,461,881.50	$13,549.45	0.00927	62.79
50.5 - 51.5	$834,179.05	$68.19	0.00008	62.21
51.5 - 52.5	$834,110.86	$0.00	0.00000	62.20
52.5 - 53.5	$834,110.86	$0.00	0.00000	62.20
53.5 - 54.5	$834,110.86	$42,695.86	0.05119	62.20
54.5 - 55.5	$0.00	$0.00	0.00000	59.02
55.5 - 56.5	$0.00	$0.00	0.00000	59.02
56.5 - 57.5	$0.00	$0.00	0.00000	59.02
57.5 - 58.5	$0.00	$0.00	0.00000	59.02
58.5 - 59.5	$0.00	$0.00	0.00000	59.02
59.5 - 60.5	$0.00	$0.00	0.00000	59.02

Kansas Gas Service
Gas Division
382.00 Meter Installations

Observed Life Table
Retirement Expr. 1972 TO 2022
Placement Years 1900 TO 2022

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	$110,882,847.60	$13,155.82	0.00012	100.00
0.5 - 1.5	$108,445,773.13	$159,182.79	0.00147	99.99
1.5 - 2.5	$105,801,756.07	$161,222.71	0.00152	99.84
2.5 - 3.5	$104,538,535.15	$751,650.64	0.00719	99.69
3.5 - 4.5	$102,385,913.59	$148,505.77	0.00145	98.97
4.5 - 5.5	$97,662,441.03	$137,343.39	0.00141	98.83
5.5 - 6.5	$96,462,998.36	$145,400.62	0.00151	98.69
6.5 - 7.5	$95,574,775.61	$170,022.12	0.00178	98.54
7.5 - 8.5	$94,886,203.78	$145,444.02	0.00153	98.37
8.5 - 9.5	$93,405,797.93	$155,756.63	0.00167	98.22
9.5 - 10.5	$91,921,369.76	$905,036.13	0.00985	98.05
10.5 - 11.5	$89,444,915.56	$593,283.74	0.00663	97.09
11.5 - 12.5	$87,636,745.72	$392,336.44	0.00448	96.44
12.5 - 13.5	$84,112,406.63	$383,592.63	0.00456	96.01
13.5 - 14.5	$78,603,612.49	$319,251.08	0.00406	95.57
14.5 - 15.5	$73,140,229.10	$424,602.19	0.00581	95.18
15.5 - 16.5	$67,974,891.46	$221,655.85	0.00326	94.63
16.5 - 17.5	$62,765,064.78	$168,819.85	0.00269	94.32
17.5 - 18.5	$56,812,852.99	$346,196.63	0.00609	94.07
18.5 - 19.5	$55,665,851.82	$117,578.63	0.00211	93.50
19.5 - 20.5	$51,637,441.12	$99,042.31	0.00192	93.30
20.5 - 21.5	$44,157,134.82	$190,373.73	0.00431	93.12
21.5 - 22.5	$42,353,192.15	$134,210.64	0.00317	92.72
22.5 - 23.5	$37,564,686.44	$212,370.41	0.00565	92.42
23.5 - 24.5	$33,976,049.77	$156,301.10	0.00460	91.90
24.5 - 25.5	$31,941,790.01	$100,847.02	0.00316	91.48
25.5 - 26.5	$30,215,336.70	$85,857.96	0.00284	91.19
26.5 - 27.5	$27,802,165.64	$122,186.84	0.00439	90.93
27.5 - 28.5	$26,265,083.48	$111,189.52	0.00423	90.53
28.5 - 29.5	$24,886,306.92	$61,140.97	0.00246	90.15
29.5 - 30.5	$22,091,686.97	$71,725.65	0.00325	89.93
30.5 - 31.5	$19,903,794.23	$87,311.87	0.00439	89.63
31.5 - 32.5	$16,004,119.36	$62,472.39	0.00390	89.24
32.5 - 33.5	$14,617,248.39	$66,503.39	0.00455	88.89
33.5 - 34.5	$12,943,410.19	$61,788.72	0.00477	88.49
34.5 - 35.5	$11,864,279.38	$77,227.61	0.00651	88.07
35.5 - 36.5	$10,238,491.90	$90,550.87	0.00884	87.49

Kansas Gas Service
Gas Division
382.00 Meter Installations

Observed Life Table
Retirement Expr. 1972 TO 2022
Placement Years 1900 TO 2022

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	$9,597,302.81	$155,557.88	0.01621	86.72
37.5 - 38.5	$8,469,083.57	$94,561.56	0.01117	85.31
38.5 - 39.5	$7,585,777.32	$66,662.05	0.00879	84.36
39.5 - 40.5	$6,946,717.32	$54,885.22	0.00790	83.62
40.5 - 41.5	$6,378,935.60	$42,145.53	0.00661	82.96
41.5 - 42.5	$5,789,231.58	$46,904.20	0.00810	82.41
42.5 - 43.5	$4,871,193.57	$41,172.03	0.00845	81.74
43.5 - 44.5	$4,094,880.32	$46,662.94	0.01140	81.05
44.5 - 45.5	$3,885,452.67	$52,165.38	0.01343	80.13
45.5 - 46.5	$3,478,938.33	$61,348.24	0.01763	79.05
46.5 - 47.5	$3,103,846.67	$53,841.75	0.01735	77.66
47.5 - 48.5	$2,976,325.82	$45,947.35	0.01544	76.31
48.5 - 49.5	$2,936,300.93	$34,130.17	0.01162	75.13
49.5 - 50.5	$2,653,055.27	$69,350.67	0.02614	74.26
50.5 - 51.5	$2,426,176.89	$117,988.95	0.04863	72.32
51.5 - 52.5	$2,394,527.35	$95,579.99	0.03992	68.80
52.5 - 53.5	$2,201,457.22	$56,096.06	0.02548	66.06
53.5 - 54.5	$1,907,202.91	$22,559.51	0.01183	64.37
54.5 - 55.5	$1,766,946.98	$2,875.07	0.00163	63.61
55.5 - 56.5	$1,634,695.75	$239,096.51	0.14626	63.51
56.5 - 57.5	$1,294,596.66	$271,965.95	0.21008	54.22
57.5 - 58.5	$924,356.76	$37,634.90	0.04071	42.83
58.5 - 59.5	$802,125.36	$49,062.08	0.06117	41.09
59.5 - 60.5	$679,771.86	$74,830.24	0.11008	38.57
60.5 - 61.5	$532,284.52	$22,308.75	0.04191	34.33
61.5 - 62.5	$439,944.49	$17,706.48	0.04025	32.89
62.5 - 63.5	$387,534.31	$2,889.10	0.00746	31.56
63.5 - 64.5	$384,807.20	$4,182.35	0.01087	31.33
64.5 - 65.5	$380,930.48	$1,995.07	0.00524	30.99
65.5 - 66.5	$379,184.76	$897.09	0.00237	30.83
66.5 - 67.5	$378,387.74	$282,867.47	0.74756	30.75
67.5 - 68.5	$95,551.30	$75,235.05	0.78738	7.76
68.5 - 69.5	$20,381.78	$9,340.61	0.45828	1.65
69.5 - 70.5	$11,053.67	$1,799.70	0.16281	0.89
70.5 - 71.5	$9,294.64	$1,798.36	0.19348	0.75
71.5 - 72.5	$9,697.61	$347.37	0.03582	0.60
72.5 - 73.5	$9,350.24	$205.28	0.02195	0.58

Kansas Gas Service
Gas Division
382.00 Meter Installations

Observed Life Table
Retirement Expr. 1972 TO 2022
Placement Years 1900 TO 2022

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	$9,144.96	$89.52	0.00979	0.57
74.5 - 75.5	$9,055.44	$84.15	0.00929	0.56
75.5 - 76.5	$8,971.29	$170.13	0.01896	0.56
76.5 - 77.5	$8,801.16	$187.40	0.02129	0.55
77.5 - 78.5	$8,613.76	$61.37	0.00712	0.54
78.5 - 79.5	$8,552.39	$144.98	0.01695	0.53
79.5 - 80.5	$8,407.41	$195.81	0.02329	0.52
80.5 - 81.5	$8,211.60	$190.95	0.02325	0.51
81.5 - 82.5	$8,020.65	$2,529.06	0.31532	0.50
82.5 - 83.5	$5,491.59	$2,562.46	0.46662	0.34
83.5 - 84.5	$2,929.13	$132.20	0.04513	0.18
84.5 - 85.5	$2,796.93	$154.00	0.05506	0.17
85.5 - 86.5	$2,642.93	$174.42	0.06599	0.16
86.5 - 87.5	$2,468.51	$346.23	0.14026	0.15
87.5 - 88.5	$2,122.28	$1,967.43	0.92704	0.13
88.5 - 89.5	$154.85	$18.03	0.11644	0.01
89.5 - 90.5	$136.82	$0.00	0.00000	0.01
90.5 - 91.5	$136.82	$9.37	0.06848	0.01
91.5 - 92.5	$127.45	$85.02	0.66709	0.01

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 62 *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)
1928	6,959.00	62.00	112.24	8.38	940.89
1929	34,583.00	62.00	557.78	8.66	4,832.51
1930	62,084.00	62.00	1,001.34	8.94	8,954.76
1931	17,868.00	62.00	288.19	9.23	2,660.51
1933	19,635.00	62.00	316.69	9.81	3,105.74
1935	3,263.00	62.00	52.63	10.40	547.39
1936	173.00	62.00	2.79	10.71	29.87
1938	1,824.00	62.00	29.42	11.32	332.99
1940	247.00	62.00	3.98	11.95	47.62
1941	14,519.00	62.00	234.17	12.28	2,874.82
1943	84,940.00	62.00	1,369.99	12.94	17,728.17
1945	59.00	62.00	0.95	13.63	12.97
1947	909.00	62.00	14.66	14.34	210.24
1948	1,130.00	62.00	18.23	14.71	268.01
1949	3,495,898.00	62.00	56,384.84	15.08	850,229.52
1950	422,151.00	62.00	6,808.81	15.46	105,257.84
1951	70,737.00	62.00	1,140.91	15.85	18,079.84
1952	4,095.00	62.00	66.05	16.24	1,072.78
1953	1,338,507.00	62.00	21,588.59	16.65	359,360.58
1954	212,657.00	62.00	3,429.91	17.06	58,504.96
1955	166,779.00	62.00	2,689.95	17.48	47,010.92
1956	66,365.00	62.00	1,070.39	17.90	19,164.59
1957	25,779.00	62.00	415.79	18.34	7,625.35
1958	56,306.00	62.00	908.15	18.78	17,058.96
1959	75,840.00	62.00	1,223.21	19.24	23,531.09
1960	4,521.00	62.00	72.92	19.70	1,436.32
1961	16,874.00	62.00	272.16	20.17	5,488.79

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 62 *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)
1962	289,975.00	62.00	4,676.97	20.64	96,554.14
1963	569,740.00	62.00	9,189.26	21.13	194,186.63
1964	353,165.00	62.00	5,696.15	21.63	123,192.29
1965	238,430.00	62.00	3,845.60	22.13	85,102.44
1966	84,408.00	62.00	1,361.40	22.64	30,825.41
1967	389,982.00	62.00	6,289.96	23.16	145,682.46
1968	254,603.00	62.00	4,106.46	23.69	97,284.82
1969	511,436.00	62.00	8,248.88	24.23	199,853.95
1970	18,215.00	62.00	293.79	24.77	7,277.62
1971	6,371,966.00	62.00	102,772.53	25.33	2,602,788.17
1972	710,603.00	62.00	11,461.21	25.89	296,697.80
1973	70,826.00	62.00	1,142.34	26.46	30,220.94
1974	489,650.00	62.00	7,897.50	27.03	213,491.09
1975	22,174.00	62.00	357.64	27.62	9,876.59
1976	448,902.00	62.00	7,240.28	28.21	204,242.20
1977	83,642.00	62.00	1,349.05	28.81	38,865.23
1978	302,701.00	62.00	4,882.22	29.42	143,612.65
1979	580,763.00	62.00	9,367.04	30.03	281,298.42
1980	414,193.00	62.00	6,680.46	30.65	204,760.78
1981	858,036.00	62.00	13,839.14	31.28	432,895.31
1982	2,900,667.00	62.00	46,784.44	31.92	1,493,200.71
1983	2,019,821.00	62.00	32,577.40	32.56	1,060,649.89
1984	4,506,026.00	62.00	72,677.05	33.21	2,413,441.16
1985	550,349.00	62.00	8,876.50	33.86	300,590.23
1986	4,481,413.00	62.00	72,280.07	34.52	2,495,456.64
1987	1,611,613.00	62.00	25,993.48	35.19	914,805.46
1988	2,502,919.00	62.00	40,369.22	35.87	1,447,915.32

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 62 *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)
1989	3,153,512.00	62.00	50,862.55	36.55	1,858,927.16
1990	1,229,737.00	62.00	19,834.25	37.23	738,520.07
1991	2,549,305.00	62.00	41,117.38	37.93	1,559,402.78
1992	1,800,386.00	62.00	29,038.17	38.62	1,121,561.78
1993	4,498,439.00	62.00	72,554.68	39.33	2,853,236.60
1994	6,064,218.00	62.00	97,808.91	40.03	3,915,715.10
1995	4,030,552.00	62.00	65,008.20	40.75	2,648,951.41
1996	123,774.00	62.00	1,996.33	41.47	82,778.57
1997	970,308.00	62.00	15,649.96	42.19	660,255.98
1998	6,363,807.00	62.00	102,640.94	42.92	4,404,889.21
1999	15,750,964.00	62.00	254,045.05	43.65	11,088,737.45
2000	9,933,271.00	62.00	160,212.31	44.39	7,111,159.65
2001	343,794.00	62.00	5,545.00	45.13	250,223.94
2002	17,967,810.00	62.00	289,800.25	45.87	13,293,685.24
2003	8,665,974.00	62.00	139,772.26	46.62	6,516,383.16
2004	6,045,918.00	62.00	97,513.75	47.37	4,619,634.66
2005	5,170,871.00	62.00	83,400.24	48.13	4,014,210.39
2006	5,076,651.00	62.00	81,880.58	48.89	4,003,314.96
2007	4,641,990.00	62.00	74,869.99	49.66	3,717,877.55
2008	5,789,144.00	62.00	93,372.28	50.43	4,708,475.00
2009	2,752,375.00	62.00	44,392.66	51.20	2,272,858.34
2010	3,065,874.00	62.00	49,449.04	51.98	2,570,162.36
2011	23,523,393.00	62.00	379,405.45	52.76	20,015,673.43
2012	8,472,861.00	62.00	136,657.57	53.54	7,316,674.98
2013	6,437,891.00	62.00	103,835.83	54.33	5,641,242.19
2014	5,382,495.00	62.00	86,813.49	55.12	4,785,116.67
2015	5,430,389.00	62.00	87,585.97	55.92	4,897,415.91

Kansas Gas Service
Gas Division
367.00 Transmission Mains

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 62 *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)
2016	5,820,784.00	62.00	93,882.60	56.71	5,324,547.37
2017	8,059,511.00	62.00	129,990.70	57.52	7,476,742.02
2018	3,816,775.00	62.00	61,560.22	58.32	3,590,476.81
2019	10,830,107.00	62.00	174,677.25	59.13	10,329,424.83
2020	3,788,348.00	62.00	61,101.72	59.95	3,662,993.12
2021	6,789,390.00	62.00	109,505.10	60.77	6,654,318.47
2022	2,930,506.00	62.00	47,265.71	61.59	2,911,013.33
Total	245,112,044.00	62.00	3,953,377.21	46.48	183,737,736.86

Composite Average Remaining Life ... 46.48 Years

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 76 *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)
1920	78,172.00	76.00	1,028.57	14.21	14,620.09
1921	321.00	76.00	4.22	14.53	61.39
1923	6,495.00	76.00	85.46	15.18	1,297.26
1924	20,103.00	76.00	264.51	15.51	4,102.97
1925	184,978.00	76.00	2,433.90	15.84	38,563.38
1926	176,620.00	76.00	2,323.92	16.18	37,611.60
1927	588,393.00	76.00	7,741.94	16.53	127,973.30
1928	188,166.00	76.00	2,475.84	16.88	41,787.36
1929	129,749.00	76.00	1,707.21	17.23	29,420.60
1930	326,602.00	76.00	4,297.35	17.59	75,607.21
1931	325,224.00	76.00	4,279.22	17.96	76,850.14
1932	72,065.00	76.00	948.21	18.33	17,381.34
1933	18,297.00	76.00	240.75	18.71	4,503.96
1934	11,535.00	76.00	151.77	19.09	2,897.58
1935	178,019.00	76.00	2,342.33	19.48	45,630.80
1936	237,576.00	76.00	3,125.97	19.88	62,134.04
1937	245,888.00	76.00	3,235.34	20.28	65,608.62
1938	107,211.00	76.00	1,410.66	20.69	29,183.07
1939	110,298.00	76.00	1,451.28	21.10	30,625.66
1940	146,196.00	76.00	1,923.61	21.52	41,403.89
1941	212,500.00	76.00	2,796.02	21.95	61,381.52
1942	364,357.00	76.00	4,794.12	22.39	107,331.41
1943	129,189.00	76.00	1,699.84	22.83	38,806.68
1944	18,955.00	76.00	249.41	23.28	5,806.01
1945	350,768.00	76.00	4,615.32	23.73	109,544.02
1946	94,413.00	76.00	1,242.26	24.20	30,058.90
1947	887,232.00	76.00	11,673.99	24.67	287,968.03

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 76 *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)
1948	355,976.00	76.00	4,683.85	25.14	117,768.96
1949	751,188.00	76.00	9,883.95	25.63	253,289.39
1950	784,706.00	76.00	10,324.98	26.12	269,665.35
1951	1,280,299.00	76.00	16,845.87	26.61	448,347.14
1952	1,420,660.00	76.00	18,692.71	27.12	506,909.34
1953	1,429,576.00	76.00	18,810.02	27.63	519,722.91
1954	2,234,587.00	76.00	29,402.17	28.15	827,600.47
1955	1,324,076.00	76.00	17,421.88	28.67	499,510.82
1956	1,174,837.00	76.00	15,458.23	29.20	451,439.85
1957	515,599.00	76.00	6,784.13	29.74	201,771.40
1958	241,045.00	76.00	3,171.61	30.29	96,054.60
1959	1,290,014.00	76.00	16,973.70	30.84	523,399.79
1960	1,431,619.00	76.00	18,836.90	31.40	591,399.71
1961	2,227,068.00	76.00	29,303.23	31.96	936,519.11
1962	805,686.00	76.00	10,601.03	32.53	344,844.39
1963	2,682,858.00	76.00	35,300.41	33.11	1,168,740.56
1964	1,410,077.00	76.00	18,553.46	33.69	625,092.09
1965	1,750,546.00	76.00	23,033.27	34.28	789,584.28
1966	2,552,716.00	76.00	33,588.03	34.88	1,171,476.81
1967	1,621,539.00	76.00	21,335.83	35.48	756,981.91
1968	2,514,371.00	76.00	33,083.50	36.09	1,193,868.34
1969	2,568,485.00	76.00	33,795.52	36.70	1,240,364.45
1970	2,210,784.00	76.00	29,088.97	37.32	1,085,645.16
1971	3,707,332.00	76.00	48,780.20	37.95	1,851,031.13
1972	1,702,346.00	76.00	22,399.07	38.58	864,134.52
1973	2,056,802.00	76.00	27,062.91	39.22	1,061,291.89
1974	1,942,839.00	76.00	25,563.42	39.86	1,018,893.97

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 76 *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)
1975	1,637,851.00	76.00	21,550.46	40.50	872,886.01
1976	2,604,056.00	76.00	34,263.55	41.16	1,410,279.31
1977	1,946,384.00	76.00	25,610.06	41.82	1,070,953.47
1978	3,093,901.00	76.00	40,708.82	42.48	1,729,326.43
1979	2,648,426.00	76.00	34,847.36	43.15	1,503,703.45
1980	3,714,394.00	76.00	48,873.12	43.82	2,141,836.75
1981	2,703,235.00	76.00	35,568.53	44.50	1,582,878.32
1982	2,521,348.00	76.00	33,175.30	45.19	1,499,106.84
1983	2,458,787.00	76.00	32,352.14	45.88	1,484,162.01
1984	2,350,648.00	76.00	30,929.27	46.57	1,440,291.48
1985	4,207,391.00	76.00	55,359.86	47.27	2,616,644.66
1986	4,200,812.00	76.00	55,273.29	47.97	2,651,324.36
1987	6,216,126.00	76.00	81,790.32	48.67	3,980,975.78
1988	3,166,703.00	76.00	41,666.73	49.38	2,057,692.89
1989	5,076,139.00	76.00	66,790.64	50.10	3,346,129.00
1990	5,223,955.00	76.00	68,735.57	50.82	3,492,913.63
1991	7,604,916.00	76.00	100,063.69	51.54	5,157,302.82
1992	3,842,258.00	76.00	50,555.52	52.27	2,642,352.21
1993	8,930,037.00	76.00	117,499.32	53.00	6,226,982.59
1994	9,632,704.00	76.00	126,744.84	53.73	6,810,067.79
1995	8,780,951.00	76.00	115,537.68	54.47	6,293,078.39
1996	5,456,063.00	76.00	71,789.59	55.21	3,963,372.09
1997	2,192,059.00	76.00	28,842.59	55.95	1,613,792.85
1998	974,926.00	76.00	12,827.85	56.70	727,348.96
1999	8,392,917.00	76.00	110,432.02	57.45	6,344,471.00
2000	16,597,267.00	76.00	218,382.92	58.20	12,710,958.09
2001	8,167,449.00	76.00	107,465.36	58.96	6,336,537.48

Kansas Gas Service
Gas Division
376.10 Mains - Metallic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 76 *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)
2002	13,559,112.00	76.00	178,407.59	59.72	10,655,177.24
2003	7,500,082.00	76.00	98,684.31	60.49	5,969,109.50
2004	7,137,340.00	76.00	93,911.43	61.25	5,752,531.96
2005	7,195,502.00	76.00	94,676.72	62.02	5,872,287.96
2006	7,957,247.00	76.00	104,699.58	62.80	6,574,842.79
2007	4,723,106.00	76.00	62,145.51	63.57	3,950,866.59
2008	7,476,073.00	76.00	98,368.40	64.35	6,330,363.57
2009	7,080,681.00	76.00	93,165.93	65.14	6,068,422.54
2010	4,511,512.00	76.00	59,361.41	65.92	3,913,226.04
2011	4,702,987.00	76.00	61,880.79	66.71	4,128,104.61
2012	8,222,412.00	76.00	108,188.55	67.50	7,302,937.33
2013	4,171,802.00	76.00	54,891.59	68.30	3,748,881.07
2014	5,793,819.00	76.00	76,233.70	69.10	5,267,393.84
2015	4,163,122.00	76.00	54,777.38	69.90	3,828,716.86
2016	6,303,197.00	76.00	82,935.98	70.70	5,863,521.34
2017	7,513,313.00	76.00	98,858.40	71.51	7,069,131.05
2018	5,335,414.00	76.00	70,202.12	72.32	5,076,838.07
2019	8,906,132.00	76.00	117,184.78	73.13	8,569,727.45
2020	8,145,718.00	76.00	107,179.43	73.95	7,925,627.32
2021	8,796,720.00	76.00	115,745.16	74.77	8,653,828.52
2022	19,368,545.00	76.00	254,846.74	75.59	19,263,332.87
Total	342,102,492.00	76.00	4,501,303.78	56.49	254,295,746.34

Composite Average Remaining Life ... 56.49 Years

Kansas Gas Service
Gas Division
376.20 Mains - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
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)
1957	142.00	60.00	2.37	6.58	15.58
1958	132.00	60.00	2.20	6.94	15.26
1959	690.00	60.00	11.50	7.31	84.05
1960	6,398.00	60.00	106.63	7.70	821.16
1961	156.00	60.00	2.60	8.12	21.10
1962	904.00	60.00	15.07	8.55	128.88
1964	1,896.00	60.00	31.60	9.51	300.60
1965	28.00	60.00	0.47	10.03	4.68
1966	318.00	60.00	5.30	10.58	56.06
1968	177.00	60.00	2.95	11.75	34.66
1970	1,040.00	60.00	17.33	13.01	225.53
1971	7,614.00	60.00	126.90	13.67	1,734.32
1972	1,814.00	60.00	30.23	14.34	433.52
1973	1,684.00	60.00	28.07	15.02	421.54
1974	376,014.00	60.00	6,266.88	15.72	98,488.48
1975	836,221.00	60.00	13,936.98	16.42	228,880.25
1976	1,152,304.00	60.00	19,205.01	17.14	329,180.60
1977	1,273,244.00	60.00	21,220.67	17.87	379,180.14
1978	2,310,529.00	60.00	38,508.71	18.61	716,710.96
1979	2,481,567.00	60.00	41,359.34	19.36	800,850.02
1980	2,704,575.00	60.00	45,076.13	20.13	907,495.33
1981	2,334,371.00	60.00	38,906.08	20.91	813,663.00
1982	1,820,508.00	60.00	30,341.72	21.71	658,605.79
1983	1,574,426.00	60.00	26,240.36	22.51	590,663.28
1984	2,743,100.00	60.00	45,718.21	23.33	1,066,509.17
1985	3,782,376.00	60.00	63,039.43	24.15	1,522,676.63
1986	3,543,533.00	60.00	59,058.72	25.00	1,476,285.59

Kansas Gas Service
Gas Division
376.20 Mains - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
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)
1987	4,457,754.00	60.00	74,295.69	25.85	1,920,545.06
1988	3,328,335.00	60.00	55,472.10	26.71	1,481,848.99
1989	4,026,344.00	60.00	67,105.55	27.59	1,851,174.45
1990	5,262,716.00	60.00	87,711.69	28.47	2,497,211.69
1991	6,543,722.00	60.00	109,061.73	29.36	3,202,297.50
1992	5,036,288.00	60.00	83,937.90	30.27	2,540,488.99
1993	10,687,100.00	60.00	178,117.84	31.18	5,553,429.34
1994	13,126,835.00	60.00	218,779.98	32.10	7,022,445.76
1995	11,576,218.00	60.00	192,936.43	33.02	6,371,687.09
1996	11,292,573.00	60.00	188,209.03	33.96	6,391,556.30
1997	5,703,463.00	60.00	95,057.45	34.90	3,317,491.94
1998	2,517,371.00	60.00	41,956.07	35.85	1,504,047.62
1999	13,971,054.00	60.00	232,850.26	36.80	8,569,298.22
2000	24,762,353.00	60.00	412,704.74	37.76	15,583,852.89
2001	10,296,785.00	60.00	171,612.61	38.72	6,645,373.30
2002	19,454,526.00	60.00	324,241.20	39.69	12,869,479.19
2003	11,041,740.00	60.00	184,028.49	40.66	7,482,960.36
2004	10,055,412.00	60.00	167,589.74	41.64	6,978,044.02
2005	11,447,363.00	60.00	190,788.86	42.62	8,130,717.36
2006	9,688,989.00	60.00	161,482.70	43.60	7,040,181.59
2007	11,542,926.00	60.00	192,381.57	44.58	8,576,629.38
2008	10,817,799.00	60.00	180,296.15	45.57	8,215,674.28
2009	7,423,751.00	60.00	123,728.84	46.56	5,760,255.95
2010	8,114,723.00	60.00	135,245.01	47.55	6,430,311.65
2011	7,492,728.00	60.00	124,878.45	48.54	6,061,253.63
2012	10,139,268.00	60.00	168,987.33	49.53	8,369,952.78
2013	7,438,445.00	60.00	123,973.74	50.52	6,263,641.33

Kansas Gas Service
Gas Division
376.20 Mains - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
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)
2014	9,839,273.00	60.00	163,987.43	51.52	8,448,462.63
2015	14,009,767.00	60.00	233,495.47	52.51	12,261,933.00
2016	11,599,834.00	60.00	193,330.03	53.51	10,345,339.02
2017	14,017,698.00	60.00	233,627.65	54.51	12,734,691.51
2018	17,610,352.00	60.00	293,505.05	55.51	16,291,346.60
2019	20,687,816.00	60.00	344,795.98	56.50	19,482,445.54
2020	23,416,106.00	60.00	390,267.35	57.50	22,441,456.94
2021	22,095,088.00	60.00	368,250.45	58.50	21,543,204.99
2022	22,587,341.00	60.00	376,454.64	59.50	22,399,263.62
Total	440,065,617.00	60.00	7,334,406.66	43.93	322,173,480.72

Composite Average Remaining Life ... *43.93 Years*

Kansas Gas Service

Gas Division

380.20 Services - Plastic

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2022

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 53 *Survivor Curve:* R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1968	791,415.00	53.00	14,932.30	13.96	208,495.59
1972	614,153.00	53.00	11,587.75	15.89	184,105.50
1973	1,965,696.00	53.00	37,088.46	16.40	608,151.63
1974	1,162,464.00	53.00	21,933.20	16.92	371,026.54
1975	1,823,415.00	53.00	34,403.92	17.45	600,290.89
1976	2,426,500.00	53.00	45,782.84	17.99	823,702.21
1977	4,613,061.00	53.00	87,038.54	18.55	1,614,186.28
1978	4,196,977.00	53.00	79,187.93	19.11	1,513,333.43
1979	4,970,458.00	53.00	93,781.85	19.69	1,846,227.85
1980	4,793,311.00	53.00	90,439.47	20.27	1,833,458.83
1981	4,770,266.00	53.00	90,004.66	20.87	1,878,363.40
1982	4,596,542.00	53.00	86,726.86	21.48	1,862,617.01
1983	4,520,669.00	53.00	85,295.30	22.09	1,884,373.96
1984	5,113,026.00	53.00	96,471.81	22.72	2,191,870.44
1985	5,818,607.00	53.00	109,784.60	23.36	2,564,365.21
1986	5,426,992.00	53.00	102,395.67	24.01	2,458,078.92
1987	6,142,389.00	53.00	115,893.67	24.66	2,858,259.99
1988	7,050,756.00	53.00	133,032.60	25.33	3,369,615.63
1989	14,476,704.00	53.00	273,144.27	26.00	7,103,101.82
1990	14,167,728.00	53.00	267,314.56	26.69	7,134,547.44
1991	17,163,045.00	53.00	323,829.75	27.38	8,867,550.71
1992	10,281,258.00	53.00	193,985.23	28.08	5,447,910.83
1993	13,575,094.00	53.00	256,132.83	28.80	7,375,513.48
1994	10,864,989.00	53.00	204,998.98	29.52	6,050,663.40
1995	12,877,627.00	53.00	242,973.13	30.24	7,348,419.71
1996	10,579,002.00	53.00	199,603.02	30.98	6,183,713.00
1997	7,459,738.00	53.00	140,749.21	31.72	4,465,174.81

Kansas Gas Service
Gas Division
380.20 Services - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 53 *Survivor Curve:* R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1998	3,402,522.00	53.00	64,198.27	32.48	2,084,931.53
1999	4,605,954.00	53.00	86,904.45	33.24	2,888,377.91
2000	5,579,435.00	53.00	105,271.94	34.00	3,579,627.22
2001	4,934,266.00	53.00	93,098.99	34.78	3,237,713.08
2002	10,385,285.00	53.00	195,947.99	35.56	6,967,834.41
2003	12,130,945.00	53.00	228,884.84	36.35	8,319,795.61
2004	12,440,832.00	53.00	234,731.75	37.15	8,719,330.33
2005	12,545,955.00	53.00	236,715.19	37.95	8,983,221.85
2006	11,018,981.00	53.00	207,904.48	38.76	8,058,341.32
2007	9,796,388.00	53.00	184,836.77	39.58	7,315,249.16
2008	12,643,735.00	53.00	238,560.09	40.40	9,637,901.70
2009	7,759,575.00	53.00	146,406.49	41.23	6,036,371.90
2010	12,359,209.00	53.00	233,191.70	42.07	9,809,300.49
2011	13,678,588.00	53.00	258,085.54	42.91	11,073,951.41
2012	16,192,273.00	53.00	305,513.37	43.76	13,368,275.67
2013	20,967,153.00	53.00	395,605.09	44.61	17,648,477.87
2014	23,284,829.00	53.00	439,334.65	45.47	19,977,294.97
2015	9,426,905.00	53.00	177,865.42	46.34	8,241,877.39
2016	36,696,699.00	53.00	692,387.79	47.21	32,687,106.85
2017	32,762,052.00	53.00	618,149.47	48.09	29,724,446.66
2018	26,996,358.00	53.00	509,363.22	48.97	24,942,694.33
2019	32,565,043.00	53.00	614,432.33	49.85	30,632,518.80
2020	38,410,175.00	53.00	724,717.40	50.75	36,777,679.11
2021	36,752,309.00	53.00	693,437.04	51.65	35,812,632.87
2022	45,453,936.00	53.00	857,618.02	52.55	45,065,557.27

Kansas Gas Service
Gas Division
380.20 Services - Plastic

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 53 *Survivor Curve:* R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	635,031,284.00	53.00	11,981,674.71	40.08	480,237,628.21

Composite Average Remaining Life ... 40.08 Years

Kansas Gas Service
Gas Division
382.00 Meter Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 *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)
1960	34,820.00	57.00	610.87	11.33	6,920.63
1961	75,007.00	57.00	1,315.91	11.71	15,412.20
1962	72,985.00	57.00	1,280.43	12.11	15,506.47
1963	73,358.00	57.00	1,286.98	12.52	16,117.38
1964	84,759.00	57.00	1,486.99	12.95	19,257.38
1965	98,384.00	57.00	1,726.03	13.39	23,119.33
1966	101,186.00	57.00	1,775.18	13.85	24,593.09
1967	129,638.00	57.00	2,274.34	14.33	32,587.34
1968	117,931.00	57.00	2,068.95	14.82	30,653.47
1969	238,372.00	57.00	4,181.94	15.32	64,073.20
1970	97,799.00	57.00	1,715.76	15.84	27,180.29
1971	195,768.00	57.00	3,434.51	16.38	56,243.53
1972	173,048.00	57.00	3,035.91	16.92	51,374.94
1973	249,774.00	57.00	4,381.98	17.49	76,623.82
1974	64,541.00	57.00	1,132.29	18.06	20,452.86
1975	74,765.00	57.00	1,311.66	18.65	24,466.85
1976	320,885.00	57.00	5,629.53	19.25	108,390.13
1977	356,937.00	57.00	6,262.02	19.87	124,428.79
1978	164,332.00	57.00	2,883.00	20.50	59,098.08
1979	739,579.00	57.00	12,975.00	21.14	274,274.89
1980	873,396.00	57.00	15,322.66	21.79	333,843.31
1981	552,961.00	57.00	9,701.02	22.45	217,796.92
1982	515,040.00	57.00	9,035.74	23.12	208,949.42
1983	573,333.00	57.00	10,058.42	23.81	239,478.68
1984	789,394.00	57.00	13,848.95	24.50	339,306.39
1985	973,250.00	57.00	17,074.47	25.21	430,369.21
1986	553,628.00	57.00	9,712.72	25.92	251,750.31

Kansas Gas Service
Gas Division
382.00 Meter Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 *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)
1987	1,550,212.00	57.00	27,196.56	26.64	724,598.46
1988	1,020,211.00	57.00	17,898.35	27.37	489,936.07
1989	1,610,061.00	57.00	28,246.54	28.12	794,166.36
1990	1,327,073.00	57.00	23,281.86	28.87	672,061.24
1991	3,816,386.00	57.00	66,953.80	29.63	1,983,534.90
1992	2,119,278.00	57.00	37,180.13	30.39	1,129,933.58
1993	2,735,888.00	57.00	47,997.79	31.17	1,495,960.59
1994	1,268,813.00	57.00	22,259.76	31.95	711,235.54
1995	1,416,557.00	57.00	24,851.75	32.74	813,737.72
1996	2,331,205.00	57.00	40,898.13	33.54	1,371,859.11
1997	1,629,461.00	57.00	28,586.89	34.35	981,945.58
1998	1,886,673.00	57.00	33,099.36	35.16	1,163,933.76
1999	3,415,955.00	57.00	59,928.73	35.99	2,156,672.73
2000	4,741,523.00	57.00	83,184.19	36.82	3,062,569.88
2001	1,755,756.00	57.00	30,802.58	37.65	1,159,782.64
2002	7,537,026.00	57.00	132,227.85	38.50	5,090,231.74
2003	4,075,511.00	57.00	71,499.83	39.35	2,813,244.72
2004	944,051.00	57.00	16,562.21	40.20	665,846.93
2005	5,938,614.00	57.00	104,185.68	41.06	4,278,355.44
2006	5,133,318.00	57.00	90,057.75	41.93	3,776,501.97
2007	4,860,523.00	57.00	85,271.90	42.81	3,650,449.34
2008	5,257,065.00	57.00	92,228.74	43.69	4,029,515.60
2009	5,223,811.00	57.00	91,645.34	44.58	4,085,191.61
2010	3,246,497.00	57.00	56,955.80	45.47	2,589,689.63
2011	1,324,990.00	57.00	23,245.32	46.37	1,077,787.57
2012	1,683,852.00	57.00	29,541.11	47.27	1,396,351.63
2013	1,432,054.00	57.00	25,123.63	48.17	1,210,316.37

Kansas Gas Service
Gas Division
382.00 Meter Installations

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2022
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 **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)
2014	1,441,857.00	57.00	25,295.61	49.09	1,241,674.13
2015	645,091.00	57.00	11,317.33	50.00	565,900.52
2016	952,518.00	57.00	16,710.76	50.92	850,973.07
2017	1,225,515.00	57.00	21,500.15	51.85	1,114,734.64
2018	4,752,014.00	57.00	83,368.24	52.78	4,399,903.61
2019	1,563,700.00	57.00	27,433.19	53.71	1,473,419.63
2020	1,416,214.00	57.00	24,845.73	54.65	1,357,707.91
2021	2,628,201.00	57.00	46,108.55	55.58	2,562,921.79
2022	2,692,126.00	57.00	47,230.04	56.53	2,669,801.16
Total	104,894,470.00	57.00	1,840,244.50	39.51	72,704,716.10

Composite Average Remaining Life ... 39.51 Years

CERTIFICATE OF SERVICE

24-KGSG-610-RTS

I, the undersigned, hereby certify that a true and correct copy of the above and foregoing document was served by electronic service on this 1st day of July, 2024, to the following:

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