BEFORE THE CORPORATION COMMISSION OF THE STATE OF OKLAHOMA

APPLICATION OF PUBLIC SERVICE COMPANY OF OKLAHOMA, AN OKLAHOMA CORPORATION, FOR AN ADJUSTMENT IN ITS RATES AND CHARGES AND THE ELECTRIC SERVICE RULES, REGULATIONS AND CONDITIONS OF SERVICE FOR ELECTRIC SERVICE IN THE STATE OF OKLAHOMA AND TO APPROVE A PERFORMANCE BASE RATE PROPOSAL	CAUSE NO. PUD 201800097

RESPONSIVE TESTIMONY OF

DAVID J. GARRETT

ON BEHALF OF

OKLAHOMA INDUSTRIAL ENERGY CONSUMERS, WAL-MART STORES EAST, LP, AND SAM'S EAST, INC.

JANUARY 11, 2019

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I. INTRODUCTION

Q. State your name and occupation.

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

Q. Summarize your educational background and professional experience.

A. I received a B.B.A. degree with a major in Finance, an M.B.A. degree, and a Juris Doctor degree from the University of Oklahoma. I worked in private legal practice for several years before accepting a position as assistant general counsel at the Oklahoma Corporation Commission in 2011. At the Oklahoma Commission, I worked in the Office of General Counsel in regulatory proceedings. In 2012, I began working for the Public Utility Division as a regulatory analyst providing testimony in regulatory proceedings. After leaving the Oklahoma Commission, 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 have testified in numerous regulatory proceedings in multiple jurisdictions on the issues 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]

Q. Have your qualifications as an expert witness been accepted by the Oklahoma Corporation Commission?

A. Yes. I have testified before the Oklahoma Corporation Commission (the "Commission") many times and my qualifications have been accepted.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of Oklahoma Industrial Energy Consumers ("OIEC"), Wal-Mart Stores East, LP, and Sam's East, Inc. (collectively, "Wal-Mart").

Q. Describe the purpose and scope of your testimony in this proceeding.

A. In this case I am testifying in response to the direct testimony of David A. Davis for Public Service Company of Oklahoma ("PSO" or the Company) regarding the Company's proposed depreciation rates.

II. EXECUTIVE SUMMARY

Q. Summarize the key points of your testimony.

A. In this case, PSO is proposing an increase to depreciation expense of $12.8 million related to a change in depreciation rates.[2] As demonstrated by the evidence presented in this testimony, it would not be reasonable to accept PSO's filed position regarding depreciation

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[1] Direct Exhibit DJG-2-1.

[2] WP H-2-24.1 (Depreciation)

expense. The table below summarizes OIEC's and Wal-Mart's adjustments to PSO's proposed depreciation expense by plant function.[3]

Figure 1:
Summary Depreciation Expense Adjustment

Plant Function	Plant Balance 6/30/2018	PSO Proposal	OIEC Proposal	OIEC Adjustment
Production	1,573,327,285	53,871,350	49,291,892	(4,579,457)
Transmission	881,530,850	22,810,398	21,612,411	(1,197,987)
Distribution	2,542,748,682	77,768,915	74,736,062	(3,032,853)
General	176,236,002	7,675,656	7,697,657	22,001
Total	$ 5,173,842,819	$ 162,126,319	$ 153,338,023	**$ (8,788,296)**

Accepting my proposed depreciation rates would result in an adjustment reducing PSO's proposed depreciation expense by $8.8 million. The primary factors comprising OIEC's and Wal-Mart's adjustments are summarized below:

[3] *See* Exhibit DJG-3 for detailed calculations.

1. Oklaunion

Regarding the Oklaunion Plant, PSO proposes that depreciation rates be set to fully depreciate the plant by December 2020 and that regulatory credits and debits be utilized to produce an equal annual expense of $4.9 million.[4] For reasons discussed in the responsive testimony of Mark E. Garrett, OIEC and Wal-Mart propose to leave the depreciation rates for Oklaunion unchanged from those approved by the Commission in PSO's last rate case.[5]

2. Production Net Salvage

PSO proposes to use the estimated net salvage percentages adopted by the Commission in the Company's previous rate case except for account 314.3 for Comanche and Northeastern Units 1 and 2. It is reasonable to continue using the production net salvage rates adopted by the Commission in PSO's last rate case (PUD 17-151), however, these rates should be applied for all production accounts.

3. Mass Property Service Lives

For several transmission and distribution accounts, PSO is proposing service lives that are shorter than those indicated by the Company's historical retirement data, which results in unreasonably high proposed depreciation rates and expense for these accounts.

4. Mass Property Net Salvage

For several distribution accounts, the Company proposes net salvage rates that are higher than what is indicated by the historical net salvage data. This results in unreasonably high proposed depreciation rates and expense.

For these reasons, the Commission should adopt the reasonable adjustments I have recommended to PSO's proposed depreciation rates, as further discussed below.

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[4] *See* Direct Testimony of David A. Davis, pp. 17-18.

[5] *See* Order No. 672864, Cause No. PUD 201700151.

III. LEGAL STANDARDS

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

A. In *Lindheimer v. Illinois Bell Telephone Co.*, the U.S. Supreme Court stated that "depreciation is the loss, not restored by current maintenance, which is due to all the factors causing the ultimate retirement of the property. These factors embrace wear and tear, decay, inadequacy, and obsolescence."[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:

> <u>[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</u>. 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 the Company has met its burden of proof by making a convincing showing that its proposed depreciation rates are not excessive.

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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 (emphasis added).

Q. Should depreciation represent an allocated cost of capital to operation, rather than a mechanism to determine loss of value?

A. Yes. While the *Lindheimer* case and other early literature recognized depreciation as a necessary expense, the language indicated that depreciation was primarily a mechanism to determine loss of value.[9] Adoption of this "value concept" would require annual appraisals of extensive utility plant and is thus not practical in this context. Rather, the "cost allocation concept" recognizes that depreciation is a cost of providing service, and that in addition to receiving a "return on" invested capital through the allowed rate of return, a utility should also receive a "return of" its invested capital in the form of recovered depreciation expense. The cost allocation concept also satisfies several fundamental accounting principles, including verifiability, neutrality, and the matching principle.[10] The definition of "depreciation accounting" published by the American Institute of Certified Public Accountants ("AICPA") properly reflects the cost allocation concept:

> Depreciation accounting is a system of accounting that aims to distribute cost or other basic value of tangible capital assets, less salvage (if any), over the estimated useful life of the unit (which may be a group of assets) in a systematic and rational manner. It is a process of allocation, not of valuation.[11]

Thus, the concept of depreciation as "the allocation of cost has proven to be the most useful and most widely used concept."[12]

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

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

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

[12] Wolf *supra* n. 9, at 73.

IV. ANALYTIC METHODS

Q. Discuss the definition and purpose of a depreciation system, as well as the depreciation system you employed for this project.

A. The legal standards set forth above do not mandate a specific procedure for conducting depreciation analysis. These standards, however, direct that analysts use a system for estimating depreciation rates that will result in the "systematic and rational" allocation of capital recovery for the utility. 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.[13] 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.

Q. Has the Commission adopted rates developed under this depreciation system?

A. Yes. The Commission has adopted depreciation rates developed by various parties using the same or substantially similar depreciation system I have employed in this case.

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

Q. Please describe the actuarial process you used to analyze the Company's depreciable property.

A. The study of retirement patterns of industrial property is derived from the actuarial process used to study human mortality. Just as actuarial scientists study historical human mortality data in order to predict how long a group of people will live, depreciation analysts study historical plant data in order to estimate the average lives of property groups. The most common actuarial method used by depreciation analysts is called the "retirement rate method." In the retirement rate method, original property data, including additions, retirements, transfers, and other transactions, are organized by vintage and transaction year.[14] The retirement rate method is ultimately used to develop an "observed life table," ("OLT") which shows the percentage of property surviving at each age interval. This pattern of property retirement is described as a "survivor curve." The survivor curve derived from the observed life table, however, must be fitted and smoothed with a complete curve in order to determine the ultimate average life of the group.[15] 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."[16] A more detailed explanation of how the Iowa curves are used in the actuarial analysis of depreciable property is set forth in Appendix C.

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[14] 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).

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

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

Q. Please describe the Company's depreciable assets in this case.

A. The Company's depreciable assets can be divided into two main groups: life span property (i.e., production plant) and mass property (i.e., transmission and distribution plant). The analytical process is slightly different for each type of property, as discussed further below.

V. LIFE SPAN PROPERTY ANALYSIS

Q. Describe the approach to analyzing life span property.

A. For life span property, there are essentially three steps to the analytical process. First, I reviewed the Company's proposed life spans for each of its production units and compared them to life span estimates of other similar production units in other jurisdictions. Second, I examined the Company's proposed interim retirement curves or rates for each account in order to assess the remaining lives and depreciation rates for each production unit. Finally, I analyzed the proposed weighted net salvage for production accounts.

Q. Describe life span property.

A. "Life span" property accounts usually consist of property within a production plant. The assets within a production plant will be retired concurrently at the time the plant is retired, regardless of their individual ages or remaining economic lives. For example, a production plant will contain property from several accounts, such as structures, fuel holders, and generators. When the plant is ultimately retired, all of the property associated with the plant will be retired together, regardless of the age of each individual unit. Analysts often use the analogy of a car to explain the treatment of life span property. Throughout the life of a car, the owner will retire and replace various components, such as tires, belts, and brakes. When the car reaches the end of its useful life and is finally retired, all of the car's individual components are retired together. Some of the components may still have some useful life remaining, but they are nonetheless retired along with the car. Thus, the various accounts of life span property are scheduled to retire concurrently as of the production unit's probable retirement date.

A. <u>Oklaunion Plant</u>

Q. Summarize the Company's proposal regarding its Oklaunion plant.

A. The Company's depreciation study recommends an increase in depreciation rates for Oklaunion, which would result in an expense increase of $2.9 million. This position is based on an estimated retirement date of 2020 for Oklaunion and the use of regulatory credits and debits beyond 2020.[17]

Q. Are you proposing adjustments to PSO's estimated useful lives for any of its production units?

A. No. However, OIEC and Wal-Mart are recommending that the currently-approved depreciation rates for Oklaunion remain the same. These rates were based on a depreciable life date of 2046. Leaving the Oklaunion depreciation rates unchanged from those approved by the Commission in PSO's last rate case (PUD 17-151) would result in an adjustment reducing PSO's proposed depreciation expense for Oklaunion by $2.9 million.[18] The substantive arguments supporting this position are presented in the direct testimony of Mark E. Garrett.

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[17] *See* Direct Testimony of David A. Davis, pp. 16-17.

[18] *See* Exhibit DJG-3.

B. Terminal Net Salvage Analysis

Q. Describe terminal net salvage.

A. When a production plant reaches the end of its useful life, a utility may decide to decommission the plant. In that case, the utility may sell some of the remaining assets. The proceeds from this transaction are called "gross salvage." The corresponding expense associated with decommissioning the plant is called "cost of removal." The term "net salvage" equates to gross salvage less the cost of removal. When net salvage refers to production plants, it is often called "terminal net salvage," because the transaction will occur at the end of the plant's life.

Q. Describe how electric utilities typically support terminal net salvage recovery for production assets?

A. Typically, when a utility is requesting the recovery of a substantial amount of terminal net salvage costs, it supports those costs with site-specific decommissioning studies.

Q. Did PSO provide decommissioning studies in this case to support its proposed net salvage rates for production plant?

A. No. Ideally, terminal net salvage recovery should be supported by site-specific decommissioning studies. However, PSO conducted site-specific decommissioning studies in 2017 as part of its previous rate proceeding (PUD 17-151). Those decommissioning studies were used to support PSO's requested terminal net salvage recovery in that case. The proposed decommissioning costs were analyzed by various parties and the Commission ultimately adopted the adjusted production net salvage rates proposed by Staff. In this case, the Company proposes to use the same net salvage rates approved by the Commission in PSO's prior rate case (PUD 17-151) with the exception of two accounts: Account 314.3 for Comanche and Northeastern Units 1 and 2.[19]

Q. Do you agree with the Company's position?

A. I agree conceptually that it is reasonable to use net salvage rates that were approved only a year ago and were based on Staff's reasonable adjustments to site-specific decommissioning studies performed relatively recently in 2017. However, I believe we should use all of the currently-approved net salvage rates rather than adjusting the two salvage rates that would be most beneficial to customers. If the reasoning behind continuing to use the currently-approved production net salvage rates is sound – and I would agree that it is – then we should use all of those rates in this case.

Q. Are your proposed depreciation rates for the Company's production assets based on all of the currently-approved production net salvage rates?

A. Yes. My proposed production net salvage rates and corresponding depreciation rates are presented in my exhibits.[20]

Q. What is the impact of your adjustment to the Company's proposed production net salvage rates?

A. Leaving the currently-approved production net salvage rates unchanged would result in an adjustment reducing the company proposed depreciation expense for its production accounts (excluding Oklaunion) by $1.7 million.[21]

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[19] *See* Direct Testimony of David A. Davis, pp. 6-7.

[20] *See* Exhibit DJG-5.

[21] *See* Exhibit DJG-3.

VI. MASS PROPERTY ANALYSIS

Q. Describe mass property.

A. Unlike life span property accounts, "mass" property accounts usually contain a large number of small units that will not be retired concurrently. For example, poles, conductors, transformers, and other transmission and distribution plant are usually classified as mass property. Estimating the service life of any single unit contained in a mass account would not require any actuarial analysis or curve-fitting techniques. Since we must develop a single rate for an entire group of assets, however, actuarial analysis is required to calculate the average remaining life of the group.

Q. How did you determine the depreciation rates for the mass property accounts?

A. To develop depreciation rates for the Company's mass property accounts, I obtained the Company's historical plant data to develop observed life tables for each account. I used Iowa curves to smooth and complete the observed data to calculate the average remaining life of each account. Finally, I analyzed the Company's proposed net salvage rates for each mass account by reviewing the historical salvage data. After estimating the remaining life and salvage rates for each account, I calculated the corresponding depreciation rates. Further details about the actuarial analysis and curve-fitting techniques involved in this process are presented in the attached appendices.

Q. Please describe your approach in estimating the service lives of mass property.

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

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

A. Not necessarily. Mathematical fitting is an important part of the curve-fitting process because it promotes objective, unbiased results. While mathematical curve fitting is important, however, it may not always yield the optimum result; therefore, it should not necessarily be adopted without further analysis. In fact, for some of the accounts in this case I selected Iowa curves that were not the mathematical best fit, and in every such instance, this decision resulted in shorter curves (higher depreciation rates) being chosen, as further illustrated below.

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. "Points at the end of the curve are often based on fewer exposures and may be given less weight than points based on larger samples. The weight placed on those points will depend on the size of the exposures."[22] In accordance with this standard, an analyst may decide to truncate the tail end of the OLT curve at a certain percent of initial exposures, such as one percent. Using this approach puts a greater emphasis on the most valuable portions of the curve. For my analysis in this case, I not only considered the entirety of the OLT curve, but also conducted further analyses that involved fitting Iowa curves to the most significant part of the OLT curve for certain accounts. In other words, to verify the accuracy of my curve selection, I narrowed the focus of my additional calculation to consider the top 99% of the "exposures" (i.e., dollars exposed to retirement) and to eliminate the tail end of the curve representing the bottom 1% of exposures.

Q. Discuss the general differences between your service life estimates and the Company's service life estimates for the accounts to which you propose adjustments.

A. While the Company and I used similar curve-fitting approaches in this case, the curves I selected for these accounts provide a better mathematical fit to the observed data and

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[22] Wolf *supra* n. 9, at 46.

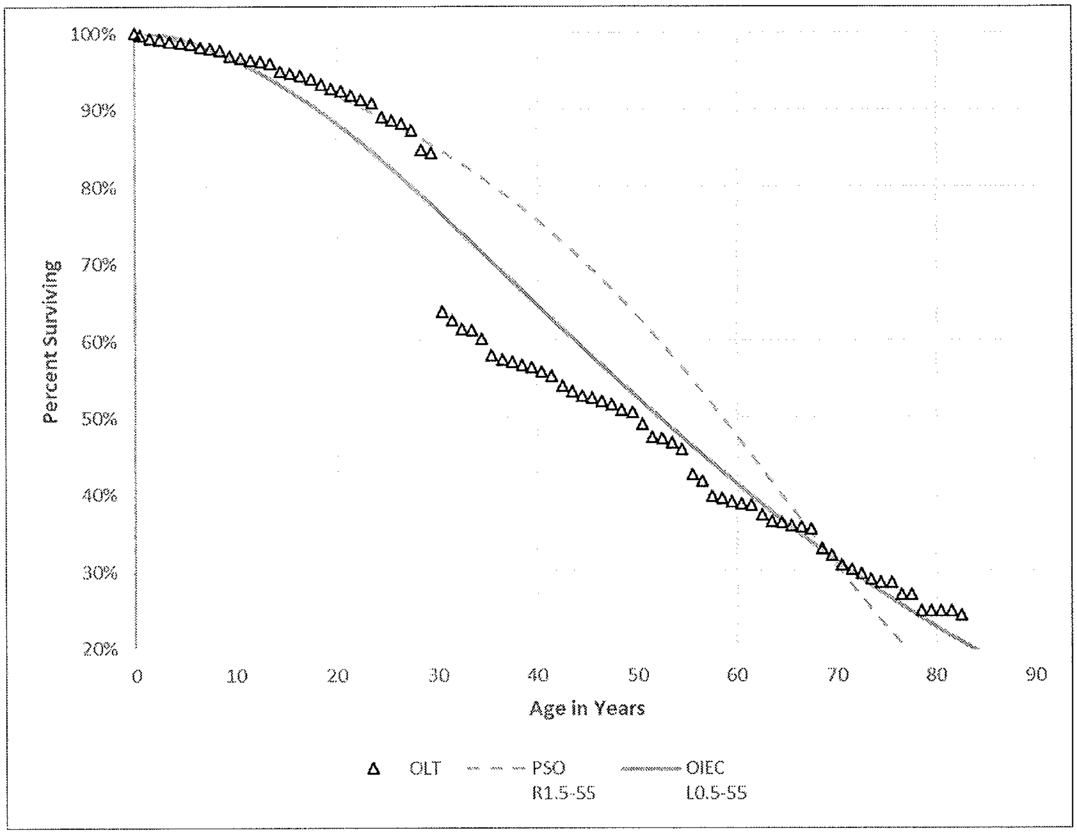
provide a more reasonable and accurate representation of the mortality characteristics for each account in my opinion. In each of the following accounts, the Company has selected a curve that underestimates the average remaining life of the assets in the account, which results in unreasonably high depreciation rates. The analysis of each selected account is presented below.

1. Account 353 – Station Equipment

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

A. The OLT curve for this account and other accounts discussed in this section is constructed using the Company's historical property data. The graph below shows the two different Iowa curves selected by Mr. Davis and me to best represent the average remaining life for the assets in this account. For this account, I selected the L0.5-55 Iowa curve and Mr. Davis selected the R1.5-55 curve. This means that both Iowa curves represent the same average life (55), but the shapes of the curves are different, as illustrated in the graph below.

Figure 2:
Account 353 – Station Equipment



As shown in the graph, the R1.5-5 curve tracks relatively well with the observed data (the black triangles) until about age 30. At that point, the OLT curve experiences a sudden decline. However, many of the data points occurring after this decline are statistically relevant. In my opinion, the selected Iowa curve for this account should try to incorporate these data points while still reflecting the general shape of the upper portion of the OLT curve. The L0.5-55 curve I selected gives more weight to the relevant data points occurring after age-interval 30 than does that Company's Iowa curve.

Q. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A. Yes. Selected Iowa curves based on visual curve fitting techniques can be confirmed and bolstered by checking them mathematically. 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. The curve with the lower SSD represents the better mathematical fit. For this account, the SSD for the R1.5-55 Iowa curve selected by the Company is 0.8169 while the SSD for the L0.5-55 curve I selected is only 0.1999, which means it provides the better mathematical fit to the observed data.[23]

Q. Describe the impact to PSO's proposed depreciation accrual for this account if your recommended service life is adopted.

A. Adopting my proposed service life for this account would result in an adjustment reducing PSO's proposed depreciation accrual by $298,537.[24]

2. <u>Account 356 – Overhead Conductors and Devices</u>

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

A. For this account, I selected the L1-77 curve and Mr. Davis selected the R2-67 curve. The graph below shows these two curves along with the OLT curve.

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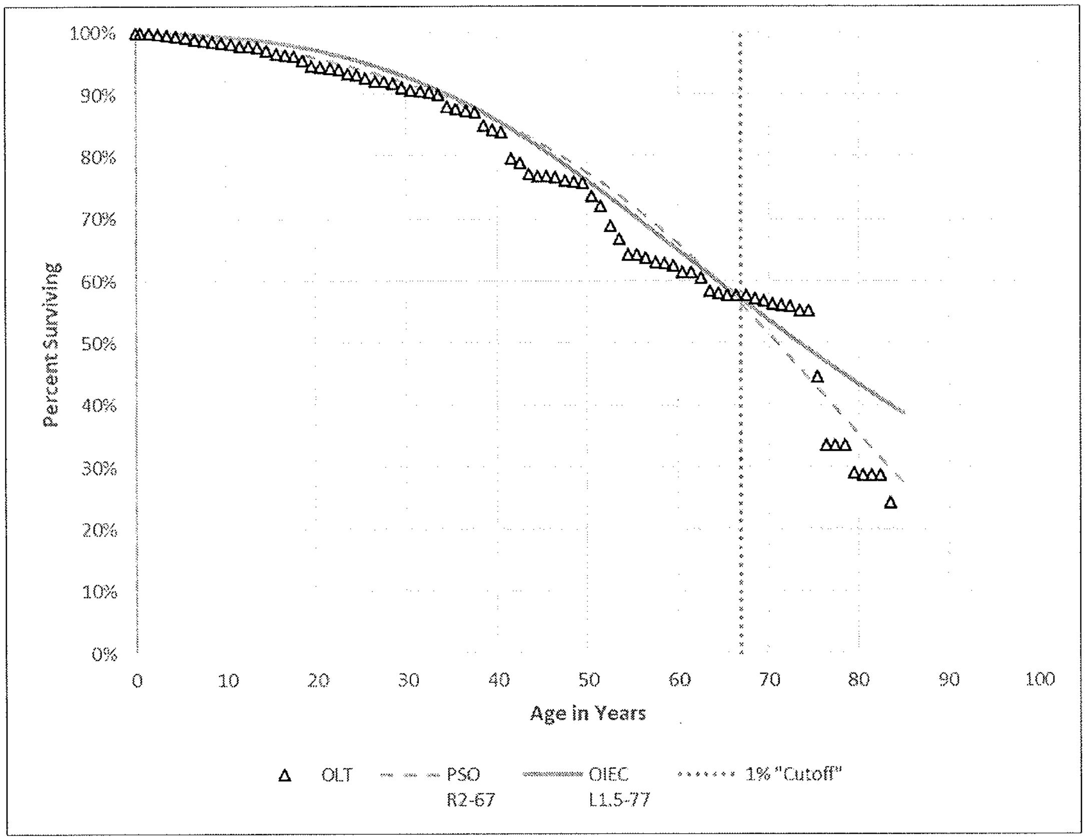
[23] Exhibit DJG-6.

[24] Exhibit DJG-4.

Figure 3:
Account 356 – Overhead Conductors and Devices



As shown in the graph, both curves provide a good fit to the data through age-interval 67. The vertical dotted line represents the 1% "cutoff" that may be used as general benchmark to determine which portion of the "tail" end of the curve is statistically irrelevant. Based on this benchmark, the Company's R2-67 curve appears to track these statistically irrelevant data points at the tail end of this OLT curve.

Q. Does your selected curve provide a better mathematical fit to the more statistically relevant portions of the OLT curve?

A. Yes. Proper mathematical curve fitting techniques should consider the statistical relevance of the data points to which the SSD calculation will be applied. When we consider the most statistically relevant portion of the OLT curve for this account, the L1.5-77 curve I selected provides the better mathematical fit. Specifically, the Company's R2-67 curve has an SSD of 0.0312 and the L1-5-77 curve I selected has an SSD of 0.0222, making it the better mathematical fit.[25]

Q. Describe the impact to PSO's proposed depreciation accrual for this account if your recommended service life is adopted.

A. Adopting my proposed service life for this account would result in an adjustment reducing PSO's proposed depreciation accrual by $753,168.[26]

3. <u>Account 362 – Station Equipment</u>

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

A. The OLT curve for this account is relatively well-suited for conventional Iowa curve-fitting techniques. This is because the OLT curve for this account is relatively smooth and follows one of the typical patterns observed in survivor curves for industrial property. For this account, I selected the R0.5-73 curve and the Company selected the R3-60 curve. The graph below shows these two curves along with the OLT curve.

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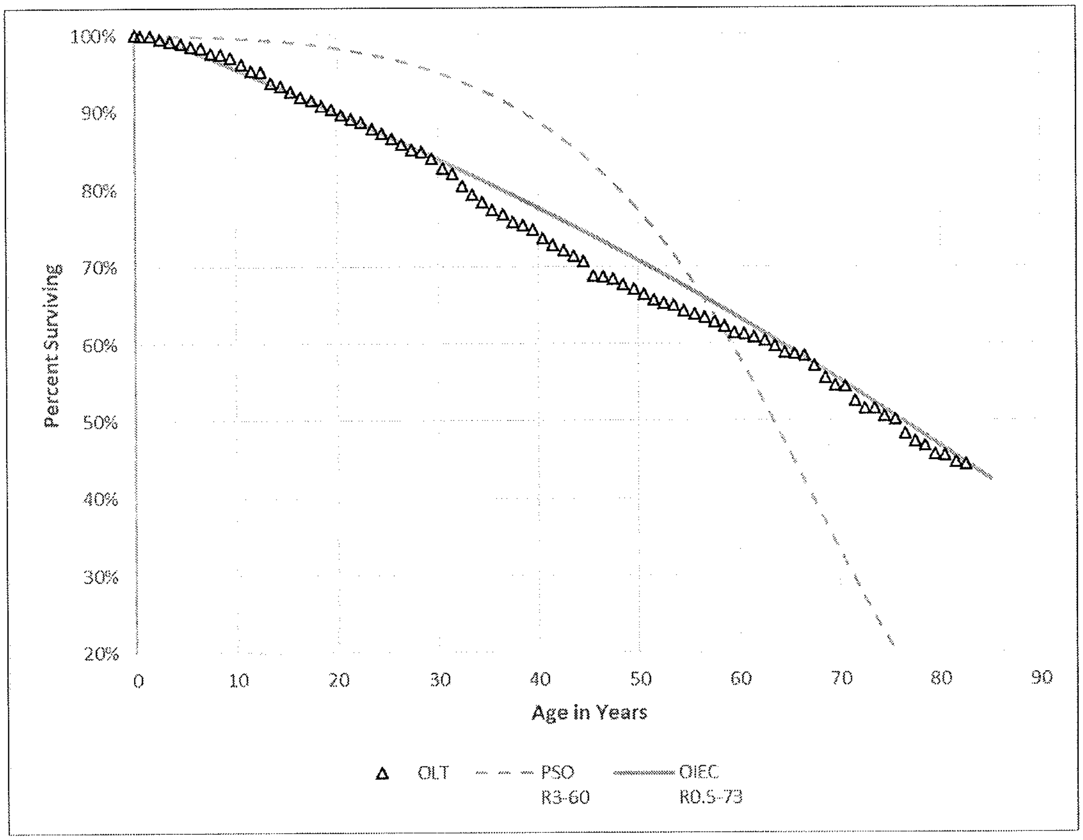
[25] Exhibit DJG-7.

[26] Exhibit DJG-4.

Figure 4:
Account 362 – Station Equipment



As shown in the graph, the R3-60 curve selected by the Company does not track at all with the observed retirement rate for this account. According to the depreciation study, the currently-approved 75-year average service life for this account is "unreasonably long" according to the "results of the life analysis."[27] Based on the graph above, however, it is unclear what analysis the depreciation study is referring to. The R3-60 curve selected by the Company is such a poor fit for this account that in order to accept it, the Commission would have to completely disregard the validity and purpose of the Iowa curve-fitting

[27] Exhibit DAD-3, Depreciation Study Workpapers, p. 360.

process, which has been an industry standard for decades. In other words, if the Company can simply make conclusory claims that a particular average service life estimate (or for this account, the service life ordered by the Commission) is "unreasonable" or "excessive" without any objective evidence, then it would entirely defeat the purpose of analyzing historical retirement patterns in order to make the most objective estimates of remaining life through the Iowa curve-fitting process. As discussed above, the Company bears the sole burden to demonstrate that its proposed depreciation rates are not excessive, and it has clearly failed to meet that burden for this account.

Q. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A. Yes. Although it is clear from a mere visual observation that the R0.5-73 curve provides a much better fit to the observed data than the Company's R3-60 curve, the results can be confirmed mathematically. Specifically, the SSD for the Company's curve is 2.1397 and the SSD for the R0.5-73 curve is only 0.0216.[28]

Q. Describe the impact to PSO's proposed depreciation accrual for this account if your recommended service life is adopted.

A. Adopting my proposed service life for this account would result in an adjustment reducing PSO's proposed depreciation accrual by $1,757,585.[29]

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[28] Direct Exhibit DG 2-9.

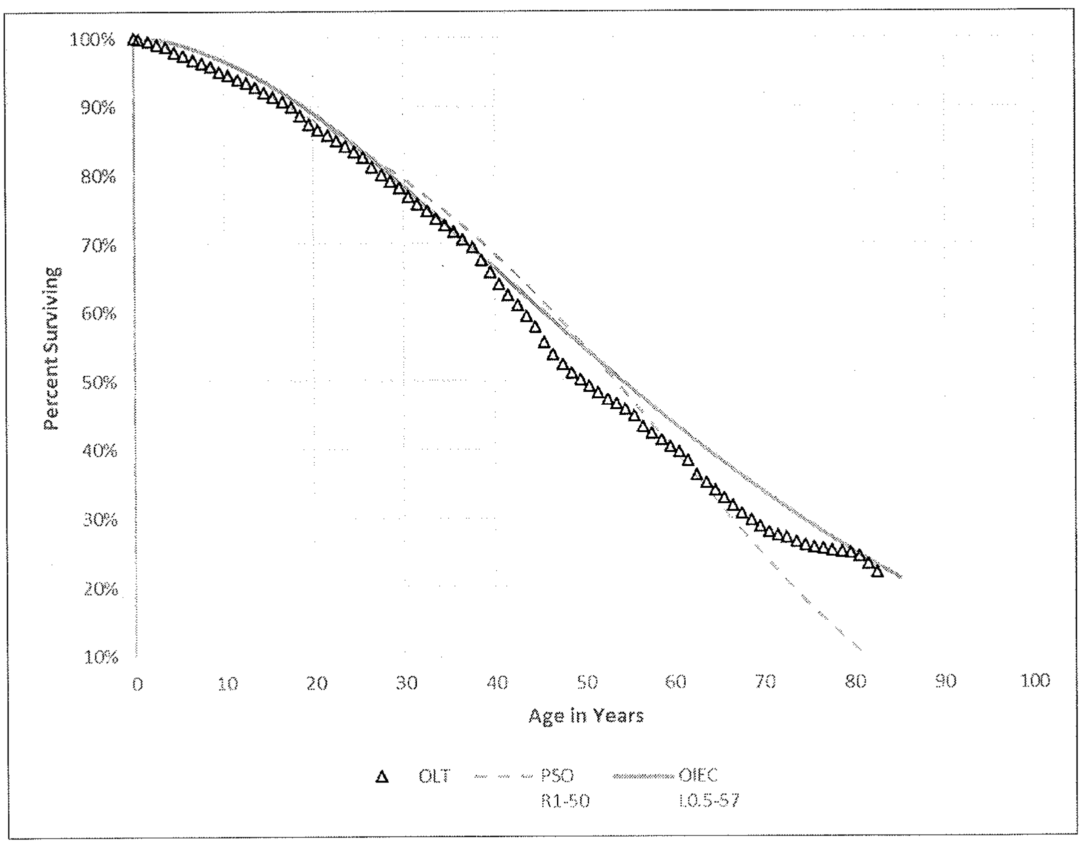
[29] Exhibit DJG-4.

4. Account 364 – Poles, Towers and Fixtures

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

A. I selected the L0.5-57 curve for this account and the Company selected the R1-50 curve. Both curves are within a reasonable range for this account, but the L0.5-57 curve is preferable in my opinion because it provides a better mathematical fit to the observed data for this account. The graph below shows these two Iowa curves juxtaposed with the OLT curve.

Figure 5:
Account 364 – Poles, Towers and Fixtures



Q. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A. Yes. The SSD for the L0.5-57 curve I selected is 0.0313 and SSD for the Company's curve is 0.2158.[30]

Q. Describe the impact to PSO's proposed depreciation accrual for this account if your recommended service life is adopted.

A. Adopting my proposed service life for this account would result in an adjustment reducing PSO's proposed depreciation accrual by $2,867,705.[31]

5. Account 366 – Underground Conduit

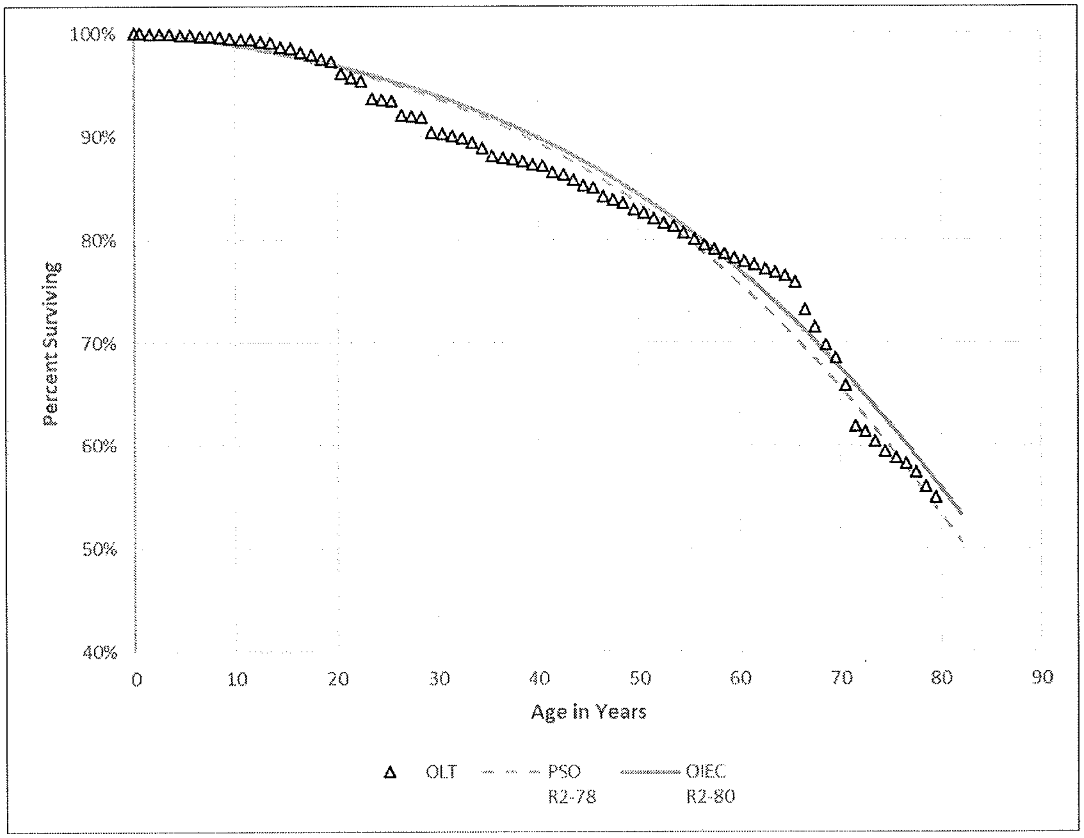
Q. Describe your service life estimate for this account and compare it with the Company's estimate.

A. For Account 366, I selected the R2-80 curve and the Company selected the R2-78 curve. The graph below shows these two curves along with the OLT curve.

[30] Exhibit DJG-9.

[31] Exhibit DJG-4.

Figure 6:
Account 366 – Underground Conduit



Q. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A. Yes. The SSD for the Company's curve is 0.0455 and the SSD for the R2-80 curve I selected is 0.0295.[32]

[32] Exhibit DJG-10.

Q. Describe the impact to PSO's proposed depreciation accrual for this account if your recommended service life is adopted.

A. Adopting my proposed service life for this account would result in an adjustment reducing PSO's proposed depreciation accrual by $46,272.[33]

6. <u>Account 367 – Underground Conductor</u>

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

A. For this account, I selected the R1-79 curve and Mr. Davis selected the R1.5-70 curve. The graph below shows these two curves along with the OLT curve.

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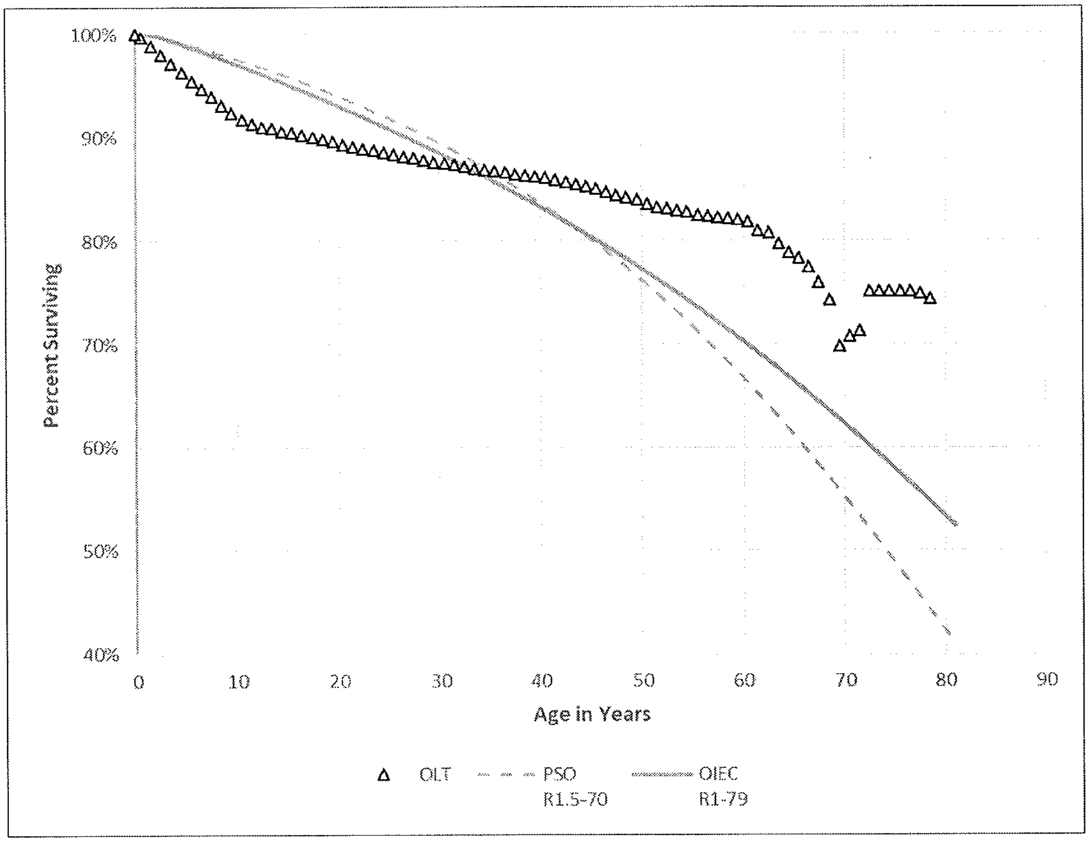
[33] Exhibit DJG-4.

Figure 7:
Account 367 – Underground Conductor



For this account, selecting the mathematically best-fitting Iowa curve could result in an unreasonably long service life estimate. In my opinion, however, the Company's curve does not give enough consideration to flatter trajectory of the retirement rate indicated in the OLT curve so far. The R1 curve I selected is in the same modal family of curves as the R1.5 curve selected by Mr. Davis, except it is less steep, while the 79-year service life gives more consideration to the other longer average life indicated by this OLT curve.

Q. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A. Yes. Specifically, the SSD for the Company's curve is 1.2275 while the SSD for the R1-79 curve is only 0.5990.[34]

Q. Describe the impact to PSO's proposed depreciation accrual for this account if your recommended service life is adopted.

A. Adopting my proposed service life for this account would result in an adjustment reducing PSO's proposed depreciation accrual by $901,303.[35]

VII. MASS PROPERTY NET SALVAGE

Q. Describe the concept of net salvage.

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

[34] Exhibit DJG-11.

[35] Exhibit DJG-4.

Q. Describe how you analyzed the Company's net salvage rates.

A. In this case, I examined the Company's historical net salvage data over different periods of time.

Q. Are you recommending any adjustments to the Company's proposed net salvage rates?

A. Yes. I am recommending net salvage adjustments on two mass property accounts: Account 361 and Account 370. These accounts are discussed further below.

Q. Describe the Company's position regarding Account 361.

A. The Company is proposing a net salvage rate of -5% for this account.[36]

Q. Do you agree with the Company's position?

A. No. While it is not uncommon to observe negative net salvage rates in historical utility property data, the data for Account 361 shows a positive net salvage rate of 31%, which is considerably higher than the negative 5% net salvage rate proposed by PSO.[37] According to the depreciation study, "[r]ecent history confirms that the -5% savage rate is reasonable."[38] This statement is apparently based on the fact that during the most recent period this account experienced a -5.49% net salvage rate. However, when analyzing net salvage, it is important to consider more than one year of experience. This is because net salvage rates can often fluctuate widely from year to year. In this account, for example,

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[36] Exhibit DAD-3, Depreciation Study Workpapers, p. 410.

[37] *Id.*

[38] *Id.*

there was a positive net salvage rate of 40.84% in 2001, followed by a salvage rate of 0% the following year.

Q. What is your recommendation for this account?

A. Although the overall historical net salvage data set shows a positive net salvage rate of 31%, I am recommending a positive net salvage rate of 15% in the interest of reasonableness. This strikes a balance between the unreasonably high (i.e., more negative) net salvage rate of -5% proposed by the Company and the observed positive net salvage rate of 31%, which is unlikely to continue at that high of a rate.

Q. Describe the Company's position regarding Account 370.

A. The Company is proposing a net salvage rate of -30% for this account.[39]

Q. Do you agree with the Company's position?

A. No. The overall net salvage calculation for this account shows a <u>positive</u> net salvage rate of 34%.[40] According to the depreciation study, the Commission's decision to allow PSO to recover the remaining value of older meters in this account through a regulatory asset created a "distortion" in the Company's account 370."[41] Nonetheless, the positive net salvage values created by this scenario should not be completely ignored in my opinion. While I could agree that it is unlikely we will observe net salvage rates as high as 34%

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[39] Exhibit DAD-3, Depreciation Study Workpapers, p. 418.

[40] *Id.*

[41] *Id.*

going forward in this account, I also think it is reasonable to give some consideration to this recent positive net salvage experience.

Q. What is your recommendation for this account?

A. I recommend a net salvage rate of 0% for this account. This strikes a balance between the unreasonably high (i.e., more negative) net salvage rate of -30% proposed by the Company and the observed positive net salvage rate of 34%, which is unlikely to continue at that high of a rate.

VIII. CONCLUSION AND RECOMMENDATION

Q. Summarize the key points of your testimony.

A. In this case, PSO is proposing an increase in depreciation expense of $12.8 million due to a change in depreciation rates. For the reasons discussed above, it would be unreasonable in my opinion to accept PSO's filed position without reasonable adjustments. OIEC's and Wal-Mart's proposed adjustments are summarized again as follows:

1. Leave the currently-approved depreciation rates for PSO's Oklaunion plant unchanged;

2. Leave the currently-approved production net salvage rates unchanged;

3. Extend the service lives of several mass property accounts as supported by objective Iowa curve-fitting techniques; and

4. Adjust the proposed net salvage rates of two mass property accounts based on reasonable observations of historical net salvage data.

Q. What are OIEC's and Wal-Mart's recommendations to the Commission with regard to PSO's proposed depreciation rates?

A. OIEC and Wal-Mart recommend the Commission adopt the proposed depreciation rates presented in Exhibit DJG-5. Applying these rates to updated plant balances results in an estimated depreciation expense adjustment reducing PSO's proposed expense by $8.8 million.

Q. Does this conclude your testimony?

A. Yes.

Respectfully Submitted,

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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.[42] 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.[43] The figure below illustrates the basic concept of a depreciation system and includes some of the available parameters.[44]

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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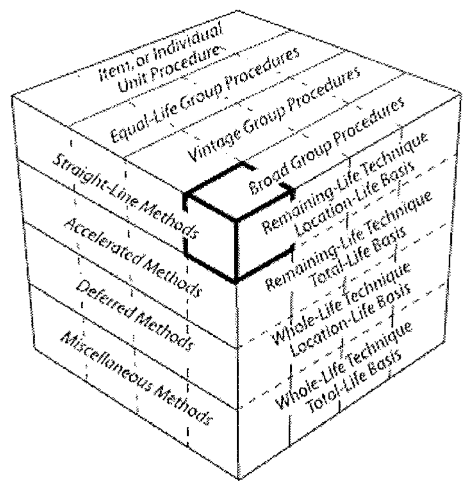
[42] Wolf *supra* n. 9, at 69-70.

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

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

Figure 8:
The Depreciation System Cube



1. <u>Allocation Methods</u>

The "method" refers to the pattern of depreciation in relation to the accounting periods. The method most commonly used in the regulatory context is the "straight-line method" – a type of age-life method in which the depreciable cost of plant is charged in equal amounts to each accounting period over the service life of plant.[45] 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.[46] The basic formula for the straight-line method is as follows:[47]

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[45] NARUC *supra* n. 10, at 56.

[46] *Id.*

[47] *Id.*

Equation 1:
Straight-Line Accrual

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

Gross plant is a known amount from the utility's records, while both net salvage and service life must be estimated in order 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.[48] In practice, the annual accrual is expressed as a rate which is applied to the original cost of plant in order to determine the annual accrual in dollars. The formula for determining the straight-line rate is as follows:[49]

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.[50] 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

48 *Id.* at 57.

49 *Id.* at 56.

50 Wolf *supra* n. 9, at 74-75.

excessively conducting calculations for each unit. Whereas an individual unit of property has a single life, a group of property displays a dispersion of lives and the life characteristics of the group must be described statistically.[51] 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.[52]

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.[53] Thus, the average life procedure treats each unit as though its life is equal to the average life of the group. In contrast, the equal life procedure treats each unit in the group as though its life was known.[54] Under the equal life procedure the property is divided into subgroups that each has a common life.[55]

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

[51] *Id.* at 74.

[52] NARUC *supra* n. 10, at 61-62.

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

[54] *Id.* at 75.

[55] *Id.*

technique applies the depreciation rate on the estimated average service life of group, while the remaining life technique seeks to recover undepreciated costs over the remaining life of the plant.[56]

In choosing the application technique, consideration should be given to the proper level of the accumulated depreciation account. Depreciation accrual rates are calculated using estimates of service life and salvage. Periodically these estimates must be revised due to changing conditions, which cause the accumulated depreciation account to be higher or lower than necessary. Unless some corrective action is taken, the annual accruals will not equal the original cost of the plant at the time of final retirement.[57] 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.[58] 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

[56] NARUC *supra* n. 10, at 63-64.

[57] Wolf *supra* n. 9, at 83.

[58] NARUC *supra* n. 10, at 325.

in the annual accrual.[59] 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:[60]

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.[61]

4. Analysis Model

The fourth parameter of a depreciation system, the "model," relates to the way of viewing the life and salvage characteristics of the vintage groups that have been combined to form a continuous property group for depreciation purposes.[62] 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

[59] NARUC *supra* n. 10, 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.").

[60] *Id.* at 64.

[61] Wolf *supra* n. 9, at 178.

[62] *See* Wolf *supra* n. 9, at 139 (I added the term "model" to distinguish this fourth depreciation system parameter from the other three parameters).

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

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

APPENDIX B:

IOWA CURVES

Early work in the analysis of the service life of industrial property was based on models that described the life characteristics of human populations.[63] This explains why the word "mortality" is often used in the context of depreciation analysis. In fact, a group of property installed during the same accounting period is analogous to a group of humans born during the same calendar year. Each period the group will incur a certain fraction of deaths / retirements until there are no survivors. Describing this pattern of mortality is part of actuarial analysis, and is regularly used by insurance companies to determine life insurance premiums. The pattern of mortality may be described by several mathematical functions, particularly the survivor curve and frequency curve. Each curve may be derived from the other so that if one curve is known, the other may be obtained. A survivor curve is a graph of the percent of units remaining in service expressed as a function of age.[64] 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. Development

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.[65] They generalized the 65 curves

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[63] Wolf *supra* n. 9, at 276.

[64] *Id.* at 23.

[65] *Id.* at 34.

into 13 survivor curve types and published their results in *Bulletin 103: Life Characteristics of Physical Property*. The 13 type curves were designed to be used as valuable aids in forecasting probable future service lives of industrial property. Over the next few years, Winfrey continued gathering additional data, particularly from public utility property, and expanded the examined property groups from 65 to 176.[66] This resulted in 5 additional survivor curve types for a total of 18 curves. In 1935, Winfrey published *Bulletin 125: Statistical Analysis of Industrial Property Retirements*. According to Winfrey, "[t]he 18 type curves are expected to represent quite well all survivor curves commonly encountered in utility and industrial practices."[67] 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.[68] Rather than using the original formulas, analysts typically rely on the published tables containing the percentages surviving. This is because absent knowledge of the integration technique applied to each age interval, it is not possible to recreate the exact original published table values. In the 1970s, John Russo collected data from over 2,000 property accounts reflecting

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[66] *Id.*

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

[68] 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. 9, at 305-38 (publishing the percent surviving for each Iowa curve, including "O" type curve, at one percent intervals).

observations during the period 1965 – 1975 as part of his Ph.D. dissertation at Iowa State. Russo essentially repeated Winfrey's data collection, testing, and analysis methods used to develop the original Iowa curves, except that Russo studied industrial property in service several decades after Winfrey published the original Iowa curves. Russo drew three major conclusions from his research:[69]

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.[70]

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

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[69] *See* Wolf *supra* n. 9, at 37.

[70] *Id.*

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

2. Classification

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

The classification of the survivor curves was made according to whether the mode of the retirement frequency curves was to the left, to the right, or coincident with average service life. There are three modal "families" of curves: six left modal curves (L0, L1, L2, L3, L4, L5); five right modal curves (R1, R2, R3, R4, R5); and seven symmetrical curves (S0, S1, S2, S3, S4, S5, S6).[71] 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.

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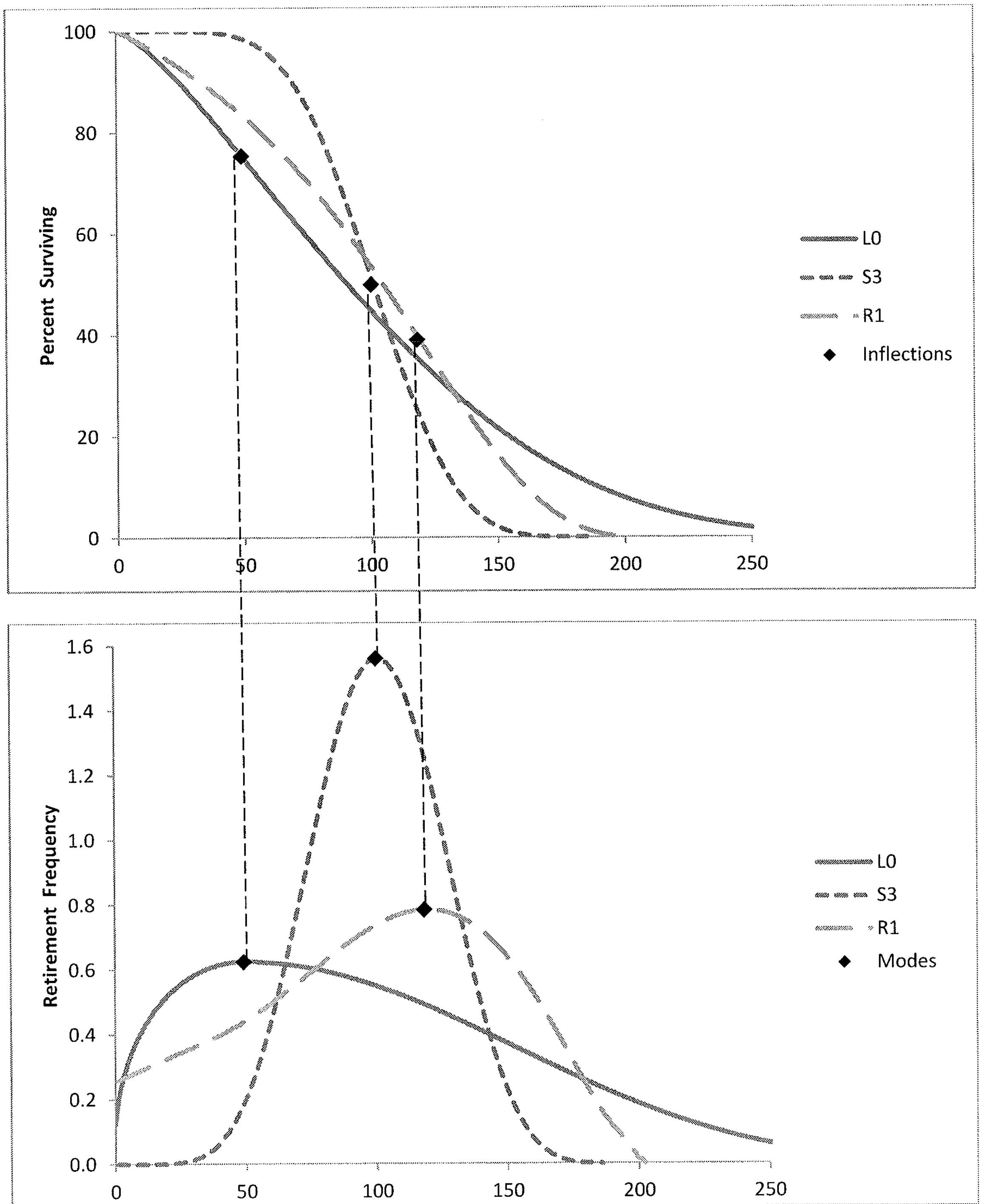
[71] In 1967, Harold A. Cowles added four origin-modal curves known as "O type" curves. There are also several "half" curves and a square curve, so the total amount of survivor curves commonly called "Iowa" curves is about 31 (see NARUC supra n. 10, at 68).

Figure 9:
Modal Age Illustration



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

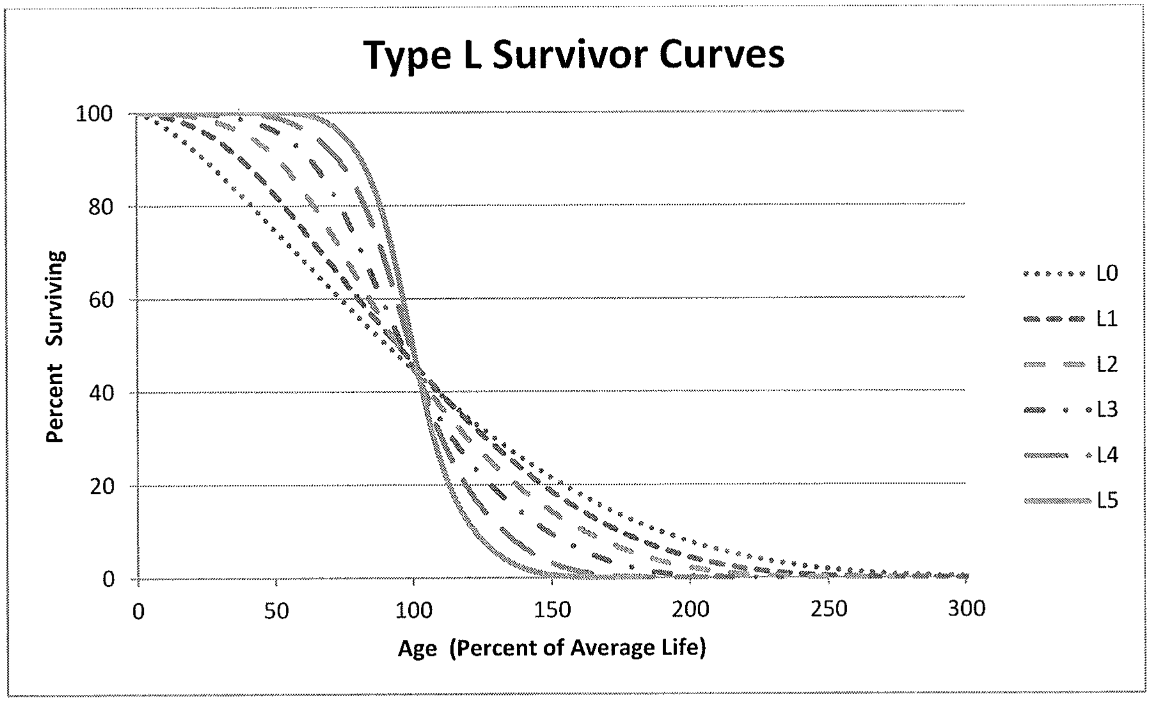
> Since the location of a particular survivor on a graph is affected by both its span in years and the shape of the curve, it is difficult to classify a group of curves unless one of these variables can be controlled. This is easily done by expressing the age in percent of average life."[72]

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.

[72] Winfrey, *Bulletin 125: Statistical Analyses of Industrial Property Retirements* 60, Vol. XXXIV, No. 23 (Iowa State College of Agriculture and Mechanic Arts 1935).

**Figure 10:
Type L Survivor and Frequency Curves**



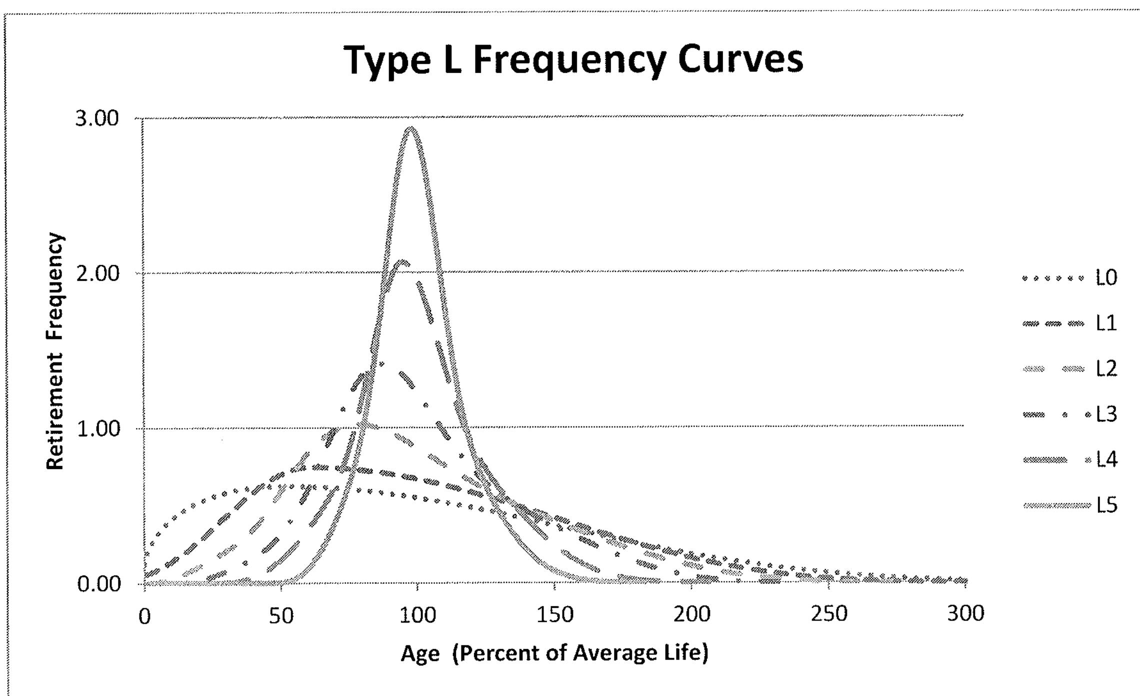
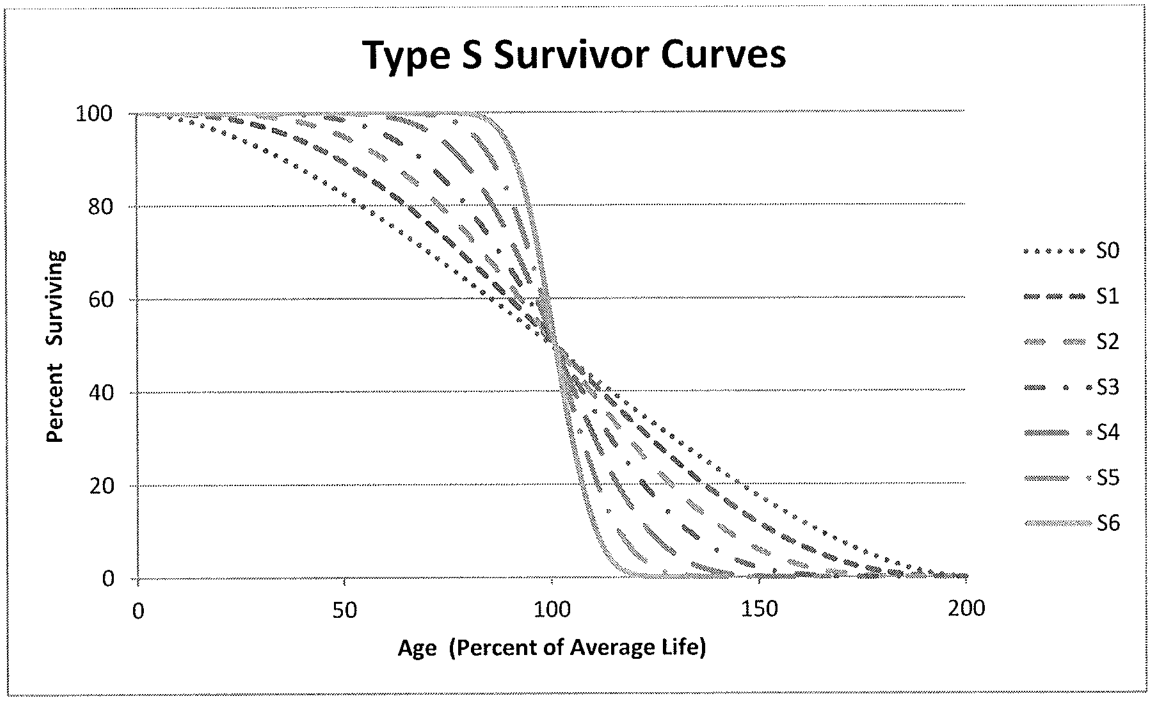


Figure 11:
Type S Survivor and Frequency Curves



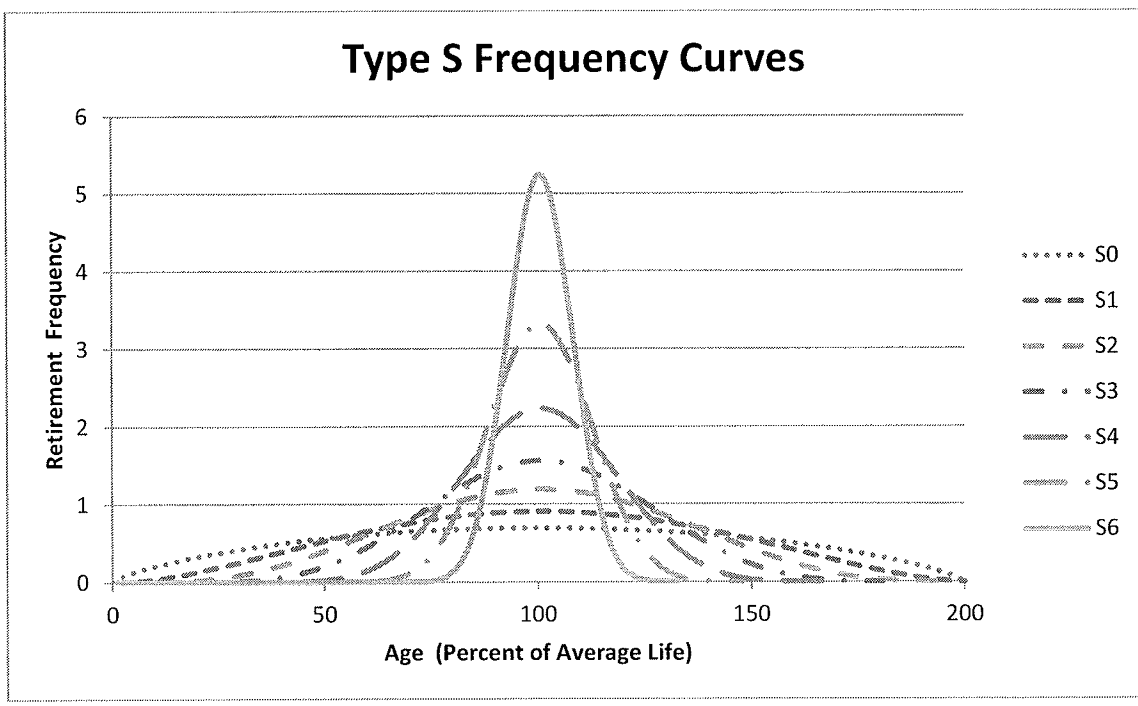
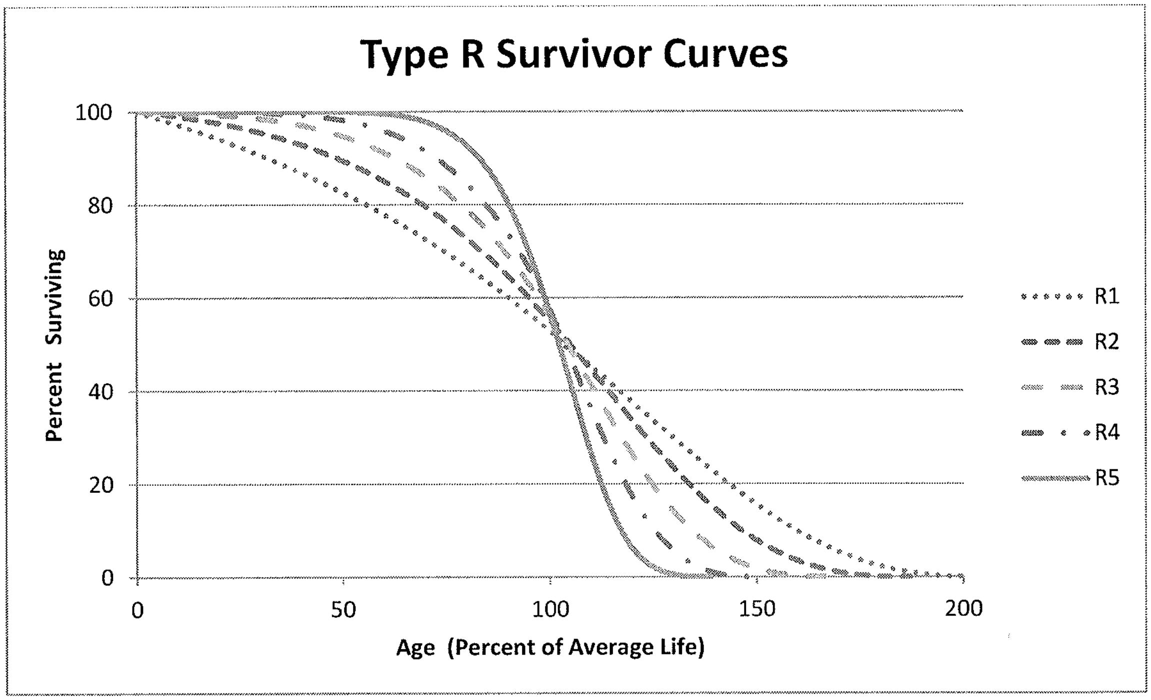
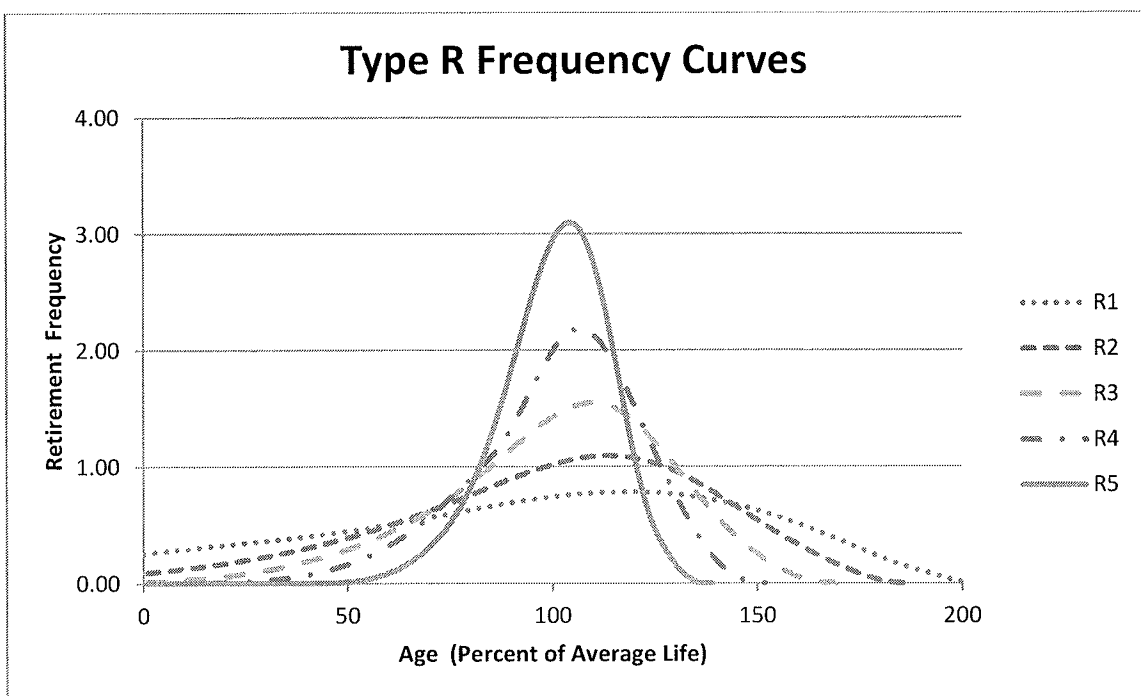


Figure 12:
Type R Survivor and Frequency Curves





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

3. <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.[73]

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:[74]

Equation 4:
Average Life

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

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

[73] 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.

[74] *See* NARUC *supra* n. 10, at 71.

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

Realized life is similar to average life, except that realized life is the average years of service experienced to date from the vintage's original installations.[75] As shown in the figure below, realized life is the area under the survivor curve from zero to age RLx. Likewise, unrealized life is the area under the survivor curve from age RLx 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.[76] 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 potion of the survivor curve is divided by the percent surviving at age x (denoted Sx). Thus, the average remaining life formula is:

Equation 5:
Average Remaining Life

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

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

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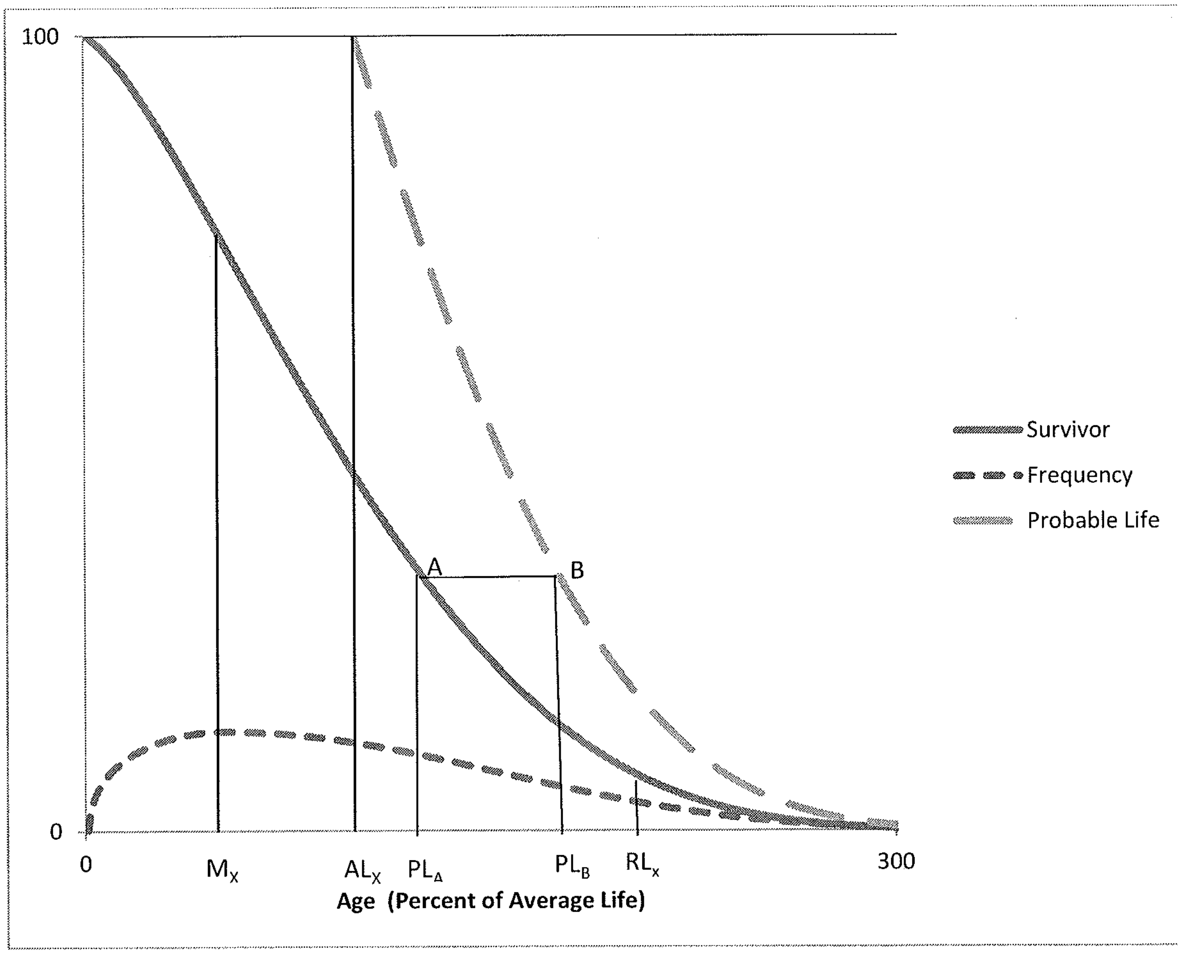
[75] *Id.* at 73.

[76] *Id.* at 74.

Figure 13:
Iowa Curve Derivations



Finally, the probable life may also be determined from the Iowa curve. The probable life of a property group is the total life expectancy of the property surviving at any age and is equal to the remaining life plus the current age.[77] The probable life is also illustrated in this figure. The probable life at age PL_A is the age at point PL_B. Thus, to read the probable life at age PL_A, see the

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[77] Wolf *supra* n. 9, at 28.

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

APPENDIX C:
ACTUARIAL ANALYSIS

Actuarial science is a discipline that applies various statistical methods to assess risk probabilities and other related functions. Actuaries often study human mortality. The results from historical mortality data are used to predict how long similar groups of people who are alive will live today. Insurance companies rely of 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.[78]

Figure 14:
Forces of Retirement

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

While actuaries study historical mortality data in order to predict how long a group of people will live, depreciation analysts must look at a utility's historical data in order to estimate the average lives of property groups. A utility's historical data is often contained in the Continuing

[78] NARUC *supra* n. 10, at 14-15.

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.[79] 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 in order to calculating observed survivor curves for property groups. Of these methods, the retirement rate method is superior, and is widely employed by depreciation analysts.[80] 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 in order 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 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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[79] *Id.* at 112-13.

[80] 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.[81] 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 2009 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 was retired during 2012.

Figure 15:
Exposure Matrix

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

[81] 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 account period is called an "exposure" rather than an addition.

Figure 16:
Retirement Matrix

Placement Years	2008	2009	2010	2011	2012	2013	2014	2015	Total During Age Interval	Age Interval
	Experience Years Retirments During the Year (Dollars in 000's)									
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.[82] 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).

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[82] Wolf *supra* n. 9, at 22.

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

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

Figure 17:
Observed Life Table

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

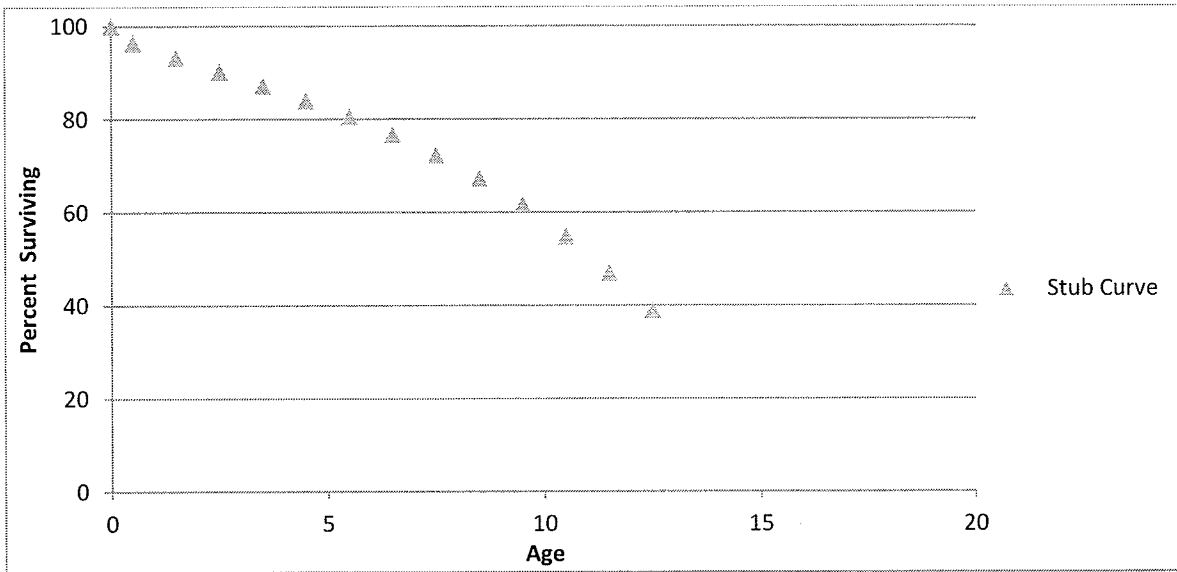
Column F on the right shows the percentages surviving at the beginning of each age interval. This column starts at 100% surviving. Each consecutive number below is calculated by multiplying the percent surviving from the previous age interval by the corresponding survivor ratio for that age interval. For example, the percent surviving at the start of age interval 1.5 is 93.21%, which was calculated by multiplying the percent surviving for age interval 0.5 (96.43%) by the survivor ratio for age interval 0.5 (0.967)[83].

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

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

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

Figure 18:
Original "Stub" Survivor Curve



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

<u>Banding</u>

The forces of retirement and characteristics of industrial property are constantly changing. A depreciation analyst may examine the magnitude of these changes. Analysts often use a technique called "banding" to assist with this process. Banding refers to the merging of several years of data into a single data set for further analysis, and it is a common technique associated with the retirement rate method.[84] 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.[85]

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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[84] NARUC *supra* n. 10, at 113.

[85] *Id.*

Figure 19:
Placement Bands

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

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

Analysts often use placement bands for comparing the survivor characteristics of properties with different physical characteristics.[86] 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 with a special chemical treatment that extended the service lives of the 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

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

bands are very useful in depreciation analysis, they also possess an intrinsic dilemma. A fundamental characteristic of placement bands is that they yield fairly complete survivor curves for older vintages. However, with newer vintages, which are arguably more valuable for forecasting, placement bands yield shorter survivor curves. Longer "stub" curves are considered more valuable for forecasting average life. Thus, an analyst must select a band width broad enough to provide confidence in the reliability of the resulting curve fit, yet narrow enough so that an emerging trend may be observed.[87]

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.

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

Figure 20:
Experience Bands

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

The shaded cells within the experience band equal the total exposures at the beginning of age interval 4.5–5.5 ($1,237). The same experience band would be used for the retirement matrix covering the same experience years of 2011 – 2013. This of course would result in a different OLT and original stub survivor than if the band had not been used. Analysts often use experience bands to isolate and analyze the effects of an operating environment over time.[88] 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

[88] *Id.*

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

Depreciation analysts must use professional judgment in determining the types of bands to use and the band widths. In practice, analysts may use various combinations of placement and experience bands in order to increase the data sample size, identify trends and changes in life characteristics, and isolate unusual events. Regardless of which bands are used, observed survivor curves in depreciation analysis rarely reach zero percent. This is because, as seen in the OLT above, relatively newer vintage groups have not yet been fully retired at the time the property is studied. An analyst could confine the analysis to older, fully retired vintage groups in order to get complete survivor curves, but such analysis would ignore some 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.

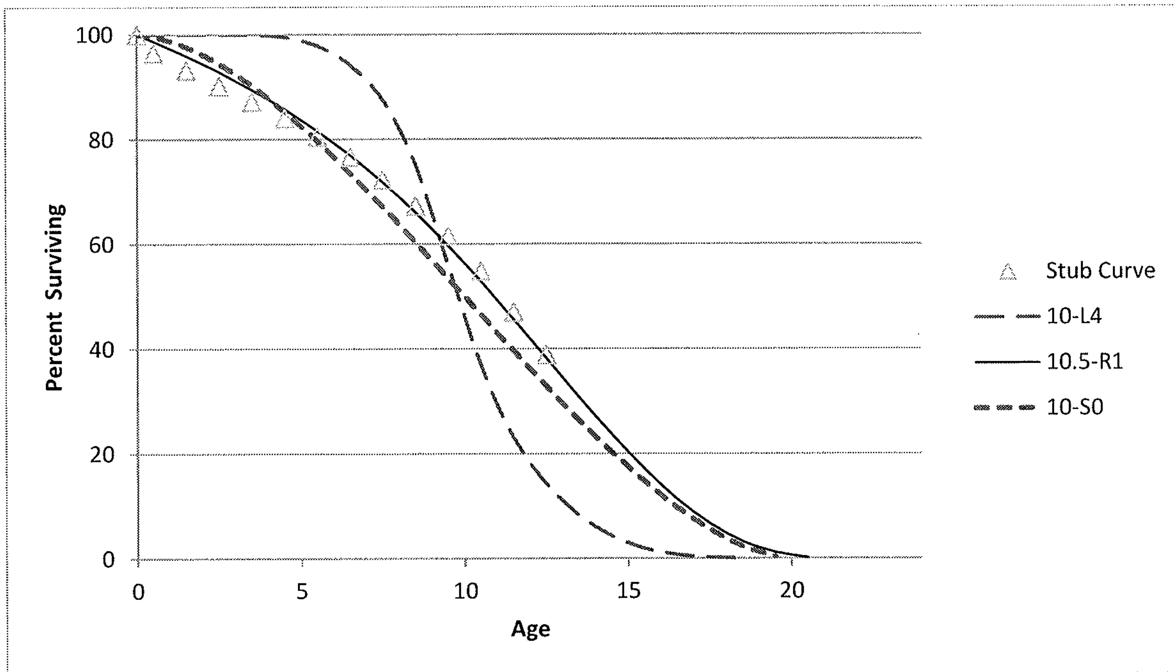
Curve Fitting

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 used 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."[89]

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

[89] Wolf *supra* n. 9, at 46 (22 curves includes Winfrey's 18 original curves plus Cowles's four "O" type curves).

Figure 21:
Visual Curve Fitting



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

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

repeated for the remaining 21 Iowa type curves. The "best fit" is declared to be the type of curve that minimizes the sum of differences squared.[90]

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."[91]

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 of the other two curves. Curve 10-L4 is the worst fit, which was also confirmed visually.

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[90] Wolf *supra* n. 9, at 47.

[91] *Id.* at 48.

Figure 22:
Mathematical Fitting

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

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EDUCATION

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

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

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

PROFESSIONAL DESIGNATIONS

Society of Depreciation Professionals
Certified Depreciation Professional (CDP)

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

The Mediation Institute
Certified Civil / Commercial & Employment Mediator

WORK EXPERIENCE

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

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

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

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

TEACHING EXPERIENCE

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

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

PUBLICATIONS

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

VOLUNTEER EXPERIENCE

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

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

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

PROFESSIONAL ASSOCIATIONS

Oklahoma Bar Association 2007 – Present

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

Society of Utility Regulatory Financial Analysts 2014 – Present

SELECTED CONTINUING PROFESSIONAL EDUCATION

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

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

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

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

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

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

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

Utility Regulatory Proceedings

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

Utility Regulatory Proceedings

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

Summary Expense Adjustment

Plant Function	Plant Balance 6/30/2018	PSO Proposal	OIEC Proposal	OIEC Adjustment
Production	1,573,327,285	53,871,350	49,291,892	(4,579,457)
Transmission	881,530,850	22,810,398	21,612,411	(1,197,987)
Distribution	2,542,748,682	77,768,915	74,736,062	(3,032,853)
General	176,236,002	7,675,656	7,697,657	22,001
Total	$ 5,173,842,819	$ 162,126,319	$ 153,338,023	**$ (8,788,296)**

Detailed Expense Adjustment

		[1]	[2]	[3]	[4]	[5]	[6]
Acct No	Description	Plant 6/30/2018	PSO Depr Rates	PSO Depr Expense	OIEC Depr Rates	OIEC Depr Expense	OIEC Exp Adjustment
	PRODUCTION						
	Oklaunion						
310.00	Land - Coal Fired	1,989,307					
311.00	Structures, Improvements-Coal	18,717,142	5.21%	958,748	1.94%	363,113	(595,635)
	Boiler Plant Equip-Coal	52,150,202	5.37%	2,797,165	2.15%	1,121,229	(1,675,936)
314.00	Turbogenerator Units-Coal	15,515,079	4.29%	665,699	1.79%	277,720	(387,979)
315.00	Accessory Elect Equip-Coal	6,598,031	3.90%	257,122	1.50%	98,970	(158,151)
316.00	Misc Pwr Plant Equip-Coal	5,651,150	3.86%	218,010	1.74%	98,330	(119,680)
	ARO#1 Oklaunion Ash Pond : PSO/AEPTN : PPOKLARO1	3,694,291		315,725		315,725	-
	ARO#2 Oklaunion Ash Pond : PSO/AEPTN : PPOKLARO2	1,680,688		143,777		143,777	-
	ARO#3 Oklaunion Ash Pond : PSO/AEPTN : PPOKLARO3	220,480		19,216		19,216	-
	ARO#4 Oklaunion Ash Pond : PSO/AEPTN : PPOKLARO4	220,480		19,216		19,216	-
317.00	ARO Steam Production Plant	15,619		1,083		1,083	-
		106,452,469	5.09%	5,395,761	2.31%	2,458,379	(2,937,381)
	Northeast Generating Plant - Unit 3						
310.00	Land - Coal Fired	1,141,086					
311.00	Structures, Improvements-Coal	20,009,581	2.77%	549,853	2.77%	553,457	3,604
312.00	Boiler Plant Equip-Coal	376,685,387	3.39%	12,773,925	3.39%	12,786,110	12,186
312.10	Coal Transportation Equip	5,255,850	0.18%	9,461	0.18%	9,461	-
314.00	Turbogenerator Units-Coal	46,210,042	2.11%	974,978	2.11%	976,978	2,000
315.00	Accessory Elect Equip-Coal	20,373,338	1.46%	297,747	1.46%	298,017	270
316.00	Misc Pwr Plant Equip-Coal	17,721,449	2.57%	459,077	2.57%	455,712	(3,364)
317.00	ARO Steam Production Plant	802,640		19,769		19,769	-
317.00	ARO#1 Steam Production Plant	6,814,018		217,260		217,260	-
317.00	ARO#2 Steam Production Plant	12,934,871		407,272		407,272	-
317.00	ARO Steam Production Plant - Rtn Pond	279,358		7,180		7,180	-
		508,227,620	3.09%	15,716,521	3.10%	15,731,215	14,694
	Northeast Generating Plant - Unit 3 - Rail Spur						
310.00	Land - Coal Fired	1,880,041					
310.10	Land Rights - Coal Fired	939,196	10.14%	95,234	10.14%	95,256	22
312.00	Rail Spur	22,359,915	3.26%	728,933	3.26%	729,390	457
		25,179,152	3.27%	824,168	3.28%	824,646	478
	Total Steam Production - Coal	**639,859,241**	**3.43%**	**21,936,449**	**2.97%**	**19,014,241**	**(2,922,208)**
	Comanche						
310.30	Land - Oil/Gas	345,962					
311.30	Struct, Improvements-Oil/Gas	6,400,783	3.03%	191,213	3.03%	193,872	2,659

Detailed Expense Adjustment

Acct No	Description	[1] Plant 6/30/2018	[2] PSO Depr Rates	[3] PSO Depr Expense	[4] OIEC Depr Rates	[5] OIEC Depr Expense	[6] OIEC Exp Adjustment
312.30	Boiler Plant Equip-Oil/Gas	64,819,231	5.19%	3,357,526	5.19%	3,365,515	7,989
314.30	Turbogenator Units-Oil/Gas	63,864,739	3.22%	2,056,445	2.58%	1,647,850	(408,594)
315.30	Accssry Elect Equip-Oil/Gas	7,543,617	2.58%	188,583	2.58%	194,632	6,049
316.30	Misc Pwr Plt Equip-Oil/Gas	2,887,414	3.12%	90,087	3.12%	90,009	(79)
317.00	RET#1 Comanche Retention Pond	683,326		50,622		50,622	-
317.30	ARO Steam Prod Plnt Oil/Gas	159,024		9,873		9,873	-
		146,704,096	4.06%	5,944,348	3.78%	5,552,373	(391,975)
	Northeast Generating Plant - Units 1 & 2						
310.30	Land - Oil/Gas	101,505		-			
310.31	Land Rights - Oil/Gas	1		-			
311.30	Struct, Improvements-Oil/Gas	11,994,169	3.19%	382,943	3.19%	383,078	135
312.30	Boiler Plant Equip-Oil/Gas	93,997,307	3.13%	2,943,978	3.13%	2,937,862	(6,116)
314.30	Turbogenator Units-Oil/Gas	141,467,433	3.66%	5,177,708	2.71%	3,838,856	(1,338,852)
315.30	Accssry Elect Equip-Oil/Gas	14,582,338	2.86%	415,940	2.86%	417,295	1,355
316.30	Misc Pwr Plt Equip-Oil/Gas	7,901,518	2.93%	231,375	2.93%	231,889	514
317.00	ARO Steam Production Plant	609,488		5,242		5,242	-
		270,653,758	3.38%	9,157,187	2.89%	7,814,223	(1,342,964)
	Riverside Generating Plant - Units 1 & 2						
310.30	Land - Oil/Gas	1,376,358					
311.30	Struct, Improvements-Oil/Gas	10,499,136	3.15%	327,185	3.15%	330,563	3,377
312.30	Boiler Plant Equip-Oil/Gas	75,896,302	2.07%	1,572,416	2.07%	1,574,262	1,846
314.30	Turbogenator Units-Oil/Gas	70,682,383	2.63%	1,858,947	2.63%	1,860,794	1,847
315.30	Accssry Elect Equip-Oil/Gas	10,491,996	1.53%	160,527	1.53%	160,386	(142)
316.30	Misc Pwr Plt Equip-Oil/Gas	7,597,086	4.29%	323,498	4.29%	325,998	2,500
317.30	ARO Steam Prod Plnt Oil/Gas	2,222,230		79,144		79,144	-
317.30	ARO Steam Prod Plnt Oil/Gas - Rtn Pond #1	996,132		38,937		38,937	-
		179,761,625	2.43%	4,360,653	2.43%	4,370,083	9,429
	Southwestern Generating Plant U1-5						
310.30	Land - Oil/Gas	191,512					
311.30	Struct, Improvements-Oil/Gas	8,384,869	4.84%	405,199	4.84%	405,951	753
312.30	Boiler Plant Equip-Oil/Gas	37,147,384	4.72%	1,737,639	4.72%	1,754,987	17,349
314.30	Turbogenator Units-Oil/Gas	36,670,887	4.95%	1,815,209	4.95%	1,816,928	1,719
315.30	Accssry Elect Equip-Oil/Gas	10,842,146	4.87%	514,332	4.87%	527,738	13,406
316.30	Misc Pwr Plt Equip-Oil/Gas	1,679,264	5.55%	92,498	5.55%	93,156	658
317.30	ARO Steam Prod Plnt Oil/Gas	813,308		20,862		20,862	-
317.30	ARO Steam Prod Plnt Oil/Gas - Retn Pond #1	129,254		-		-	-
		95,858,624	4.82%	4,585,739	4.82%	4,619,623	33,885
	Tulsa Generating Plant Units 2 & 4						

Detailed Expense Adjustment

Acct No	Description	[1] Plant 6/30/2018	[2] PSO Depr Rates	[3] PSO Depr Expense	[4] OIEC Depr Rates	[5] OIEC Depr Expense	[6] OIEC Exp Adjustment
310.30	Land - Oil/Gas	97,253		-			
311.30	Struct, Improvements-Oil/Gas	7,906,462	4.31%	334,343	4.31%	340,463	6,120
312.30	Boiler Plant Equip-Oil/Gas	25,722,769	3.42%	877,102	3.42%	878,802	1,699
314.30	Turbogenator Units-Oil/Gas	31,927,384	3.46%	1,104,688	3.46%	1,104,087	(601)
315.30	Accssry Elect Equip-Oil/Gas	10,339,334	4.91%	506,894	4.91%	507,615	721
316.30	Misc Pwr Plt Equip-Oil/Gas	3,141,538	5.59%	168,360	5.59%	175,469	7,109
317.30	ARO Steam Prod Plnt Oil/Gas	3,248,543		201,248		201,248	-
317.30	ARO Steam Prod Plnt Oil/Gas - Retn Pond #1	247,987		17,005		17,005	-
		82,631,269	3.90%	3,209,639	3.90%	3,224,688	15,049
	Total Steam Production - Oil & Gas	**775,609,373**	**3.52%**	**27,257,566**	**3.30%**	**25,580,989**	**(1,676,577)**
	Comanche						
342.00	Fuel Holders - Gas	2,994	2.42%	72	2.42%	73	0
344.00	Generators - Gas	754,469	0.93%	7,017	0.93%	6,981	(35)
346.00	Misc Power Plant Eq-Gas	17,858	1.38%	246	1.38%	246	(0)
		775,321	0.95%	7,335	0.94%	7,300	(35)
	Riverside Generating Plant						
346.00	Misc Pwr Plt Equip-Oil/Gas	182,933	2.77%	5,067	2.77%	5,065	(3)
342.00	Fuel Holders - Gas	9,797,993	2.41%	236,132	2.41%	235,649	(483)
344.00	Generators - Gas	48,146,734	2.42%	1,165,156	2.42%	1,165,845	689
345.00	Accessory Electric Eq-Gas	4,795,290	3.11%	150,247	3.11%	148,908	(1,339)
		62,922,950	2.47%	1,556,603	2.47%	1,555,467	(1,135)
	Southwestern Generating Plant U4&5						
341.00	Structures & Improvments-Gas	5,253,788	3.03%	159,190	3.03%	159,241	51
344.00	Generators - Gas	44,894,125	2.19%	983,430	2.19%	982,297	(1,133)
345.00	Accessory Electric Eq-Gas	9,696,457	2.29%	221,942	2.29%	222,382	440
346.00	Accessory Electric Eq-Gas	52,297	3.73%	1,476	3.73%	1,952	475
		59,896,667	2.28%	1,366,038	2.28%	1,365,872	(167)
	Weleetka Generating Plant						
340.00	Land	62,660		-			
341.00	Structures & Improvments-Gas	920,297	12.87%	98,174	12.87%	118,463	20,289
342.00	Fuel Holders - Gas	2,074,691	3.55%	73,652	3.55%	73,601	(51)
344.00	Generators - Gas	24,667,572	4.40%	1,085,373	4.40%	1,085,551	178
345.00	Accessory Electric Eq-Gas	797,078	15.74%	125,458	15.74%	125,421	(37)
346.00	Misc Power Plant Eq-Gas	2,661,391	10.94%	291,156	10.94%	291,201	44
347.00	ARO Other Production	23,812		2,039		2,039	-
		31,207,501	5.40%	1,675,851	5.44%	1,696,274	20,423

Detailed Expense Adjustment

		[1]	[2]	[3]	[4]	[5]	[6]
Acct No	Description	Plant 6/30/2018	PSO Depr Rates	PSO Depr Expense	OIEC Depr Rates	OIEC Depr Expense	OIEC Exp Adjustment
	Total Other Production	**154,802,439**	**2.98%**	**4,605,828**	**2.99%**	**4,624,914**	**19,086**
	Northeast Generating Plant - Units 1 & 2						
342.00	Fuel Holders - Gas	63,289	1.58%	1,000	1.58%	1,000	(0)
344.00	Generators - Gas	241,260	0.18%	434	0.18%	434	0
345.00	Accessory Electric Eq-Gas	83,558	3.05%	2,549	3.05%	2,550	2
346.00	Misc Power Plant Eq-Gas	3,019	1.05%	32	1.05%	32	(0)
		391,126	1.03%	4,014	1.03%	4,016	2
	Northeast Generating Plant - Unit 3 - Diesel						
344.00	Generators - Gas	437,950	2.05%	8,978	2.05%	8,980	2
		437,950	2.05%	8,978	2.05%	8,980	2
	Riverside Generating Plant - Diesel Unit						
342.00	Fuel Holders - Gas	24,392	3.32%	810	3.32%	811	1
344.00	Generators - Gas	470,175	0.77%	3,620	0.77%	3,608	(12)
345.00	Accessory Electric Eq-Gas	68,642	0.71%	230	0.71%	485	255
		563,209	0.88%	4,660	0.87%	4,905	244
	Southwestern Generating Plant - Diesel						
342.00	Fuel Holders - Gas	58,811	2.71%	1,594	2.71%	1,594	1
344.00	Generators - Gas	212,484	0.80%	1,700	0.80%	1,693	(7)
		271,295	1.21%	3,294	1.21%	3,287	(6)
	Tulsa Generating Plant - Diesel Unit						
342.00	Fuel Holders - Gas	70,372	1.13%	795	1.13%	795	0
344.00	Generators - Gas	608,404	1.08%	6,571	1.08%	6,545	(26)
345.00	Accessory Electric Eq-Gas	-		-			
		678,776	1.09%	7,366	1.08%	7,340	(26)
	Weleetka Generating Plant - Diesel Unit						
342.00	Fuel Holders - Gas	10,291	6.24%	642	6.24%	642	(0)
344.00	Generators - Gas	666,380	6.08%	40,516	6.08%	40,543	27
345.00	Accessory Electric Eq-Gas	36,296	5.39%	1,956	5.39%	1,956	(0)
346.00	Misc Power Plant Eq-Gas	911	8.76%	80	8.76%	80	0
		713,878	6.05%	43,194	6.05%	43,221	27
	Total Diesel	**3,056,233**	**2.37%**	**71,507**	**2.35%**	**71,749**	**242**

Detailed Expense Adjustment

Acct No	Description	[1] Plant 6/30/2018	[2] PSO Depr Rates	[3] PSO Depr Expense	[4] OIEC Depr Rates	[5] OIEC Depr Expense	[6] OIEC Exp Adjustment
	TOTAL PRODUCTION	**1,573,327,285**	**3.52%**	**53,871,350**	**3.13%**	**49,291,892**	**(4,579,457)**
	TRANSMISSION						
350.00	Land	3,150,433					
350.10	Land Rights	38,569,025	1.15%	444,759	1.15%	443,279	(1,480)
352.00	Structures and Improvements	8,204,290	1.77%	139,831	1.77%	145,140	5,309
353.00	Station Equipment	410,610,975	1.92%	7,901,373	1.84%	7,558,212	(343,161)
353.10	Station Equipment-SmartGrid	1,184,577	1.92%	13,609	1.84%	21,805	8,196
354.00	Towers and Fixtures	17,645,480	2.50%	442,729	2.50%	440,351	(2,378)
355.00	Poles and Fixtures	233,644,699	4.05%	9,571,725	4.05%	9,460,749	(110,976)
356.00	Overhead Conductors, Device	168,449,456	2.55%	4,294,862	2.10%	3,541,367	(753,495)
358.00	Undergrnd Conductors Device	71,915	2.10%	1,510	2.10%	1,509	(1)
		881,530,850	2.58%	22,810,398	2.45%	21,612,411	(1,197,987)
	DISTRIBUTION						
360.00	Land	7,799,764					
360.10	Land Rights	2,825,284	1.09%	30,804	1.09%	30,889	85
361.00	Structures and Improvements	11,820,039	2.23%	226,664	1.72%	203,321	(23,343)
362.00	Station Equipment	385,782,279	1.27%	4,859,885	1.31%	5,046,395	186,509
362.10	Station Equipment-SmartGrid	588,571	1.27%	4,147	1.31%	7,699	3,552
364.00	Poles, Towers and Fixtures	431,968,555	4.35%	18,413,386	3.66%	15,810,940	(2,602,446)
365.00	Overhead Conductors, Device	407,242,776	3.40%	13,708,222	3.40%	13,857,898	149,676
366.00	Underground Conduit	86,738,009	2.05%	1,722,890	2.00%	1,730,520	7,630
367.00	Undergrnd Conductors,Device	361,694,065	1.83%	6,429,213	1.57%	5,662,539	(766,674)
368.00	Line Transformers	359,492,177	3.23%	11,291,681	3.23%	11,595,390	303,708
369.00	Services	269,555,888	2.84%	7,593,591	2.84%	7,661,237	67,646
370.00	Meters	12,242,225	9.64%	1,169,386	6.86%	839,450	(329,935)
370.16	AMI Meters	96,396,135	9.07%	8,795,497	9.07%	8,746,389	(49,108)
371.00	Installs Customer Premises	47,635,523	4.22%	2,001,393	4.22%	2,008,170	6,776
373.00	Street Lghtng & Signal Sys	60,967,392	2.52%	1,522,155	2.52%	1,535,226	13,070
		2,542,748,682	3.11%	77,768,915	2.94%	74,736,062	(3,032,853)
	GENERAL						
389.00	Land	6,957,792					
389.10	Land Rights	127,950	0.00%	-	0.00%	-	-
390.00	Structures and Improvements	64,789,862	2.02%	1,303,122	2.02%	1,311,293	8,171
391.00	Office Furniture, Equipment	1,535,778	5.23%	89,007	5.23%	80,288	(8,719)
391.11	Office Equip - Computers	159,400	21.17%	33,745	21.17%	33,742	(3)
392.00	Transportation Equipment	1,951,777	6.76%	131,940	6.76%	131,845	(95)
393.00	Stores Equipment	2,356,747	3.65%	86,021	3.65%	86,044	22
394.00	Tools	26,922,047	4.11%	1,086,025	4.11%	1,105,904	19,879
395.00	Laboratory Equipment	1,432,083	5.48%	78,343	5.48%	78,425	81

Detailed Expense Adjustment

Acct No	Description	[1] Plant 6/30/2018	[2] PSO Depr Rates	[3] PSO Depr Expense	[4] OIEC Depr Rates	[5] OIEC Depr Expense	[6] OIEC Exp Adjustment
396.00	Power Operated Equipment	639,346	6.06%	38,744	6.06%	38,751	7
397.00	Communication Equipment	48,002,185	7.36%	3,528,505	7.36%	3,531,383	2,878
397.11	Comm Equip-Mobile Radios	660,330	7.36%	48,552	7.36%	48,579	27
397.12	Comm Equip-SCADA, RTU	159,864	7.36%	13,461	7.36%	11,761	(1,700)
397.16	Comm Equip-AMI	13,519,562	6.74%	913,635	6.74%	911,549	(2,086)
398.00	Miscellaneous Equipment	5,936,226	5.30%	311,311	5.30%	314,850	3,539
399.19	ARO General Plant Trans	555,241		-		-	-
399.30	Other Tangible Property-Rail Maint Facility	529,811	2.50%	13,245	2.50%	13,245	-
		176,236,002	4.57%	7,675,656	4.57%	7,697,657	22,001
101.00	**ELECTRIC PLANT IN SERVICE**	**5,173,842,819**	**3.16%**	**162,126,319**	**2.96%**	**153,338,023**	**(8,788,296)**
	Less:						
	Depreciation charged to Clearing			13,245		13,245	-
	Depreciation charged to Inventory			824,168		824,168	-
						-	-
	TOTAL DEPRECIATION EXPENSE			**161,288,906**		**152,500,610**	**(8,788,296)**

[1] Updated plant balances at 6/30/2018 from response to AG 5-7 Attachment 1 (Sch I Depr Exp 6 Month Update), WP H-2-24.1 (Depreciation)
[2] PSO proposed rates from WP H-2-24.1 (Depreciation)
[3] PSO proposed depreciation expense from WP H-2-24.1 (Depreciation)
[4] OIEC Proposed rates from Exhibit DJG-5
[5] = [1] * [4]
[6] = [5] - [3]

Detailed Rate Comparison

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		PSO Proposal		OIEC Proposal		OIEC less Current Rates		OIEC less Proposed Rates	
Account No.	Description	Original Cost	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	STEAM PRODUCTION PLANT											
	Coal Plants											
	NORTHEASTERN UNIT 3											
311.00	Structures & Improvements	19,616,179	2.55%	500,213	2.77%	542,576	2.77%	542,576	0.22%	42,363	0.00%	0
312.00	Boiler Plant Equipment	376,144,087	3.29%	12,375,140	3.39%	12,767,737	3.39%	12,767,737	0.10%	392,597	0.00%	0
314.00	Turbogenerator Units	46,069,012	2.13%	981,270	2.11%	973,996	2.11%	973,996	-0.02%	-7,274	0.00%	0
315.00	Accessory Electrical Equipment	20,310,077	1.47%	298,558	1.46%	297,091	1.46%	297,091	-0.01%	-1,467	0.00%	0
316.00	Misc. Power Plant Equip.	17,770,427	2.61%	463,808	2.57%	456,972	2.57%	456,972	-0.04%	-6,836	0.00%	0
	Total	479,909,782	3.05%	14,618,989	3.13%	15,038,372	3.13%	15,038,371	0.08%	419,382	0.00%	0
	RAIL SPUR											
310.10	Rail Spur - Land Rights	939,196	3.77%	35,408	10.14%	95,256	10.14%	95,256	6.37%	59,848	0.00%	0
312.00	Rail Spur	22,359,915	1.34%	299,623	3.26%	729,390	3.26%	729,390	1.92%	429,767	0.00%	0
312.11	Rail Cars	5,255,850	0.14%	7,358	0.18%	9,379	0.18%	9,379	0.04%	2,021	0.00%	0
	Total	28,554,961	1.20%	342,389	2.92%	834,025	2.92%	834,025	1.72%	491,636	0.00%	0
	Total Coal Plants	508,464,743	2.94%	14,961,378	3.12%	15,872,397	3.12%	15,872,397	0.18%	911,019	0.00%	0
	Gas & Combined Cycle Plants											
	COMANCHE											
311.30	Structures & Improvements	6,081,404	2.35%	142,913	3.03%	184,198	3.03%	184,198	0.68%	41,285	0.00%	0
312.30	Boiler Plant Equipment	64,579,509	4.80%	3,099,816	5.19%	3,353,068	5.19%	3,353,068	0.39%	253,252	0.00%	0
314.30	Turbogenerator Units	63,876,588	2.71%	1,731,056	3.22%	2,059,997	2.58%	1,648,156	-0.13%	-82,900	-0.64%	-411,841
315.30	Accessory Electrical Equipment	7,299,668	1.84%	134,314	2.58%	188,338	2.58%	188,338	0.74%	54,024	0.00%	0
316.30	Misc. Power Plant Equip.	2,887,414	2.61%	75,362	3.12%	90,009	3.12%	90,009	0.51%	14,647	0.00%	0
	Total	144,724,583	3.58%	5,183,461	4.06%	5,875,610	3.78%	5,463,769	0.20%	280,308	-0.28%	-411,841
	NORTHEASTERN UNITS 1 AND 2											
311.30	Structures & Improvements	11,738,389	3.07%	360,369	3.19%	374,909	3.19%	374,909	0.12%	14,540	0.00%	0
312.30	Boiler Plant Equipment	93,824,880	3.12%	2,927,336	3.13%	2,932,473	3.13%	2,932,473	0.01%	5,137	0.00%	0
314.30	Turbogenerator Units	141,467,433	2.67%	3,777,180	3.66%	5,178,510	2.71%	3,838,856	0.04%	61,676	-0.95%	-1,339,654
315.30	Accessory Electrical Equipment	14,452,618	2.63%	380,104	2.86%	413,583	2.86%	413,583	0.23%	33,479	0.00%	0
316.30	Misc. Power Plant Equip.	7,896,760	2.88%	227,427	2.93%	231,750	2.93%	231,750	0.05%	4,323	0.00%	0
	Total	269,380,080	2.85%	7,672,416	3.39%	9,131,224	2.89%	7,791,570	0.04%	119,154	-0.50%	-1,339,654
	RIVERSIDE UNITS 1 AND 2											
311.30	Structures & Improvements	10,381,155	3.00%	311,435	3.15%	326,848	3.15%	326,848	0.15%	15,413	0.00%	0
312.30	Boiler Plant Equipment	75,896,029	2.19%	1,662,123	2.07%	1,574,256	2.07%	1,574,256	-0.12%	-87,867	0.00%	0
314.30	Turbogenerator Units	70,682,383	2.75%	1,943,766	2.63%	1,860,794	2.63%	1,860,794	-0.12%	-82,972	0.00%	0
315.30	Accessory Electrical Equipment	10,442,279	2.09%	218,244	1.53%	159,626	1.53%	159,626	-0.56%	-58,618	0.00%	0

Detailed Rate Comparison

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		PSO Proposal		OIEC Proposal		OIEC less Current Rates		OIEC less Proposed Rates	
Account No.	Description	Original Cost	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
316.30	Misc. Power Plant Equip.	7,440,448	4.06%	302,082	4.29%	319,277	4.29%	319,277	0.23%	17,195	0.00%	0
	Total	174,842,294	2.54%	4,437,650	2.43%	4,240,801	2.43%	4,240,801	-0.11%	-196,849	0.00%	0
	SOUTHWESTERN UNITS 1-3											
311.30	Structures & Improvements	8,367,833	3.55%	297,058	4.84%	405,126	4.84%	405,126	1.29%	108,068	0.00%	0
312.30	Boiler Plant Equipment	36,987,164	3.51%	1,298,249	4.72%	1,747,418	4.72%	1,747,418	1.21%	449,169	0.00%	0
314.30	Turbogenerator Units	36,665,979	3.51%	1,286,976	4.95%	1,816,686	4.95%	1,816,685	1.44%	529,709	0.00%	0
315.30	Accessory Electrical Equipment	10,523,730	3.54%	372,540	4.87%	512,239	4.87%	512,240	1.33%	139,700	0.00%	0
316.30	Misc. Power Plant Equip.	1,650,837	3.08%	50,846	5.55%	91,579	5.55%	91,579	2.47%	40,733	0.00%	0
	Total	94,195,543	3.51%	3,305,669	4.85%	4,573,048	4.85%	4,573,048	1.34%	1,267,379	0.00%	0
	TULSA UNITS 2 AND 4											
311.30	Structures & Improvements	7,757,373	4.20%	325,810	4.31%	334,043	4.31%	334,043	0.11%	8,233	0.00%	0
312.30	Boiler Plant Equipment	25,214,148	3.07%	774,074	3.42%	861,425	3.42%	861,425	0.35%	87,351	0.00%	0
314.30	Turbogenerator Units	31,927,384	3.55%	1,133,422	3.46%	1,104,087	3.46%	1,104,087	-0.09%	-29,335	0.00%	0
315.30	Accessory Electrical Equipment	10,323,188	4.59%	473,834	4.91%	506,822	4.91%	506,822	0.32%	32,988	0.00%	0
316.30	Misc. Power Plant Equip.	3,006,579	4.28%	128,682	5.59%	167,931	5.59%	167,931	1.31%	39,249	0.00%	0
	Total	78,228,672	3.63%	2,835,822	3.80%	2,974,308	3.80%	2,974,308	0.17%	138,486	0.00%	0
	Total Gas & Combined Cycle	761,371,172	3.08%	23,435,018	3.52%	26,794,991	3.29%	25,043,495	0.21%	1,608,477	-0.23%	-1,751,496
	Total Steam Production Plant	1,269,835,915	3.02%	38,396,396	3.36%	42,667,387	3.22%	40,915,892	0.20%	2,519,496	-0.14%	-1,751,496
	OTHER PRODUCTION PLANT											
	WELEETKA											
341.00	Structures & Improvements	762,809	12.20%	93,063	12.87%	98,190	12.87%	98,190	0.67%	5,127	0.00%	0
342.00	Fuel Holders, Producers & Access.	2,074,691	3.25%	67,427	3.55%	73,601	3.55%	73,601	0.30%	6,174	0.00%	0
344.00	Generators	24,667,572	4.09%	1,008,904	4.40%	1,085,551	4.40%	1,085,551	0.31%	76,647	0.00%	0
345.00	Accessory Electrical Equip.	797,064	11.47%	91,423	15.74%	125,418	15.74%	125,418	4.27%	33,995	0.00%	0
346.00	Misc. Power Plant Equip.	2,660,587	9.35%	248,765	10.94%	291,113	10.94%	291,113	1.59%	42,348	0.00%	0
	Total	30,962,723	4.88%	1,509,582	5.41%	1,673,873	5.41%	1,673,873	0.53%	164,291	0.00%	0
	COMANCHE - Diesel						0.00%	0	0.00%	0	0.00%	0
342.00	Fuel Holders, Producers & Access.	2,994	2.44%	73	2.42%	73	2.42%	73	-0.02%	0	0.00%	0
344.00	Generators	754,469	1.03%	7,771	0.93%	6,981	0.93%	6,981	-0.10%	-790	0.00%	0
346.00	Misc. Power Plant Equip.	17,858	0.00%	0	1.38%	246	1.38%	246	1.38%	246	0.00%	0
	Total	775,321	1.01%	7,844	0.94%	7,300	0.94%	7,300	-0.07%	-544	0.00%	0
	NORTHEASTERN U1 AND 2 - Diesel						0.00%	0	0.00%	0	0.00%	0
342.00	Fuel Holders, Producers & Access.	63,289	1.12%	709	1.58%	1,000	1.58%	1,000	0.46%	291	0.00%	0
344.00	Generators	241,260	1.91%	4,608	0.18%	434	0.18%	434	-1.73%	-4,174	0.00%	0

Detailed Rate Comparison

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		PSO Proposal		OIEC Proposal		OIEC less Current Rates		OIEC less Proposed Rates	
Account No.	Description	Original Cost	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
345.00	Accessory Electrical Equip.	83,558	4.32%	3,610	3.05%	2,550	3.05%	2,550	-1.27%	-1,060	0.00%	0
346.00	Misc. Power Plant Equip.	3,019	1.36%	41	1.05%	32	1.05%	32	-0.31%	-9	0.00%	0
	Total	391,126	2.29%	8,968	1.03%	4,016	1.03%	4,016	-1.26%	-4,952	0.00%	0
	NORTHEASTERN UNIT 3 - Diesel											
344.00	Generators	437,950	2.05%	8,978	2.05%	8,980	2.05%	8,980	0.00%	2	0.00%	0
	Total	437,950	2.05%	8,978	2.05%	8,980	2.05%	8,980	0.00%	2	0.00%	0
	RIVERSIDE - Diesel											
342.00	Fuel Holders, Producers & Access.	24,392	4.97%	1,212	3.32%	811	3.32%	811	-1.65%	-401	0.00%	0
344.00	Generators	470,175	1.02%	4,796	0.77%	3,608	0.77%	3,608	-0.25%	-1,188	0.00%	0
345.00	Accessory Electrical Equip.	28,635	1.67%	478	0.71%	202	0.71%	202	-0.96%	-276	0.00%	0
	Total	523,202	1.24%	6,486	0.88%	4,622	0.88%	4,622	-0.36%	-1,864	0.00%	0
	SOUTHWESTERN - Diesel											
342.00	Fuel Holders, Producers & Access.	67,052	3.67%	2,461	2.71%	1,818	2.71%	1,818	-0.96%	-643	0.00%	0
344.00	Generators	212,484	0.88%	1,870	0.80%	1,693	0.80%	1,693	-0.08%	-177	0.00%	0
	Total	279,536	1.55%	4,331	1.26%	3,511	1.26%	3,511	-0.29%	-820	0.00%	0
	TULSA - Diesel											
342.00	Fuel Holders, Producers & Access.	70,372	1.47%	1,034	1.13%	795	1.13%	795	-0.34%	-239	0.00%	0
344.00	Generators	608,404	1.42%	8,639	1.08%	6,545	1.08%	6,545	-0.34%	-2,094	0.00%	0
	Total	678,776	1.43%	9,673	1.08%	7,340	1.08%	7,340	-0.35%	-2,333	0.00%	0
	WELEETKA - Diesel											
342.00	Fuel Holders, Producers & Access.	10,291	6.49%	668	6.24%	642	6.24%	642	-0.25%	-26	0.00%	0
344.00	Generators	666,380	6.63%	44,181	6.08%	40,543	6.08%	40,543	-0.55%	-3,638	0.00%	0
345.00	Accessory Electrical Equip.	36,296	7.75%	2,813	5.39%	1,956	5.39%	1,956	-2.36%	-857	0.00%	0
346.00	Misc. Power Plant Equip.	911	8.46%	77	8.76%	80	8.76%	80	0.30%	3	0.00%	0
	Total	713,878	6.69%	47,739	6.05%	43,221	6.05%	43,221	-0.64%	-4,518	0.00%	0
	RIVERSIDE - Units 3&4											
342.00	Fuel Holders, Producers & Access.	9,797,993	2.54%	248,869	2.41%	235,649	2.41%	235,649	-0.13%	-13,220	0.00%	0
344.00	Generators	48,141,767	2.74%	1,319,084	2.42%	1,165,725	2.42%	1,165,725	-0.32%	-153,359	0.00%	0
345.00	Accessory Electrical Equip.	4,794,905	5.97%	286,256	3.11%	148,896	3.11%	148,896	-2.86%	-137,360	0.00%	0
346.00	Misc. Power Plant Equip.	182,933	3.54%	6,476	2.77%	5,065	2.77%	5,065	-0.77%	-1,411	0.00%	0
	Total	62,917,598	2.96%	1,860,685	2.47%	1,555,335	2.47%	1,555,335	-0.49%	-305,350	0.00%	0
	SOUTHWESTERN - Units 4&5											
341.00	Structures & Improvements	5,253,787	2.91%	152,885	3.03%	159,241	3.03%	159,241	0.12%	6,356	0.00%	0
344.00	Generators	44,888,652	2.48%	1,113,239	2.19%	982,178	2.19%	982,178	-0.29%	-131,061	0.00%	0

Detailed Rate Comparison

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		PSO Proposal		OIEC Proposal		OIEC less Current Rates		OIEC less Proposed Rates	
Account No.	Description	Original Cost	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
345.00	Accessory Electrical Equip.	9,731,732	5.10%	496,318	2.29%	223,191	2.29%	223,191	-2.81%	-273,127	0.00%	0
346.00	Misc. Power Plant Equip.	36,976	3.18%	1,176	3.73%	1,380	3.73%	1,380	0.55%	204	0.00%	0
	Total	59,911,147	2.94%	1,763,618	2.28%	1,365,989	2.28%	1,365,989	-0.66%	-397,629	0.00%	0
	Total Other Production Plant	157,591,257	3.32%	5,227,904	2.97%	4,674,187	2.97%	4,674,187	-0.35%	-553,717	0.00%	0
	TOTAL PRODUCTION PLANT	1,427,427,172	3.06%	43,624,300	3.32%	47,341,574	3.19%	45,590,079	0.13%	1,965,779	-0.12%	-1,751,496
	TRANSMISSION PLANT											
350.10	Land Rights	38,569,491	1.07%	412,694	1.15%	443,284	1.15%	443,284	0.08%	30,590	0.00%	0
352.00	Structures & Improvements	7,396,444	2.05%	151,627	1.77%	130,848	1.77%	130,848	-0.28%	-20,779	0.00%	0
353.00	Station Equipment	393,520,245	1.72%	6,768,548	1.92%	7,542,155	1.84%	7,243,619	0.12%	475,071	-0.08%	-298,537
354.00	Towers & Fixtures	17,758,994	1.73%	307,231	2.50%	443,184	2.50%	443,184	0.77%	135,953	0.00%	0
355.00	Poles & Fixtures	231,365,386	3.92%	9,069,523	4.05%	9,368,455	4.05%	9,368,455	0.13%	298,932	0.00%	0
356.00	OH Conductor & Devices	166,989,587	2.18%	3,640,373	2.55%	4,263,843	2.10%	3,510,675	-0.08%	-129,698	-0.45%	-753,168
358.00	Underground Conductor	71,915	2.09%	1,503	2.10%	1,509	2.10%	1,509	0.01%	6	0.00%	0
	Total Transmission Plant	855,672,062	2.38%	20,351,499	2.59%	22,193,280	2.47%	21,141,575	0.09%	790,076	-0.12%	-1,051,705
	DISTRIBUTION PLANT											
360.10	Land Rights	2,826,079	1.07%	30,239	1.09%	30,898	1.09%	30,898	0.02%	659	0.00%	0
361.00	Structures & Improvements	9,380,585	2.38%	223,258	2.23%	209,256	1.72%	161,359	-0.66%	-61,899	-0.51%	-47,897
362.00	Station Equipment	357,505,235	1.20%	4,290,063	1.80%	6,434,090	1.31%	4,676,504	0.11%	386,441	-0.49%	-1,757,585
364.00	Poles, Towers, & Fixtures	416,302,441	4.14%	17,234,921	4.35%	18,105,233	3.66%	15,237,528	-0.48%	-1,997,393	-0.69%	-2,867,705
365.00	Overhead Conductor & Devices	398,478,926	3.44%	13,707,675	3.40%	13,559,677	3.40%	13,559,677	-0.04%	-147,998	0.00%	0
366.00	Underground Conduit	81,209,894	2.06%	1,672,924	2.05%	1,666,501	2.00%	1,620,228	-0.06%	-52,696	-0.06%	-46,272
367.00	Underground Conductor	344,269,950	1.95%	6,713,264	1.83%	6,291,057	1.57%	5,389,754	-0.38%	-1,323,510	-0.26%	-901,303
368.00	Line Transformers	345,511,124	3.15%	10,883,600	3.23%	11,144,432	3.23%	11,144,432	0.08%	260,832	0.00%	0
369.00	Services	265,357,581	2.85%	7,562,691	2.84%	7,541,914	2.84%	7,541,914	-0.01%	-20,777	0.00%	0
370.00	Meters	12,114,794	9.58%	1,160,597	9.64%	1,168,172	6.86%	830,712	-2.72%	-329,885	-2.79%	-337,459
370.16	AMI - Meters	97,061,730	6.76%	6,561,373	9.07%	8,806,780	9.07%	8,806,780	2.31%	2,245,407	0.00%	0
371.00	Installations on Custs. Prem.	47,228,264	4.06%	1,917,468	4.22%	1,991,001	4.22%	1,991,001	0.16%	73,533	0.00%	0
373.00	Street Lighting & Signal Sys.	59,947,380	2.69%	1,612,585	2.52%	1,509,541	2.52%	1,509,541	-0.17%	-103,044	0.00%	0
	Total Distribution Plant	2,437,193,983	3.02%	73,570,658	3.22%	78,458,550	2.97%	72,500,328	-0.04%	-1,070,330	-0.24%	-5,958,222
	GENERAL PLANT											
390.00	Structures & Improvements	61,294,380	1.76%	1,078,781	2.02%	1,240,547	2.02%	1,240,547	0.26%	161,766	0.00%	0
391.00	Office Furniture & Equipment	1,473,562	2.44%	35,955	5.23%	77,035	5.23%	77,035	2.79%	41,080	0.00%	0
391.10	Office Equipment - Computers	151,397	20.00%	30,279	21.17%	32,048	21.17%	32,048	1.17%	1,769	0.00%	0
392.00	Transportation Equipment	1,951,778	6.67%	130,184	6.76%	131,845	6.76%	131,845	0.09%	1,661	0.00%	0

Detailed Rate Comparison

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		PSO Proposal		OIEC Proposal		OIEC less Current Rates		OIEC less Proposed Rates	
Account No.	Description	Original Cost	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
393.00	Stores Equipment	2,329,332	3.33%	77,567	3.65%	85,043	3.65%	85,043	0.32%	7,476	0.00%	0
394.00	Tools Shop & Garage Equipment	25,994,587	4.00%	1,039,783	4.11%	1,067,806	4.11%	1,067,806	0.11%	28,023	0.00%	0
395.00	Laboratory Equipment	1,429,618	1.94%	27,735	5.48%	78,290	5.48%	78,290	3.54%	50,555	0.00%	0
396.00	Power Operated Equipment	639,346	4.24%	27,108	6.06%	38,751	6.06%	38,751	1.82%	11,643	0.00%	0
397.00	Communication Equipment	44,429,269	4.54%	2,017,089	7.36%	3,268,534	7.36%	3,268,534	2.82%	1,251,445	0.00%	0
397.16	AMI - Communication Equipment	13,499,233	6.67%	900,399	6.74%	910,179	6.74%	910,179	0.07%	9,780	0.00%	0
398.00	Miscellaneous Equipment	5,828,220	5.00%	291,411	5.30%	309,121	5.30%	309,121	0.30%	17,710	0.00%	0
399.30	Alliance Rail	529,811	2.50%	13,245	3.21%	17,009	3.21%	17,009	0.71%	3,764	0.00%	0
	Total General Plant	159,550,533	3.55%	5,669,536	4.55%	7,256,206	4.55%	7,256,206	0.99%	1,586,670	0.00%	0
	TOTAL DEPRECIABLE PLANT	4,879,843,750	2.93%	143,215,993	3.18%	155,249,610	3.00%	146,488,188	0.07%	3,272,195	-0.18%	-8,761,422

[1] PSO Depreciation Study pp. VI-4 - VI-8
[2] Sch. I-1
[3] PSO Depreciation Study pp. VI-4 - VI-8
[4] DG-D-4
[5] = [4] - [2]
[6] = [4] - [3]

Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Iowa Curve Type	Iowa Curve AL	[3] Net Salvage	[4] Depreciable Base	[5] Book Reserve	[6] Future Accruals	[7] Remaining Life	[8] Service Life Accrual	[9] Service Life Rate	[10] Net Salvage Accrual	[11] Net Salvage Rate	[12] Total Accrual	[13] Total Rate
	STEAM PRODUCTION PLANT														
	Coal Plants														
	NORTHEASTERN UNIT 3														
311.00	Structures & Improvements	19,616,179			-4%	20,400,826	9,305,154	11,095,672	20.45	504,207	2.57%	38,369	0.20%	542,576	2.77%
312.00	Boiler Plant Equipment	376,144,087			-4%	391,189,850	121,662,930	269,526,920	21.11	12,055,005	3.20%	712,732	0.19%	12,767,737	3.39%
314.00	Turbogenerator Units	46,069,012			-4%	47,911,772	27,331,240	20,580,532	21.13	886,785	1.92%	87,211	0.19%	973,996	2.11%
315.00	Accessory Electrical Equipment	20,310,077			-4%	21,122,480	14,628,062	6,494,418	21.86	259,927	1.28%	37,164	0.18%	297,091	1.46%
316.00	Misc. Power Plant Equip.	17,770,427			-4%	18,481,244	9,136,168	9,345,076	20.45	422,213	2.38%	34,759	0.20%	456,972	2.57%
	Total	479,909,782			-4%	499,106,173	182,063,554	317,042,619	21.08	14,128,138	2.94%	910,234	0.19%	15,038,371	3.13%
	RAIL SPUR														
310.10	Rail Spur - Land Rights	939,196			0%	939,196	129,519	809,677	8.50	95,256	10.14%	0	0.00%	95,256	10.14%
312.00	Rail Spur	22,359,915			-4%	23,254,312	17,054,496	6,199,816	8.50	624,167	2.79%	105,223	0.47%	729,390	3.26%
312.11	Rail Cars	5,255,850			0%	5,255,850	5,177,630	78,220	8.34	9,379	0.18%	0	0.00%	9,379	0.18%
	Total	28,554,961			-3%	29,449,358	22,361,645	7,087,713	8.50	728,802	2.55%	105,223	0.37%	834,025	2.92%
	Total Coal Plants	508,464,743			-4%	528,555,531	204,425,199	324,130,332	20.42	14,856,940	2.92%	1,015,457	0.20%	15,872,397	3.12%
	Gas & Combined Cycle Plants														
	COMANCHE														
311.30	Structures & Improvements	6,081,404			-5%	6,385,474	3,213,580	3,171,894	17.22	166,540	2.74%	17,658	0.29%	184,198	3.03%
312.30	Boiler Plant Equipment	64,579,509			-5%	67,808,484	13,555,845	54,252,639	16.18	3,153,502	4.88%	199,566	0.31%	3,353,068	5.19%
314.30	Turbogenerator Units	63,876,588			5%	60,682,759	35,119,860	25,562,899	15.51	1,854,077	2.90%	-205,921	-0.32%	1,648,156	2.58%
315.30	Accessory Electrical Equipment	7,299,668			-5%	7,664,651	4,434,658	3,229,993	17.15	167,056	2.29%	21,282	0.29%	188,338	2.58%
316.30	Misc. Power Plant Equip.	2,887,414			-5%	3,031,785	1,610,548	1,421,237	15.79	80,865	2.80%	9,143	0.32%	90,009	3.12%
	Total	144,724,583			-1%	145,573,153	57,934,491	87,638,662	16.04	5,422,040	3.75%	41,728	0.03%	5,463,769	3.78%
	NORTHEASTERN UNITS 1 AND 2														
311.30	Structures & Improvements	11,738,389			-10%	12,912,228	6,081,394	6,830,834	18.22	310,483	2.65%	64,426	0.55%	374,909	3.19%
312.30	Boiler Plant Equipment	93,824,880			-10%	103,207,368	50,745,423	52,461,945	17.89	2,408,019	2.57%	524,454	0.56%	2,932,473	3.13%
314.30	Turbogenerator Units	141,467,433			5%	134,394,061	73,586,583	60,807,478	15.84	4,285,407	3.03%	-446,551	-0.32%	3,838,856	2.71%
315.30	Accessory Electrical Equipment	14,452,618			-10%	15,897,880	8,676,724	7,221,156	17.46	330,807	2.29%	82,776	0.57%	413,583	2.86%
316.30	Misc. Power Plant Equip.	7,896,760			-10%	8,686,436	4,735,102	3,951,334	17.05	185,434	2.35%	46,315	0.59%	231,750	2.93%
	Total	269,380,080			-2%	275,097,973	143,825,226	131,272,747	16.85	7,520,150	2.79%	271,420	0.10%	7,791,570	2.89%
	RIVERSIDE UNITS 1 AND 2														
311.30	Structures & Improvements	10,381,155			-13%	11,730,705	4,389,691	7,341,014	22.46	266,762	2.57%	60,087	0.58%	326,848	3.15%
312.30	Boiler Plant Equipment	75,896,029			-13%	85,762,513	50,137,099	35,625,414	22.63	1,138,265	1.50%	435,991	0.57%	1,574,256	2.07%
314.30	Turbogenerator Units	70,682,383			-13%	79,871,093	38,747,545	41,123,548	22.10	1,445,015	2.04%	415,779	0.59%	1,860,794	2.63%
315.30	Accessory Electrical Equipment	10,442,279			-13%	11,799,775	8,195,429	3,604,346	22.58	99,506	0.95%	60,119	0.58%	159,626	1.53%
316.30	Misc. Power Plant Equip.	7,440,448			-13%	8,407,706	1,852,959	6,554,747	20.53	272,162	3.66%	47,114	0.63%	319,277	4.29%
	Total	174,842,294			-13%	197,571,792	103,322,723	94,249,069	22.22	3,221,710	1.84%	1,019,091	0.58%	4,240,801	2.43%
	SOUTHWESTERN UNITS 1-3														
311.30	Structures & Improvements	8,367,833			-9%	9,120,938	3,497,784	5,623,154	13.88	350,868	4.19%	54,258	0.65%	405,126	4.84%
312.30	Boiler Plant Equipment	36,987,164			-9%	40,316,009	15,869,636	24,446,373	13.99	1,509,473	4.08%	237,945	0.64%	1,747,418	4.72%
314.30	Turbogenerator Units	36,665,979			-9%	39,965,917	14,514,158	25,451,759	14.01	1,581,144	4.31%	235,542	0.64%	1,816,685	4.95%
315.30	Accessory Electrical Equipment	10,523,730			-9%	11,470,866	4,181,696	7,289,170	14.23	445,681	4.24%	66,559	0.63%	512,240	4.87%
316.30	Misc. Power Plant Equip.	1,650,837			-9%	1,799,412	791,129	1,008,283	11.01	78,084	4.73%	13,495	0.82%	91,579	5.55%
	Total	94,195,543			-9%	102,673,142	38,854,403	63,818,739	13.96	3,965,249	4.21%	607,798	0.65%	4,573,048	4.85%

Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Iowa Curve Type	[2] Iowa Curve AL	[3] Net Salvage	[4] Depreciable Base	[5] Book Reserve	[6] Future Accruals	[7] Remaining Life	[8] Service Life Accrual	[9] Service Life Rate	[10] Net Salvage Accrual	[11] Net Salvage Rate	[12] Total Accrual	[13] Total Rate
	TULSA UNITS 2 AND 4														
311.30	Structures & Improvements	7,757,373			-10%	8,533,110	3,205,121	5,327,989	15.95	285,408	3.68%	48,636	0.63%	334,043	4.31%
312.30	Boiler Plant Equipment	25,214,148			-10%	27,735,563	14,667,748	13,067,815	15.17	695,214	2.76%	166,211	0.66%	861,425	3.42%
314.30	Turbogenerator Units	31,927,384			-10%	35,120,122	17,432,653	17,687,469	16.02	904,790	2.83%	199,297	0.62%	1,104,087	3.46%
315.30	Accessory Electrical Equipment	10,323,188			-10%	11,355,507	3,266,629	8,088,878	15.96	442,140	4.28%	64,682	0.63%	506,822	4.91%
316.30	Misc. Power Plant Equip.	3,006,579			-10%	3,307,237	1,355,876	1,951,361	11.62	142,057	4.72%	25,874	0.86%	167,931	5.59%
	Total	78,228,672			-10%	86,051,539	39,928,027	46,123,512	15.51	2,469,609	3.16%	504,699	0.65%	2,974,308	3.80%
	Total Gas & Combined Cycle	761,371,172			-6%	806,967,600	383,864,870	423,102,730	16.89	22,598,759	2.97%	2,444,736	0.32%	25,043,495	3.29%
	Total Steam Production Plant	1,269,835,915			-5%	1,335,523,131	588,290,069	747,233,062	18.26	37,455,699	2.95%	3,460,193	0.27%	40,915,892	3.22%
	OTHER PRODUCTION PLANT														
	WELEETKA														
341.00	Structures & Improvements	762,809			-5%	800,949	366,948	434,001	4.42	89,561	11.74%	8,629	1.13%	98,190	12.87%
342.00	Fuel Holders, Producers & Access.	2,074,691			-5%	2,178,426	1,847,959	330,467	4.49	50,497	2.43%	23,103	1.11%	73,601	3.55%
344.00	Generators	24,667,572			-5%	25,900,951	21,081,104	4,819,847	4.44	807,763	3.27%	277,788	1.13%	1,085,551	4.40%
345.00	Accessory Electrical Equip.	797,064			-5%	836,917	320,193	516,724	4.12	115,745	14.52%	9,673	1.21%	125,418	15.74%
346.00	Misc. Power Plant Equip.	2,660,587			-5%	2,793,616	1,495,254	1,298,362	4.46	261,285	9.82%	29,827	1.12%	291,113	10.94%
	Total	30,962,723			-5%	32,510,859	25,111,458	7,399,401	4.42	1,324,852	4.28%	349,021	1.13%	1,673,873	5.41%
	COMANCHE - Diesel														
342.00	Fuel Holders, Producers & Access.	2,994			-4%	3,114	1,844	1,270	17.50	66	2.19%	7	0.23%	73	2.42%
344.00	Generators	754,469			-4%	784,648	662,476	122,172	17.50	5,257	0.70%	1,725	0.23%	6,981	0.93%
346.00	Misc. Power Plant Equip.	17,858			-4%	18,572	14,647	3,925	15.93	202	1.13%	45	0.25%	246	1.38%
	Total	775,321			-4%	806,334	678,967	127,367	17.45	5,524	0.71%	1,776	0.23%	7,300	0.94%
	NORTHEASTERN U1 AND 2 - Diesel														
342.00	Fuel Holders, Producers & Access.	63,289			-5%	66,453	47,959	18,494	18.50	829	1.31%	171	0.27%	1,000	1.58%
344.00	Generators	241,260			-5%	253,323	245,289	8,034	18.50	-218	-0.09%	652	0.27%	434	0.18%
345.00	Accessory Electrical Equip.	83,558			-5%	87,736	43,919	43,817	17.18	2,307	2.76%	243	0.29%	2,550	3.05%
346.00	Misc. Power Plant Equip.	3,019			-5%	3,170	2,584	586	18.50	24	0.78%	8	0.27%	32	1.05%
	Total	391,126			-5%	410,682	339,751	70,931	17.66	2,942	0.75%	1,074	0.27%	4,016	1.03%
	NORTHEASTERN UNIT 3 - Diesel														
344.00	Generators	437,950			-1%	442,330	366,000	76,330	8.50	8,465	1.93%	515	0.12%	8,980	2.05%
	Total	437,950			-1%	442,330	366,000	76,330	8.50	8,465	1.93%	515	0.12%	8,980	2.05%
	RIVERSIDE - Diesel														
342.00	Fuel Holders, Producers & Access.	24,392			-4%	25,368	6,312	19,056	23.50	769	3.15%	42	0.17%	811	3.32%
344.00	Generators	470,175			-4%	488,982	404,185	84,797	23.50	2,808	0.60%	800	0.17%	3,608	0.77%
345.00	Accessory Electrical Equip.	28,635			-4%	29,780	25,916	3,864	19.09	142	0.50%	60	0.21%	202	0.71%
	Total	523,202			-4%	544,130	436,413	107,717	23.31	3,720	0.71%	902	0.17%	4,622	0.88%
	SOUTHWESTERN - Diesel														
342.00	Fuel Holders, Producers & Access.	67,052			-4%	69,734	34,289	35,445	19.50	1,680	2.51%	138	0.21%	1,818	2.71%
344.00	Generators	212,484			-4%	220,983	188,460	32,523	19.21	1,251	0.59%	442	0.21%	1,693	0.80%
	Total	279,536			-4%	290,717	222,749	67,968	19.36	2,931	1.05%	580	0.21%	3,511	1.26%
	TULSA - Diesel														

Depreciation Rate Development

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
			Iowa Curve						Service Life		Net Salvage		Total	
Account No.	Description	Original Cost	Type AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Remaining Life	Accrual	Rate	Accrual	Rate	Accrual	Rate
342.00	Fuel Holders, Producers & Access.	70,372		-5%	73,891	60,768	13,123	16.50	582	0.83%	213	0.30%	795	1.13%
344.00	Generators	608,404		-5%	638,824	530,834	107,990	16.50	4,701	0.77%	1,844	0.30%	6,545	1.08%
	Total	678,776		-5%	712,715	591,602	121,113	16.50	5,283	0.78%	2,057	0.30%	7,340	1.08%
	WELEETKA - Diesel													
342.00	Fuel Holders, Producers & Access.	10,291		-2%	10,497	7,609	2,888	4.50	596	5.79%	46	0.44%	642	6.24%
344.00	Generators	666,380		-2%	679,708	497,668	182,040	4.49	37,575	5.64%	2,968	0.45%	40,543	6.08%
345.00	Accessory Electrical Equip.	36,296		-2%	37,022	28,396	8,626	4.41	1,791	4.94%	165	0.45%	1,956	5.39%
346.00	Misc. Power Plant Equip.	911		-2%	929	570	359	4.50	76	8.32%	4	0.44%	80	8.76%
	Total	713,878		-2%	728,156	534,243	193,913	4.49	40,038	5.61%	3,183	0.45%	43,221	6.05%
	RIVERSIDE - Units 3&4													
342.00	Fuel Holders, Producers & Access.	9,797,993		-13%	11,071,732	1,999,251	9,072,481	38.50	202,565	2.07%	33,084	0.34%	235,649	2.41%
344.00	Generators	48,141,767		-13%	54,400,197	9,531,438	44,868,759	38.49	1,003,126	2.08%	162,599	0.34%	1,165,725	2.42%
345.00	Accessory Electrical Equip.	4,794,905		-13%	5,418,243	-122,189	5,540,432	37.21	132,144	2.76%	16,752	0.35%	148,896	3.11%
346.00	Misc. Power Plant Equip.	182,933		-13%	206,714	11,724	194,990	38.50	4,447	2.43%	618	0.34%	5,065	2.77%
	Total	62,917,598		-13%	71,096,886	11,420,224	59,676,662	38.37	1,342,282	2.13%	213,053	0.34%	1,555,335	2.47%
	SOUTHWESTERN - Units 4&5													
341.00	Structures & Improvements	5,253,787		-4%	5,463,938	280,656	5,183,282	32.55	152,784	2.91%	6,456	0.12%	159,241	3.03%
344.00	Generators	44,888,652		-4%	46,684,198	8,939,114	37,745,084	38.43	935,455	2.08%	46,723	0.10%	982,178	2.19%
345.00	Accessory Electrical Equip.	9,731,732		-4%	10,121,001	1,816,064	8,304,937	37.21	212,730	2.19%	10,461	0.11%	223,191	2.29%
346.00	Misc. Power Plant Equip.	36,976		-4%	38,455	-14,672	53,127	38.50	1,342	3.63%	38	0.10%	1,380	3.73%
	Total	59,911,147		-4%	62,307,593	11,021,162	51,286,431	37.55	1,302,311	2.17%	63,679	0.11%	1,365,989	2.28%
	Total Other Production Plant	157,591,257		-8%	169,850,401	50,722,569	119,127,832	25.49	4,038,348	2.56%	635,839	0.40%	4,674,187	2.97%
	TOTAL PRODUCTION PLANT	1,427,427,172		-5%	1,505,373,532	639,012,638	866,360,894	19.00	41,494,046	2.91%	4,096,032	0.29%	45,590,079	3.19%
	TRANSMISSION PLANT													
350.10	Land Rights	38,569,491	R4 - 75	0%	38,569,491	16,777,632	21,791,859	49.16	443,284	1.15%	0	0.00%	443,284	1.15%
352.00	Structures & Improvements	7,396,444	R3 - 60	0%	7,396,444	933,842	6,462,602	49.39	130,848	1.77%	0	0.00%	130,848	1.77%
353.00	Station Equipment	393,520,245	L0.5 - 55	-5%	413,196,257	80,134,665	333,061,592	45.98	6,815,693	1.73%	427,925	0.11%	7,243,619	1.84%
354.00	Towers & Fixtures	17,758,994	R3 - 75	-55%	27,526,441	8,234,644	19,291,797	43.53	218,800	1.23%	224,384	1.26%	443,184	2.50%
355.00	Poles & Fixtures	231,365,386	R1 - 44	-60%	370,184,618	46,036,082	324,148,536	34.60	5,356,338	2.32%	4,012,117	1.73%	9,368,455	4.05%
356.00	OH Conductor & Devices	166,989,587	L1.5 - 77	-60%	267,183,339	60,685,411	206,497,928	58.82	1,807,279	1.08%	1,703,396	1.02%	3,510,675	2.10%
358.00	Underground Conductor	71,915	R4 - 45	0%	71,915	47,976	23,939	15.86	1,509	2.10%	0	0.00%	1,509	2.10%
	Total Transmission Plant	855,672,062		-31%	1,124,128,505	212,850,252	911,278,253	43.10	14,773,753	1.73%	6,367,822	0.74%	21,141,575	2.47%
	DISTRIBUTION PLANT													
360.10	Land Rights	2,826,079	R4 - 70	0%	2,826,079	1,076,964	1,749,115	56.61	30,898	1.09%	0	0.00%	30,898	1.09%
361.00	Structures & Improvements	9,380,585	R0.5 - 45	15%	7,973,497	1,653,059	6,320,438	39.17	197,282	2.10%	-35,923	-0.38%	161,359	1.72%
362.00	Station Equipment	357,505,235	R0.5 - 73	-5%	375,380,497	76,130,991	299,249,506	63.99	4,397,160	1.23%	279,345	0.08%	4,676,504	1.31%
364.00	Poles, Towers, & Fixtures	416,302,441	L0.5 - 57	-100%	832,604,882	105,317,672	727,287,210	47.73	6,515,499	1.57%	8,722,029	2.10%	15,237,528	3.66%
365.00	Overhead Conductor & Devices	398,478,926	R0.5 - 46	-50%	597,718,389	80,281,130	517,437,259	38.16	8,338,517	2.09%	5,221,160	1.31%	13,559,677	3.40%
366.00	Underground Conduit	81,209,894	R2 - 80	-60%	129,935,830	13,814,077	116,121,753	71.67	940,363	1.16%	679,865	0.84%	1,620,228	2.00%
367.00	Underground Conductor	344,269,950	R1 - 79	-27%	437,222,837	61,772,548	375,450,289	69.66	4,055,375	1.18%	1,334,380	0.39%	5,389,754	1.57%
368.00	Line Transformers	345,511,124	R1 - 36	-15%	397,337,793	105,353,676	291,984,117	26.20	9,166,315	2.65%	1,978,117	0.57%	11,144,432	3.23%
369.00	Services	265,357,581	R1.5 - 60	-70%	451,107,888	85,023,406	366,084,482	48.54	3,715,166	1.40%	3,826,747	1.44%	7,541,914	2.84%
370.00	Meters	12,114,794	L0 - 15	0%	12,114,794	3,168,023	8,946,771	10.77	830,712	6.86%	0	0.00%	830,712	6.86%
370.16	AMI - Meters	97,061,730	R2.5 - 15	-30%	126,180,249	15,302,883	110,877,366	12.59	6,493,951	6.69%	2,312,829	2.38%	8,806,780	9.07%

Depreciation Rate Development

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
			Iowa Curve							Service Life		Net Salvage		Total	
Account No.	Description	Original Cost	Type	AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Remaining Life	Accrual	Rate	Accrual	Rate	Accrual	Rate
371.00	Installations on Custs. Prem.	47,228,264	L0	30	-30%	61,396,743	15,265,248	46,131,495	23.17	1,379,500	2.92%	611,501	1.29%	1,991,001	4.22%
373.00	Street Lighting & Signal Sys.	59,947,380	R0.5	45	-35%	80,928,963	28,638,476	52,290,487	34.64	903,837	1.51%	605,704	1.01%	1,509,541	2.52%
	Total Distribution Plant	2,437,193,983			-44%	3,512,728,440	592,798,153	2,919,930,287	40.27	46,964,574	1.93%	25,535,754	1.05%	72,500,328	2.97%
	GENERAL PLANT														
390.00	Structures & Improvements	61,294,380	L0	55	-10%	67,423,818	9,539,883	57,883,935	46.66	1,109,183	1.81%	131,364	0.21%	1,240,547	2.02%
391.00	Office Furniture & Equipment	1,473,562	SQ	20	0%	1,473,562	559,921	913,641	11.86	77,035	5.23%	0	0.00%	77,035	5.23%
391.10	Office Equipment - Computers	151,397	SQ	5	0%	151,397	67,111	84,286	2.63	32,048	21.17%	0	0.00%	32,048	21.17%
392.00	Transportation Equipment	1,951,778	SQ	15	0%	1,951,778	306,354	1,645,424	12.48	131,845	6.76%	0	0.00%	131,845	6.76%
393.00	Stores Equipment	2,329,332	SQ	30	0%	2,329,332	1,281,607	1,047,725	12.32	85,043	3.65%	0	0.00%	85,043	3.65%
394.00	Tools Shop & Garage Equipment	25,994,587	SQ	25	0%	25,994,587	6,998,327	18,996,260	17.79	1,067,806	4.11%	0	0.00%	1,067,806	4.11%
395.00	Laboratory Equipment	1,429,618	SQ	20	0%	1,429,618	785,295	644,323	8.23	78,290	5.48%	0	0.00%	78,290	5.48%
396.00	Power Operated Equipment	639,346	SQ	18	0%	639,346	344,839	294,507	7.60	38,751	6.06%	0	0.00%	38,751	6.06%
397.00	Communication Equipment	44,429,269	SQ	15	0%	44,429,269	25,308,347	19,120,922	5.85	3,268,534	7.36%	0	0.00%	3,268,534	7.36%
397.16	AMI - Communication Equipment	13,499,233	SQ	15	0%	13,499,233	1,839,845	11,659,388	12.81	910,179	6.74%	0	0.00%	910,179	6.74%
398.00	Miscellaneous Equipment	5,828,220	SQ	20	0%	5,828,220	2,597,902	3,230,318	10.45	309,121	5.30%	0	0.00%	309,121	5.30%
399.30	Alliance Rail	529,811	SQ	44	0%	529,811	385,238	144,573	8.50	17,009	3.21%	0	0.00%	17,009	3.21%
	Total General Plant	159,550,533			-4%	165,679,971	50,014,669	115,665,302	15.94	7,124,842	4.47%	131,364	0.08%	7,256,206	4.55%
	TOTAL DEPRECIABLE PLANT	4,879,843,750			-29%	6,307,910,448	1,494,675,712	4,813,234,736	32.86	110,357,216	2.26%	36,130,972	0.74%	146,488,188	3.00%

[1] Company depreciation study
[2] Average life and Iowa curve shape developed through actuarial analysis and professional judgment
[3] Weighted net salvage for life span accounts approved in prior PSO case; net salvage for mass accounts 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] = ([1] - [5]) / [7]
[9] = [8] / [1]
[10] = [12] - [8]
[11] = [13] - [9]
[12] = [6] / [7]
[13] = [12] / [1].

Account 353 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R1.5-55	[5] OIEC L0.5-55	[6] PSO SSD	[7] OIEC SSD
0.0	462,639,570	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	442,172,472	99.76%	99.84%	99.92%	0.0000	0.0000
1.5	421,350,958	99.33%	99.51%	99.67%	0.0000	0.0000
2.5	410,785,868	99.18%	99.17%	99.35%	0.0000	0.0000
3.5	330,008,057	98.93%	98.82%	98.98%	0.0000	0.0000
4.5	321,383,654	98.76%	98.45%	98.55%	0.0000	0.0000
5.5	311,167,812	98.65%	98.07%	98.08%	0.0000	0.0000
6.5	297,781,304	98.15%	97.68%	97.56%	0.0000	0.0000
7.5	282,775,458	98.03%	97.28%	97.00%	0.0001	0.0001
8.5	271,093,969	97.73%	96.86%	96.40%	0.0001	0.0002
9.5	243,580,000	97.03%	96.43%	95.76%	0.0000	0.0002
10.5	209,346,100	96.77%	95.99%	95.08%	0.0001	0.0003
11.5	196,578,834	96.55%	95.53%	94.36%	0.0001	0.0005
12.5	185,052,275	96.35%	95.06%	93.60%	0.0002	0.0008
13.5	179,287,904	96.07%	94.57%	92.80%	0.0002	0.0011
14.5	170,142,415	95.01%	94.06%	91.96%	0.0001	0.0009
15.5	163,136,726	94.75%	93.55%	91.09%	0.0001	0.0013
16.5	158,176,123	94.48%	93.01%	90.19%	0.0002	0.0018
17.5	156,638,504	94.01%	92.46%	89.24%	0.0002	0.0023
18.5	149,846,471	93.31%	91.89%	88.27%	0.0002	0.0025
19.5	145,752,956	92.73%	91.30%	87.26%	0.0002	0.0030
20.5	142,806,318	92.54%	90.70%	86.22%	0.0003	0.0040
21.5	136,769,365	91.90%	90.08%	85.15%	0.0003	0.0046
22.5	135,954,139	91.35%	89.43%	84.05%	0.0004	0.0053
23.5	130,581,598	91.00%	88.77%	82.93%	0.0005	0.0065
24.5	123,753,472	89.09%	88.08%	81.78%	0.0001	0.0053
25.5	119,917,844	88.66%	87.38%	80.61%	0.0002	0.0065
26.5	114,416,434	88.22%	86.65%	79.43%	0.0002	0.0077
27.5	108,889,962	87.47%	85.90%	78.23%	0.0002	0.0085
28.5	100,717,625	84.79%	85.12%	77.01%	0.0000	0.0061
29.5	99,810,742	84.43%	84.31%	75.79%	0.0000	0.0075
30.5	74,890,391	63.82%	83.48%	74.56%	0.0387	0.0115
31.5	71,710,437	62.63%	82.63%	73.32%	0.0400	0.0114
32.5	68,050,594	61.61%	81.74%	72.08%	0.0406	0.0110
33.5	61,879,502	61.43%	80.83%	70.84%	0.0376	0.0089
34.5	58,089,977	60.31%	79.89%	69.59%	0.0383	0.0086
35.5	55,448,732	58.18%	78.92%	68.36%	0.0430	0.0104
36.5	54,554,347	57.63%	77.91%	67.12%	0.0412	0.0090
37.5	50,283,247	57.35%	76.88%	65.89%	0.0382	0.0073
38.5	45,134,026	56.82%	75.81%	64.66%	0.0361	0.0061
39.5	41,557,118	56.60%	74.71%	63.43%	0.0328	0.0047
40.5	39,673,762	55.96%	73.58%	62.21%	0.0310	0.0039
41.5	37,080,613	55.46%	72.42%	60.99%	0.0287	0.0031
42.5	34,844,086	54.23%	71.22%	59.78%	0.0288	0.0031
43.5	33,503,107	53.51%	69.98%	58.57%	0.0271	0.0026
44.5	30,957,708	52.92%	68.72%	57.37%	0.0250	0.0020
45.5	29,126,453	52.60%	67.41%	56.17%	0.0220	0.0013
46.5	26,618,245	52.17%	66.08%	54.99%	0.0193	0.0008
47.5	24,206,753	51.77%	64.71%	53.81%	0.0167	0.0004
48.5	23,351,510	51.02%	63.31%	52.63%	0.0151	0.0003
49.5	21,943,553	50.75%	61.88%	51.47%	0.0124	0.0001
50.5	19,676,341	49.21%	60.41%	50.32%	0.0126	0.0001
51.5	16,842,636	47.49%	58.92%	49.17%	0.0131	0.0003
52.5	15,582,026	47.31%	57.39%	48.03%	0.0102	0.0001

Account 353 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R1.5-55	[5] OIEC L0.5-55	[6] PSO SSD	[7] OIEC SSD
53.5	13,843,877	46.83%	55.84%	46.91%	0.0081	0.0000
54.5	13,176,656	45.99%	54.26%	45.79%	0.0068	0.0000
55.5	11,871,008	42.62%	52.65%	44.68%	0.0101	0.0004
56.5	10,341,016	41.81%	51.03%	43.59%	0.0085	0.0003
57.5	9,430,600	39.87%	49.38%	42.50%	0.0090	0.0007
58.5	8,590,957	39.55%	47.72%	41.43%	0.0067	0.0004
59.5	6,829,333	39.08%	46.04%	40.37%	0.0049	0.0002
60.5	6,017,721	38.80%	44.35%	39.32%	0.0031	0.0000
61.5	4,954,288	38.73%	42.65%	38.28%	0.0015	0.0000
62.5	4,479,491	37.36%	40.95%	37.26%	0.0013	0.0000
63.5	3,398,634	36.61%	39.25%	36.25%	0.0007	0.0000
64.5	2,886,461	36.42%	37.55%	35.26%	0.0001	0.0001
65.5	2,062,385	36.03%	35.85%	34.27%	0.0000	0.0003
66.5	1,977,150	35.90%	34.16%	33.30%	0.0003	0.0007
67.5	962,787	35.60%	32.49%	32.35%	0.0010	0.0011
68.5	822,973	32.97%	30.84%	31.41%	0.0005	0.0002
69.5	665,520	32.24%	29.21%	30.48%	0.0009	0.0003
70.5	616,136	30.85%	27.60%	29.57%	0.0011	0.0002
71.5	598,510	30.30%	26.03%	28.68%	0.0018	0.0003
72.5	572,685	29.77%	24.48%	27.80%	0.0028	0.0004
73.5	549,497	29.06%	22.98%	26.93%	0.0037	0.0005
74.5	522,329	28.57%	21.51%	26.08%	0.0050	0.0006
75.5	244,756	28.57%	20.08%	25.25%	0.0072	0.0011
76.5	217,286	27.12%	18.70%	24.43%	0.0071	0.0007
77.5	215,087	27.12%	17.36%	23.62%	0.0095	0.0012
78.5	189,295	24.88%	16.08%	22.84%	0.0077	0.0004
79.5	186,834	24.88%	14.84%	22.06%	0.0101	0.0008
80.5	168,072	24.88%	13.66%	21.31%	0.0126	0.0013
81.5	166,277	24.88%	12.52%	20.57%	0.0153	0.0019
82.5	147,163	24.42%	11.44%	19.85%	0.0168	0.0021
83.5	0	24.35%	10.42%	19.14%		
Sum of Squared Differences				[8]	0.8169	0.1999
Up to 1% of Beginning Exposures				[9]	0.7114	0.1858

[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 356 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R2-67	[5] OIEC L1.5-77	[6] PSO SSD	[7] OIEC SSD
0.0	185,349,345	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	184,347,321	99.97%	99.93%	99.98%	0.0000	0.0000
1.5	180,051,661	99.88%	99.78%	99.94%	0.0000	0.0000
2.5	175,459,556	99.79%	99.63%	99.89%	0.0000	0.0000
3.5	171,384,070	99.60%	99.47%	99.83%	0.0000	0.0000
4.5	167,382,675	99.35%	99.30%	99.77%	0.0000	0.0000
5.5	164,071,310	99.16%	99.12%	99.69%	0.0000	0.0000
6.5	158,907,742	98.86%	98.93%	99.60%	0.0000	0.0001
7.5	146,530,446	98.71%	98.74%	99.49%	0.0000	0.0001
8.5	141,506,436	98.61%	98.53%	99.38%	0.0000	0.0001
9.5	131,198,960	98.26%	98.31%	99.24%	0.0000	0.0001
10.5	120,319,080	98.13%	98.09%	99.09%	0.0000	0.0001
11.5	117,266,778	97.86%	97.85%	98.93%	0.0000	0.0001
12.5	116,557,847	97.75%	97.61%	98.74%	0.0000	0.0001
13.5	113,180,062	97.59%	97.35%	98.54%	0.0000	0.0001
14.5	110,023,810	97.15%	97.08%	98.32%	0.0000	0.0001
15.5	100,763,067	96.53%	96.79%	98.07%	0.0000	0.0002
16.5	96,621,990	96.35%	96.50%	97.81%	0.0000	0.0002
17.5	96,276,404	96.21%	96.19%	97.52%	0.0000	0.0002
18.5	94,544,716	95.44%	95.87%	97.22%	0.0000	0.0003
19.5	92,953,036	94.60%	95.54%	96.89%	0.0001	0.0005
20.5	91,059,771	94.42%	95.19%	96.54%	0.0001	0.0004
21.5	89,298,746	94.17%	94.82%	96.17%	0.0000	0.0004
22.5	89,144,398	94.01%	94.44%	95.77%	0.0000	0.0003
23.5	84,278,724	93.35%	94.05%	95.35%	0.0000	0.0004
24.5	80,436,328	93.18%	93.64%	94.91%	0.0000	0.0003
25.5	79,197,756	92.73%	93.21%	94.44%	0.0000	0.0003
26.5	71,462,529	92.21%	92.77%	93.95%	0.0000	0.0003
27.5	68,985,757	92.12%	92.30%	93.44%	0.0000	0.0002
28.5	65,725,192	91.85%	91.82%	92.90%	0.0000	0.0001
29.5	64,525,427	91.09%	91.32%	92.33%	0.0000	0.0002
30.5	63,642,181	90.74%	90.80%	91.74%	0.0000	0.0001
31.5	61,510,503	90.58%	90.27%	91.11%	0.0000	0.0000
32.5	60,053,593	90.37%	89.71%	90.46%	0.0000	0.0000
33.5	44,444,001	89.98%	89.13%	89.77%	0.0001	0.0000
34.5	42,530,307	88.01%	88.52%	89.06%	0.0000	0.0001
35.5	42,043,016	87.68%	87.90%	88.32%	0.0000	0.0000
36.5	41,264,768	87.32%	87.25%	87.54%	0.0000	0.0000
37.5	37,404,258	87.19%	86.58%	86.73%	0.0000	0.0000
38.5	32,401,957	85.07%	85.88%	85.90%	0.0001	0.0001
39.5	29,230,572	84.39%	85.17%	85.03%	0.0001	0.0000
40.5	26,936,700	83.96%	84.42%	84.14%	0.0000	0.0000
41.5	24,994,260	79.71%	83.65%	83.22%	0.0015	0.0012
42.5	22,884,218	78.98%	82.85%	82.28%	0.0015	0.0011
43.5	19,451,976	77.29%	82.03%	81.31%	0.0022	0.0016
44.5	18,953,547	76.92%	81.17%	80.32%	0.0018	0.0012
45.5	18,247,706	76.83%	80.29%	79.31%	0.0012	0.0006
46.5	14,945,037	76.61%	79.38%	78.28%	0.0008	0.0003
47.5	13,784,055	76.25%	78.44%	77.24%	0.0005	0.0001
48.5	13,126,097	75.93%	77.47%	76.18%	0.0002	0.0000
49.5	12,762,683	75.80%	76.48%	75.10%	0.0000	0.0000
50.5	10,001,185	73.60%	75.44%	74.02%	0.0003	0.0000
51.5	9,522,485	72.07%	74.39%	72.92%	0.0005	0.0001
52.5	7,962,849	68.86%	73.29%	71.81%	0.0020	0.0009

Account 356 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R2-67	[5] OIEC L1.5-77	[6] PSO SSD	[7] OIEC SSD
53.5	6,693,383	66.83%	72.17%	70.70%	0.0029	0.0015
54.5	6,214,417	64.35%	71.01%	69.58%	0.0044	0.0027
55.5	5,901,814	64.29%	69.83%	68.45%	0.0031	0.0017
56.5	5,374,946	63.69%	68.61%	67.32%	0.0024	0.0013
57.5	4,590,814	63.08%	67.36%	66.18%	0.0018	0.0010
58.5	4,421,380	62.91%	66.08%	65.05%	0.0010	0.0005
59.5	4,149,424	62.49%	64.77%	63.91%	0.0005	0.0002
60.5	3,530,583	61.49%	63.43%	62.77%	0.0004	0.0002
61.5	3,477,912	61.44%	62.06%	61.64%	0.0000	0.0000
62.5	3,371,628	60.62%	60.66%	60.51%	0.0000	0.0000
63.5	2,241,946	58.34%	59.23%	59.38%	0.0001	0.0001
64.5	1,987,018	58.06%	57.77%	58.26%	0.0000	0.0000
65.5	1,904,018	57.79%	56.29%	57.14%	0.0002	0.0000
66.5	1,855,360	57.77%	54.79%	56.03%	0.0009	0.0003
67.5	1,790,376	57.76%	53.26%	54.93%	0.0020	0.0008
68.5	1,582,500	57.15%	51.71%	53.84%	0.0030	0.0011
69.5	1,542,159	56.88%	50.14%	52.75%	0.0045	0.0017
70.5	1,524,183	56.22%	48.55%	51.68%	0.0059	0.0021
71.5	1,435,249	56.10%	46.95%	50.62%	0.0084	0.0030
72.5	1,428,669	55.85%	45.34%	49.56%	0.0110	0.0039
73.5	1,412,056	55.26%	43.72%	48.52%	0.0133	0.0045
74.5	1,403,153	55.26%	42.09%	47.49%	0.0173	0.0060
75.5	1,129,955	44.64%	40.46%	46.47%	0.0017	0.0003
76.5	715,438	33.51%	38.83%	45.46%	0.0028	0.0143
77.5	703,260	33.50%	37.20%	44.47%	0.0014	0.0120
78.5	690,988	33.50%	35.57%	43.48%	0.0004	0.0100
79.5	600,114	29.09%	33.96%	42.51%	0.0024	0.0180
80.5	588,407	28.74%	32.35%	41.56%	0.0013	0.0164
81.5	588,406	28.74%	30.77%	40.61%	0.0004	0.0141
82.5	474,715	28.74%	29.20%	39.68%	0.0000	0.0120
83.5	0	24.39%	27.65%	38.77%		
Sum of Squared Differences				[8]	0.1071	0.1425
Up to 1% of Beginning Exposures				[9]	0.0312	0.0222

[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 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R3-60	[5] OIEC R0.5-73	[6] PSO SSD	[7] OIEC SSD
0.0	396,000,000	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	363,000,000	99.94%	99.99%	99.74%	0.0000	0.0000
1.5	339,000,000	99.83%	99.96%	99.22%	0.0000	0.0000
2.5	311,000,000	99.46%	99.93%	98.69%	0.0000	0.0001
3.5	282,000,000	99.15%	99.89%	98.17%	0.0001	0.0001
4.5	251,000,000	98.85%	99.85%	97.63%	0.0001	0.0001
5.5	236,000,000	98.53%	99.80%	97.10%	0.0002	0.0002
6.5	224,000,000	98.31%	99.74%	96.56%	0.0002	0.0003
7.5	213,000,000	97.68%	99.68%	96.02%	0.0004	0.0003
8.5	199,000,000	97.45%	99.61%	95.47%	0.0005	0.0004
9.5	187,000,000	97.08%	99.53%	94.93%	0.0006	0.0005
10.5	172,000,000	96.16%	99.45%	94.37%	0.0011	0.0003
11.5	163,000,000	95.33%	99.35%	93.82%	0.0016	0.0002
12.5	159,000,000	95.19%	99.24%	93.26%	0.0016	0.0004
13.5	153,000,000	93.76%	99.12%	92.70%	0.0029	0.0001
14.5	146,000,000	93.35%	98.99%	92.13%	0.0032	0.0001
15.5	140,000,000	92.59%	98.85%	91.56%	0.0039	0.0001
16.5	134,000,000	91.91%	98.68%	90.99%	0.0046	0.0001
17.5	132,000,000	91.52%	98.51%	90.42%	0.0049	0.0001
18.5	124,000,000	90.85%	98.31%	89.84%	0.0056	0.0001
19.5	117,000,000	90.36%	98.10%	89.26%	0.0060	0.0001
20.5	111,000,000	89.67%	97.87%	88.67%	0.0067	0.0001
21.5	106,000,000	89.10%	97.62%	88.08%	0.0073	0.0001
22.5	106,000,000	88.72%	97.35%	87.49%	0.0075	0.0001
23.5	101,000,000	87.81%	97.05%	86.90%	0.0085	0.0001
24.5	96,714,495	87.30%	96.73%	86.30%	0.0089	0.0001
25.5	92,387,954	86.51%	96.38%	85.70%	0.0098	0.0001
26.5	84,695,947	85.80%	96.01%	85.09%	0.0104	0.0001
27.5	78,317,481	85.15%	95.61%	84.48%	0.0109	0.0000
28.5	73,756,420	84.80%	95.17%	83.87%	0.0108	0.0001
29.5	71,021,130	83.96%	94.71%	83.26%	0.0116	0.0000
30.5	68,988,962	82.64%	94.21%	82.64%	0.0134	0.0000
31.5	66,970,742	81.99%	93.68%	82.01%	0.0137	0.0000
32.5	63,758,126	80.45%	93.11%	81.39%	0.0160	0.0001
33.5	60,470,136	79.24%	92.50%	80.76%	0.0176	0.0002
34.5	57,032,910	78.35%	91.85%	80.12%	0.0182	0.0003
35.5	53,548,639	77.36%	91.16%	79.48%	0.0190	0.0004
36.5	52,765,149	76.77%	90.42%	78.83%	0.0186	0.0004
37.5	49,841,722	75.77%	89.64%	78.18%	0.0192	0.0006
38.5	47,752,171	75.37%	88.81%	77.53%	0.0181	0.0005
39.5	43,544,277	74.75%	87.93%	76.87%	0.0174	0.0005
40.5	41,791,021	73.69%	87.00%	76.20%	0.0177	0.0006
41.5	38,928,485	72.74%	86.01%	75.53%	0.0176	0.0008
42.5	35,134,462	72.06%	84.96%	74.86%	0.0166	0.0008
43.5	33,290,080	71.40%	83.85%	74.17%	0.0155	0.0008
44.5	31,208,231	70.69%	82.68%	73.49%	0.0144	0.0008
45.5	28,631,384	68.86%	81.44%	72.79%	0.0158	0.0015
46.5	27,564,722	68.62%	80.12%	72.10%	0.0132	0.0012
47.5	26,336,570	68.43%	78.74%	71.39%	0.0106	0.0009
48.5	24,622,564	67.60%	77.29%	70.68%	0.0094	0.0010
49.5	22,498,460	67.13%	75.75%	69.97%	0.0074	0.0008
50.5	21,132,036	66.34%	74.14%	69.24%	0.0061	0.0008
51.5	19,472,982	65.70%	72.44%	68.52%	0.0045	0.0008
52.5	17,545,845	65.31%	70.66%	67.78%	0.0029	0.0006

Account 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R3-60	[5] OIEC R0.5-73	[6] PSO SSD	[7] OIEC SSD
53.5	16,339,007	65.02%	68.80%	67.04%	0.0014	0.0004
54.5	15,405,280	64.25%	66.86%	66.30%	0.0007	0.0004
55.5	14,364,497	63.80%	64.83%	65.54%	0.0001	0.0003
56.5	13,263,083	63.46%	62.72%	64.78%	0.0001	0.0002
57.5	12,147,156	62.84%	60.53%	64.02%	0.0005	0.0001
58.5	10,903,046	62.28%	58.26%	63.25%	0.0016	0.0001
59.5	9,418,281	61.41%	55.93%	62.47%	0.0030	0.0001
60.5	7,742,684	61.21%	53.53%	61.69%	0.0059	0.0000
61.5	6,654,417	60.85%	51.08%	60.90%	0.0095	0.0000
62.5	5,399,223	60.38%	48.58%	60.11%	0.0139	0.0000
63.5	4,048,529	59.69%	46.04%	59.31%	0.0186	0.0000
64.5	3,170,881	58.87%	43.48%	58.50%	0.0237	0.0000
65.5	2,411,333	58.66%	40.91%	57.69%	0.0315	0.0001
66.5	2,123,543	58.47%	38.33%	56.87%	0.0406	0.0003
67.5	1,727,787	57.09%	35.77%	56.05%	0.0454	0.0001
68.5	1,266,680	55.57%	33.24%	55.23%	0.0499	0.0000
69.5	988,701	54.56%	30.74%	54.39%	0.0567	0.0000
70.5	883,834	54.46%	28.31%	53.56%	0.0684	0.0001
71.5	840,425	52.57%	25.94%	52.72%	0.0709	0.0000
72.5	783,119	51.57%	23.65%	51.87%	0.0780	0.0000
73.5	725,284	51.57%	21.46%	51.02%	0.0907	0.0000
74.5	698,179	50.63%	19.36%	50.17%	0.0978	0.0000
75.5	599,469	50.27%	17.38%	49.31%	0.1082	0.0001
76.5	554,366	48.35%	15.51%	48.45%	0.1078	0.0000
77.5	531,281	47.29%	13.76%	47.59%	0.1125	0.0000
78.5	474,081	46.77%	12.13%	46.72%	0.1200	0.0000
79.5	411,010	45.60%	10.63%	45.85%	0.1223	0.0000
80.5	286,253	45.53%	9.25%	44.98%	0.1316	0.0000
81.5	263,404	44.71%	7.99%	44.11%	0.1349	0.0000
82.5	147,991	44.37%	6.85%	43.23%	0.1408	0.0001
83.5	0	44.37%	5.81%	42.35%		
Sum of Squared Differences				[8]	2.1397	0.0216
Up to 1% of Beginning Exposures				[9]	0.5081	0.0206

[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 364 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R1-50	[5] OIEC L0.5-57	[6] PSO SSD	[7] OIEC SSD
0.0	477,000,000	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	452,000,000	99.86%	99.74%	99.92%	0.0000	0.0000
1.5	421,000,000	99.55%	99.21%	99.68%	0.0000	0.0000
2.5	396,000,000	99.16%	98.67%	99.38%	0.0000	0.0000
3.5	370,000,000	98.68%	98.12%	99.03%	0.0000	0.0000
4.5	346,000,000	98.00%	97.55%	98.62%	0.0000	0.0000
5.5	324,000,000	97.45%	96.96%	98.17%	0.0000	0.0001
6.5	305,000,000	96.89%	96.36%	97.68%	0.0000	0.0001
7.5	291,000,000	96.39%	95.75%	97.15%	0.0000	0.0001
8.5	279,000,000	95.81%	95.12%	96.58%	0.0000	0.0001
9.5	260,000,000	95.15%	94.48%	95.98%	0.0000	0.0001
10.5	243,000,000	94.56%	93.82%	95.33%	0.0001	0.0001
11.5	228,000,000	94.00%	93.15%	94.65%	0.0001	0.0000
12.5	214,000,000	93.41%	92.46%	93.94%	0.0001	0.0000
13.5	200,000,000	92.80%	91.77%	93.18%	0.0001	0.0000
14.5	192,000,000	92.04%	91.05%	92.39%	0.0001	0.0000
15.5	186,000,000	91.38%	90.33%	91.57%	0.0001	0.0000
16.5	175,000,000	90.72%	89.59%	90.72%	0.0001	0.0000
17.5	161,000,000	90.01%	88.83%	89.83%	0.0001	0.0000
18.5	148,000,000	88.69%	88.07%	88.90%	0.0000	0.0000
19.5	135,000,000	87.45%	87.28%	87.95%	0.0000	0.0000
20.5	125,000,000	86.55%	86.48%	86.97%	0.0000	0.0000
21.5	113,000,000	85.78%	85.67%	85.96%	0.0000	0.0000
22.5	106,000,000	85.07%	84.83%	84.92%	0.0000	0.0000
23.5	100,000,000	84.27%	83.98%	83.85%	0.0000	0.0000
24.5	94,264,463	83.44%	83.11%	82.77%	0.0000	0.0000
25.5	89,223,539	82.58%	82.22%	81.66%	0.0000	0.0001
26.5	83,856,574	81.25%	81.30%	80.53%	0.0000	0.0001
27.5	79,291,547	80.07%	80.37%	79.39%	0.0000	0.0000
28.5	74,319,483	79.06%	79.41%	78.23%	0.0000	0.0001
29.5	69,753,516	78.15%	78.44%	77.06%	0.0000	0.0001
30.5	64,629,928	76.95%	77.43%	75.88%	0.0000	0.0001
31.5	60,076,014	75.71%	76.41%	74.69%	0.0000	0.0001
32.5	55,592,744	74.74%	75.35%	73.49%	0.0000	0.0002
33.5	50,743,070	73.75%	74.28%	72.29%	0.0000	0.0002
34.5	46,914,648	72.79%	73.18%	71.10%	0.0000	0.0003
35.5	42,236,579	71.79%	72.05%	69.90%	0.0000	0.0004
36.5	39,215,582	70.68%	70.89%	68.70%	0.0000	0.0004
37.5	36,597,697	69.48%	69.72%	67.51%	0.0000	0.0004
38.5	33,089,668	67.68%	68.51%	66.32%	0.0001	0.0002
39.5	30,301,304	65.89%	67.28%	65.13%	0.0002	0.0001
40.5	28,032,484	64.06%	66.02%	63.95%	0.0004	0.0000
41.5	26,033,689	62.51%	64.74%	62.76%	0.0005	0.0000
42.5	24,316,779	61.14%	63.43%	61.59%	0.0005	0.0000
43.5	22,348,840	59.55%	62.10%	60.41%	0.0007	0.0001
44.5	20,445,703	57.94%	60.74%	59.25%	0.0008	0.0002
45.5	18,464,460	55.67%	59.36%	58.08%	0.0014	0.0006
46.5	16,713,097	53.83%	57.96%	56.93%	0.0017	0.0010
47.5	15,168,161	52.36%	56.54%	55.78%	0.0017	0.0012
48.5	13,802,580	51.18%	55.09%	54.63%	0.0015	0.0012
49.5	12,550,208	50.20%	53.63%	53.50%	0.0012	0.0011
50.5	11,873,821	49.31%	52.15%	52.37%	0.0008	0.0009
51.5	11,063,699	48.24%	50.66%	51.25%	0.0006	0.0009
52.5	10,039,210	47.37%	49.14%	50.13%	0.0003	0.0008

Account 364 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R1-50	[5] OIEC L0.5-57	[6] PSO SSD	[7] OIEC SSD
53.5	9,752,677	46.69%	47.62%	49.03%	0.0001	0.0005
54.5	8,851,634	45.92%	46.08%	47.93%	0.0000	0.0004
55.5	7,948,249	44.86%	44.53%	46.85%	0.0000	0.0004
56.5	6,975,285	43.35%	42.98%	45.77%	0.0000	0.0006
57.5	6,188,015	42.33%	41.42%	44.70%	0.0001	0.0006
58.5	5,565,829	41.35%	39.85%	43.64%	0.0002	0.0005
59.5	4,917,977	40.47%	38.28%	42.60%	0.0005	0.0005
60.5	4,243,406	39.60%	36.72%	41.56%	0.0008	0.0004
61.5	3,645,334	38.46%	35.15%	40.54%	0.0011	0.0004
62.5	3,063,378	36.26%	33.59%	39.52%	0.0007	0.0011
63.5	2,672,832	35.20%	32.04%	38.52%	0.0010	0.0011
64.5	2,115,232	34.12%	30.50%	37.53%	0.0013	0.0012
65.5	1,739,921	32.93%	28.97%	36.55%	0.0016	0.0013
66.5	1,374,012	31.83%	27.45%	35.59%	0.0019	0.0014
67.5	1,045,283	30.73%	25.96%	34.63%	0.0023	0.0015
68.5	745,720	29.78%	24.48%	33.69%	0.0028	0.0015
69.5	499,575	28.88%	23.02%	32.77%	0.0034	0.0015
70.5	326,165	28.05%	21.60%	31.85%	0.0042	0.0014
71.5	265,816	27.49%	20.20%	30.95%	0.0053	0.0012
72.5	246,747	27.18%	18.83%	30.07%	0.0070	0.0008
73.5	225,539	26.58%	17.49%	29.19%	0.0083	0.0007
74.5	209,579	26.12%	16.19%	28.34%	0.0099	0.0005
75.5	196,244	25.82%	14.93%	27.49%	0.0118	0.0003
76.5	191,121	25.55%	13.71%	26.66%	0.0140	0.0001
77.5	184,472	25.36%	12.53%	25.84%	0.0164	0.0000
78.5	177,057	25.16%	11.40%	25.04%	0.0189	0.0000
79.5	170,104	24.90%	10.32%	24.26%	0.0213	0.0000
80.5	155,735	24.49%	9.29%	23.48%	0.0231	0.0001
81.5	141,811	23.35%	8.31%	22.73%	0.0226	0.0000
82.5	29,165	22.04%	7.38%	21.98%	0.0215	0.0000
83.5	0	20.79%	6.51%	21.26%		
Sum of Squared Differences				[8]	0.2158	0.0313
Up to 1% of Beginning Exposures				[9]	0.0146	0.0146

[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 366 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R2-78	[5] OIEC R2-80	[6] PSO SSD	[7] OIEC SSD
0.0	82,483,016	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	76,699,409	100.00%	99.94%	99.94%	0.0000	0.0000
1.5	70,492,892	99.95%	99.81%	99.82%	0.0000	0.0000
2.5	65,473,423	99.91%	99.68%	99.69%	0.0000	0.0000
3.5	55,740,888	99.87%	99.55%	99.56%	0.0000	0.0000
4.5	52,749,852	99.81%	99.41%	99.42%	0.0000	0.0000
5.5	48,847,177	99.77%	99.26%	99.28%	0.0000	0.0000
6.5	46,383,123	99.73%	99.10%	99.13%	0.0000	0.0000
7.5	43,286,314	99.68%	98.94%	98.97%	0.0001	0.0001
8.5	34,089,260	99.61%	98.78%	98.81%	0.0001	0.0001
9.5	27,486,937	99.54%	98.60%	98.64%	0.0001	0.0001
10.5	23,869,517	99.42%	98.42%	98.47%	0.0001	0.0001
11.5	21,587,232	99.36%	98.23%	98.29%	0.0001	0.0001
12.5	19,972,496	99.21%	98.03%	98.10%	0.0001	0.0001
13.5	18,528,851	99.05%	97.83%	97.90%	0.0002	0.0001
14.5	14,328,064	98.68%	97.62%	97.69%	0.0001	0.0001
15.5	9,392,314	98.52%	97.40%	97.48%	0.0001	0.0001
16.5	8,295,178	98.14%	97.17%	97.26%	0.0001	0.0001
17.5	8,270,984	97.89%	96.93%	97.03%	0.0001	0.0001
18.5	7,647,643	97.44%	96.68%	96.80%	0.0001	0.0000
19.5	6,564,725	97.26%	96.42%	96.55%	0.0001	0.0001
20.5	5,668,661	96.04%	96.16%	96.30%	0.0000	0.0000
21.5	4,582,418	95.64%	95.88%	96.03%	0.0000	0.0000
22.5	4,477,282	95.34%	95.60%	95.76%	0.0000	0.0000
23.5	4,366,274	93.63%	95.30%	95.47%	0.0003	0.0003
24.5	4,361,924	93.54%	94.99%	95.18%	0.0002	0.0003
25.5	4,349,347	93.39%	94.67%	94.88%	0.0002	0.0002
26.5	4,243,079	92.07%	94.34%	94.56%	0.0005	0.0006
27.5	3,851,832	91.90%	94.00%	94.24%	0.0004	0.0005
28.5	3,844,236	91.80%	93.65%	93.90%	0.0003	0.0004
29.5	3,782,727	90.34%	93.28%	93.55%	0.0009	0.0010
30.5	3,418,945	90.19%	92.90%	93.19%	0.0007	0.0009
31.5	3,317,641	89.99%	92.51%	92.82%	0.0006	0.0008
32.5	3,306,191	89.83%	92.11%	92.44%	0.0005	0.0007
33.5	3,126,257	89.42%	91.69%	92.04%	0.0005	0.0007
34.5	2,945,578	88.88%	91.26%	91.63%	0.0006	0.0008
35.5	2,901,381	88.06%	90.81%	91.21%	0.0008	0.0010
36.5	2,890,625	87.84%	90.35%	90.77%	0.0006	0.0009
37.5	2,819,456	87.73%	89.87%	90.32%	0.0005	0.0007
38.5	2,513,341	87.57%	89.38%	89.85%	0.0003	0.0005
39.5	2,392,162	87.25%	88.87%	89.37%	0.0003	0.0004
40.5	2,240,390	87.10%	88.35%	88.88%	0.0002	0.0003
41.5	2,189,815	86.53%	87.80%	88.37%	0.0002	0.0003
42.5	2,033,661	86.32%	87.25%	87.84%	0.0001	0.0002
43.5	2,001,518	85.79%	86.67%	87.30%	0.0001	0.0002
44.5	1,720,970	85.26%	86.08%	86.74%	0.0001	0.0002
45.5	1,600,999	85.02%	85.47%	86.16%	0.0000	0.0001
46.5	1,568,695	84.20%	84.84%	85.57%	0.0000	0.0002
47.5	1,562,381	83.86%	84.19%	84.96%	0.0000	0.0001
48.5	1,543,908	83.51%	83.52%	84.33%	0.0000	0.0001
49.5	1,503,540	82.90%	82.83%	83.68%	0.0000	0.0001
50.5	1,461,299	82.59%	82.13%	83.02%	0.0000	0.0000
51.5	1,431,548	81.99%	81.40%	82.33%	0.0000	0.0000

Account 366 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R2-78	[5] OIEC R2-80	[6] PSO SSD	[7] OIEC SSD
52.5	1,406,920	81.63%	80.65%	81.63%	0.0001	0.0000
53.5	1,342,597	81.33%	79.88%	80.91%	0.0002	0.0000
54.5	1,308,932	80.59%	79.09%	80.16%	0.0002	0.0000
55.5	1,288,329	80.02%	78.28%	79.40%	0.0003	0.0000
56.5	1,220,170	79.43%	77.44%	78.61%	0.0004	0.0001
57.5	1,127,294	79.05%	76.58%	77.81%	0.0006	0.0002
58.5	1,053,543	78.65%	75.71%	76.98%	0.0009	0.0003
59.5	1,003,144	78.17%	74.80%	76.14%	0.0011	0.0004
60.5	870,925	77.87%	73.88%	75.27%	0.0016	0.0007
61.5	741,344	77.51%	72.93%	74.38%	0.0021	0.0010
62.5	737,887	77.15%	71.96%	73.47%	0.0027	0.0014
63.5	462,824	76.84%	70.96%	72.53%	0.0035	0.0019
64.5	455,949	76.46%	69.94%	71.57%	0.0042	0.0024
65.5	452,452	75.88%	68.90%	70.60%	0.0049	0.0028
66.5	434,991	73.19%	67.84%	69.59%	0.0029	0.0013
67.5	291,814	71.46%	66.75%	68.57%	0.0022	0.0008
68.5	170,985	69.83%	65.64%	67.53%	0.0018	0.0005
69.5	167,849	68.54%	64.51%	66.46%	0.0016	0.0004
70.5	161,109	65.80%	63.35%	65.37%	0.0006	0.0000
71.5	148,932	61.95%	62.17%	64.26%	0.0000	0.0005
72.5	147,462	61.34%	60.97%	63.13%	0.0000	0.0003
73.5	145,301	60.44%	59.75%	61.98%	0.0000	0.0002
74.5	142,817	59.41%	58.51%	60.81%	0.0001	0.0002
75.5	141,451	58.84%	57.25%	59.61%	0.0003	0.0001
76.5	140,045	58.27%	55.97%	58.40%	0.0005	0.0000
77.5	137,218	57.45%	54.68%	57.17%	0.0008	0.0000
78.5	131,770	56.09%	53.37%	55.93%	0.0007	0.0000
79.5	119,718	55.02%	52.04%	54.66%	0.0009	0.0000
80.5	0	54.21%	50.69%	53.38%		
Sum of Squared Differences				[8]	0.0455	0.0295
Up to 1% of Beginning Exposures				[9]	0.0157	0.0156

[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 367 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] PSO R1.5-70	[5] OIEC R1-79	[6] PSO SSD	[7] OIEC SSD
0.0	378,000,000	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	360,000,000	99.72%	99.87%	99.84%	0.0000	0.0000
1.5	333,000,000	98.90%	99.62%	99.51%	0.0001	0.0000
2.5	309,000,000	97.95%	99.35%	99.17%	0.0002	0.0001
3.5	291,000,000	97.12%	99.08%	98.83%	0.0004	0.0003
4.5	276,000,000	96.26%	98.80%	98.48%	0.0006	0.0005
5.5	260,000,000	95.49%	98.52%	98.13%	0.0009	0.0007
6.5	247,000,000	94.74%	98.22%	97.77%	0.0012	0.0009
7.5	231,000,000	93.99%	97.92%	97.40%	0.0015	0.0012
8.5	212,000,000	93.07%	97.61%	97.03%	0.0021	0.0016
9.5	176,000,000	92.35%	97.29%	96.66%	0.0025	0.0019
10.5	157,000,000	91.76%	96.97%	96.27%	0.0027	0.0020
11.5	144,000,000	91.32%	96.63%	95.88%	0.0028	0.0021
12.5	135,000,000	91.00%	96.29%	95.49%	0.0028	0.0020
13.5	127,000,000	90.82%	95.94%	95.09%	0.0026	0.0018
14.5	123,000,000	90.58%	95.58%	94.69%	0.0025	0.0017
15.5	119,000,000	90.40%	95.21%	94.27%	0.0023	0.0015
16.5	113,000,000	90.20%	94.83%	93.86%	0.0021	0.0013
17.5	103,000,000	90.04%	94.44%	93.43%	0.0019	0.0012
18.5	93,898,682	89.84%	94.05%	93.01%	0.0018	0.0010
19.5	83,609,395	89.57%	93.64%	92.57%	0.0017	0.0009
20.5	73,368,989	89.30%	93.22%	92.13%	0.0015	0.0008
21.5	58,763,596	89.06%	92.80%	91.69%	0.0014	0.0007
22.5	58,193,849	88.87%	92.36%	91.24%	0.0012	0.0006
23.5	50,973,143	88.70%	91.91%	90.78%	0.0010	0.0004
24.5	47,001,950	88.49%	91.45%	90.32%	0.0009	0.0003
25.5	44,181,538	88.30%	90.98%	89.86%	0.0007	0.0002
26.5	40,017,546	88.13%	90.50%	89.38%	0.0006	0.0002
27.5	36,765,338	87.95%	90.01%	88.91%	0.0004	0.0001
28.5	34,322,553	87.82%	89.50%	88.42%	0.0003	0.0000
29.5	32,427,745	87.61%	88.99%	87.93%	0.0002	0.0000
30.5	30,634,175	87.46%	88.45%	87.44%	0.0001	0.0000
31.5	29,016,153	87.30%	87.91%	86.94%	0.0000	0.0000
32.5	26,023,557	87.15%	87.35%	86.43%	0.0000	0.0001
33.5	23,177,375	86.97%	86.78%	85.91%	0.0000	0.0001
34.5	20,951,110	86.83%	86.19%	85.39%	0.0000	0.0002
35.5	19,073,419	86.74%	85.59%	84.86%	0.0001	0.0004
36.5	17,114,283	86.60%	84.98%	84.32%	0.0003	0.0005
37.5	15,078,499	86.45%	84.34%	83.78%	0.0004	0.0007
38.5	12,942,163	86.32%	83.70%	83.23%	0.0007	0.0010
39.5	11,021,538	86.20%	83.03%	82.67%	0.0010	0.0012
40.5	9,549,367	86.06%	82.35%	82.10%	0.0014	0.0016
41.5	8,509,830	85.84%	81.65%	81.52%	0.0018	0.0019
42.5	7,147,719	85.65%	80.93%	80.93%	0.0022	0.0022
43.5	6,156,894	85.48%	80.20%	80.34%	0.0028	0.0026
44.5	4,503,887	85.24%	79.44%	79.74%	0.0034	0.0030
45.5	3,782,754	85.01%	78.67%	79.12%	0.0040	0.0035
46.5	3,188,250	84.64%	77.88%	78.50%	0.0046	0.0038
47.5	2,837,816	84.40%	77.07%	77.87%	0.0054	0.0043
48.5	2,511,058	84.16%	76.23%	77.23%	0.0063	0.0048
49.5	2,242,058	83.90%	75.38%	76.58%	0.0072	0.0054
50.5	1,832,870	83.56%	74.51%	75.92%	0.0082	0.0058

Account 367 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**PSO R1.5-70**	**OIEC R1-79**	**PSO SSD**	**OIEC SSD**
51.5	1,650,806	83.21%	73.62%	75.25%	0.0092	0.0063
52.5	1,506,129	83.09%	72.71%	74.57%	0.0108	0.0073
53.5	1,381,769	82.93%	71.78%	73.88%	0.0124	0.0082
54.5	1,323,872	82.74%	70.82%	73.18%	0.0142	0.0091
55.5	1,263,734	82.50%	69.85%	72.47%	0.0160	0.0101
56.5	1,220,145	82.39%	68.85%	71.75%	0.0183	0.0113
57.5	1,135,490	82.25%	67.84%	71.02%	0.0208	0.0126
58.5	1,015,292	82.11%	66.80%	70.28%	0.0234	0.0140
59.5	919,669	81.98%	65.74%	69.53%	0.0264	0.0155
60.5	769,393	81.77%	64.66%	68.76%	0.0293	0.0169
61.5	565,080	80.99%	63.56%	67.99%	0.0304	0.0169
62.5	559,000	80.70%	62.44%	67.21%	0.0333	0.0182
63.5	211,774	79.67%	61.30%	66.41%	0.0337	0.0176
64.5	201,578	78.79%	60.15%	65.61%	0.0348	0.0174
65.5	200,409	78.34%	58.97%	64.80%	0.0375	0.0183
66.5	194,578	77.43%	57.77%	63.97%	0.0386	0.0181
67.5	97,032	75.95%	56.56%	63.14%	0.0376	0.0164
68.5	49,425	74.23%	55.33%	62.29%	0.0357	0.0142
69.5	46,471	69.79%	54.09%	61.44%	0.0247	0.0070
70.5	46,071	70.77%	52.83%	60.58%	0.0322	0.0104
71.5	45,374	71.30%	51.55%	59.70%	0.0390	0.0134
72.5	47,809	75.12%	50.27%	58.82%	0.0618	0.0266
73.5	47,809	75.12%	48.97%	57.93%	0.0684	0.0295
74.5	47,809	75.12%	47.66%	57.04%	0.0754	0.0327
75.5	47,809	75.12%	46.34%	56.13%	0.0828	0.0361
76.5	46,545	75.07%	45.02%	55.21%	0.0903	0.0394
77.5	41,930	74.85%	43.69%	54.29%	0.0971	0.0423
78.5	33,306	74.39%	42.35%	53.36%	0.1026	0.0442
79.5	0	72.08%	41.01%	52.42%		
			39.67%			
Sum of Squared Differences				[8]	1.2275	0.5990
Up to 1% of Beginning Exposures				[9]	0.0592	0.0450

[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.

PSO

Electric Division

353.00 Station Equipment

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$431,762,752.39	$1,094,758.00	0.00254	100.00
0.5 - 1.5	$414,767,722.48	$1,840,810.41	0.00444	99.75
1.5 - 2.5	$395,540,942.84	$554,643.00	0.00140	99.30
2.5 - 3.5	$387,711,626.78	$991,067.88	0.00256	99.16
3.5 - 4.5	$307,825,777.22	$295,164.88	0.00096	98.91
4.5 - 5.5	$300,152,200.77	$250,219.93	0.00083	98.82
5.5 - 6.5	$292,580,919.13	$1,453,094.39	0.00497	98.73
6.5 - 7.5	$280,142,048.31	$173,618.36	0.00062	98.24
7.5 - 8.5	$266,386,016.42	$834,274.05	0.00313	98.18
8.5 - 9.5	$257,177,485.12	$1,942,970.22	0.00755	97.88
9.5 - 10.5	$231,228,231.85	$597,351.22	0.00258	97.14
10.5 - 11.5	$198,519,367.55	$394,084.07	0.00199	96.88
11.5 - 12.5	$186,538,015.76	$335,943.69	0.00180	96.69
12.5 - 13.5	$176,519,205.17	$338,826.10	0.00192	96.52
13.5 - 14.5	$171,849,123.24	$1,952,370.51	0.01136	96.33
14.5 - 15.5	$164,241,906.86	$317,238.30	0.00193	95.24
15.5 - 16.5	$157,661,702.19	$349,610.05	0.00222	95.05
16.5 - 17.5	$154,814,285.32	$719,785.27	0.00465	94.84
17.5 - 18.5	$153,480,946.84	$1,155,071.65	0.00753	94.40
18.5 - 19.5	$147,127,864.76	$886,505.74	0.00603	93.69
19.5 - 20.5	$143,184,406.59	$282,166.97	0.00197	93.13
20.5 - 21.5	$140,275,792.22	$948,525.40	0.00676	92.94
21.5 - 22.5	$134,435,633.90	$781,439.18	0.00581	92.32
22.5 - 23.5	$133,703,085.74	$475,586.45	0.00356	91.78
23.5 - 24.5	$128,418,998.53	$2,682,434.31	0.02089	91.45
24.5 - 25.5	$122,427,029.18	$575,584.18	0.00470	89.54
25.5 - 26.5	$118,655,828.29	$490,787.83	0.00414	89.12
26.5 - 27.5	$113,291,783.00	$865,356.12	0.00764	88.75
27.5 - 28.5	$107,901,220.39	$3,285,931.72	0.03045	88.07
28.5 - 29.5	$99,803,500.47	$406,674.12	0.00407	85.39
29.5 - 30.5	$99,095,125.45	$24,357,811.35	0.24580	85.04
30.5 - 31.5	$74,188,888.90	$1,329,412.61	0.01792	64.14
31.5 - 32.5	$71,104,228.53	$1,127,489.75	0.01586	62.99
32.5 - 33.5	$68,050,594.16	$198,131.89	0.00291	61.99
33.5 - 34.5	$61,879,502.02	$1,129,635.05	0.01826	61.81
34.5 - 35.5	$58,089,976.90	$2,047,643.98	0.03525	60.68
35.5 - 36.5	$55,448,731.63	$527,381.88	0.00951	58.54

PSO

Electric Division

353.00 Station Equipment

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$54,554,346.89	$265,812.91	0.00487	57.99
37.5 - 38.5	$50,283,247.45	$465,428.98	0.00926	57.71
38.5 - 39.5	$45,134,026.22	$174,544.45	0.00387	57.17
39.5 - 40.5	$41,557,117.55	$463,896.19	0.01116	56.95
40.5 - 41.5	$39,673,762.40	$354,915.40	0.00895	56.31
41.5 - 42.5	$37,080,612.97	$820,846.88	0.02214	55.81
42.5 - 43.5	$34,844,085.88	$462,467.77	0.01327	54.57
43.5 - 44.5	$33,503,107.39	$374,419.46	0.01118	53.85
44.5 - 45.5	$30,957,707.64	$187,643.73	0.00606	53.25
45.5 - 46.5	$29,126,452.84	$235,483.66	0.00808	52.93
46.5 - 47.5	$26,618,245.20	$203,146.40	0.00763	52.50
47.5 - 48.5	$24,206,752.88	$354,149.66	0.01463	52.10
48.5 - 49.5	$23,351,509.68	$120,014.10	0.00514	51.34
49.5 - 50.5	$21,943,552.93	$669,501.76	0.03051	51.07
50.5 - 51.5	$19,676,341.49	$687,797.17	0.03496	49.51
51.5 - 52.5	$16,842,636.47	$62,305.16	0.00370	47.78
52.5 - 53.5	$15,582,026.20	$159,620.55	0.01024	47.61
53.5 - 54.5	$13,843,877.02	$247,734.82	0.01789	47.12
54.5 - 55.5	$13,176,656.36	$966,178.14	0.07332	46.27
55.5 - 56.5	$11,871,007.59	$225,058.62	0.01896	42.88
56.5 - 57.5	$10,341,015.98	$479,205.24	0.04634	42.07
57.5 - 58.5	$9,430,599.50	$76,825.76	0.00815	40.12
58.5 - 59.5	$8,590,957.48	$102,091.43	0.01188	39.79
59.5 - 60.5	$6,829,333.42	$48,991.77	0.00717	39.32
60.5 - 61.5	$6,017,721.03	$9,942.40	0.00165	39.04
61.5 - 62.5	$4,954,288.43	$174,855.29	0.03529	38.97
62.5 - 63.5	$4,479,490.83	$89,950.55	0.02008	37.60
63.5 - 64.5	$3,398,633.55	$18,291.25	0.00538	36.84
64.5 - 65.5	$2,886,461.18	$30,845.56	0.01069	36.64
65.5 - 66.5	$2,062,385.42	$7,474.28	0.00362	36.25
66.5 - 67.5	$1,977,150.29	$16,618.65	0.00841	36.12
67.5 - 68.5	$962,787.29	$71,050.96	0.07380	35.82
68.5 - 69.5	$822,973.46	$18,233.42	0.02216	33.17
69.5 - 70.5	$665,520.30	$28,578.09	0.04294	32.44
70.5 - 71.5	$616,135.72	$11,047.53	0.01793	31.05
71.5 - 72.5	$598,509.50	$10,582.85	0.01768	30.49
72.5 - 73.5	$572,685.22	$13,655.30	0.02384	29.95

PSO
Electric Division
353.00 Station Equipment
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

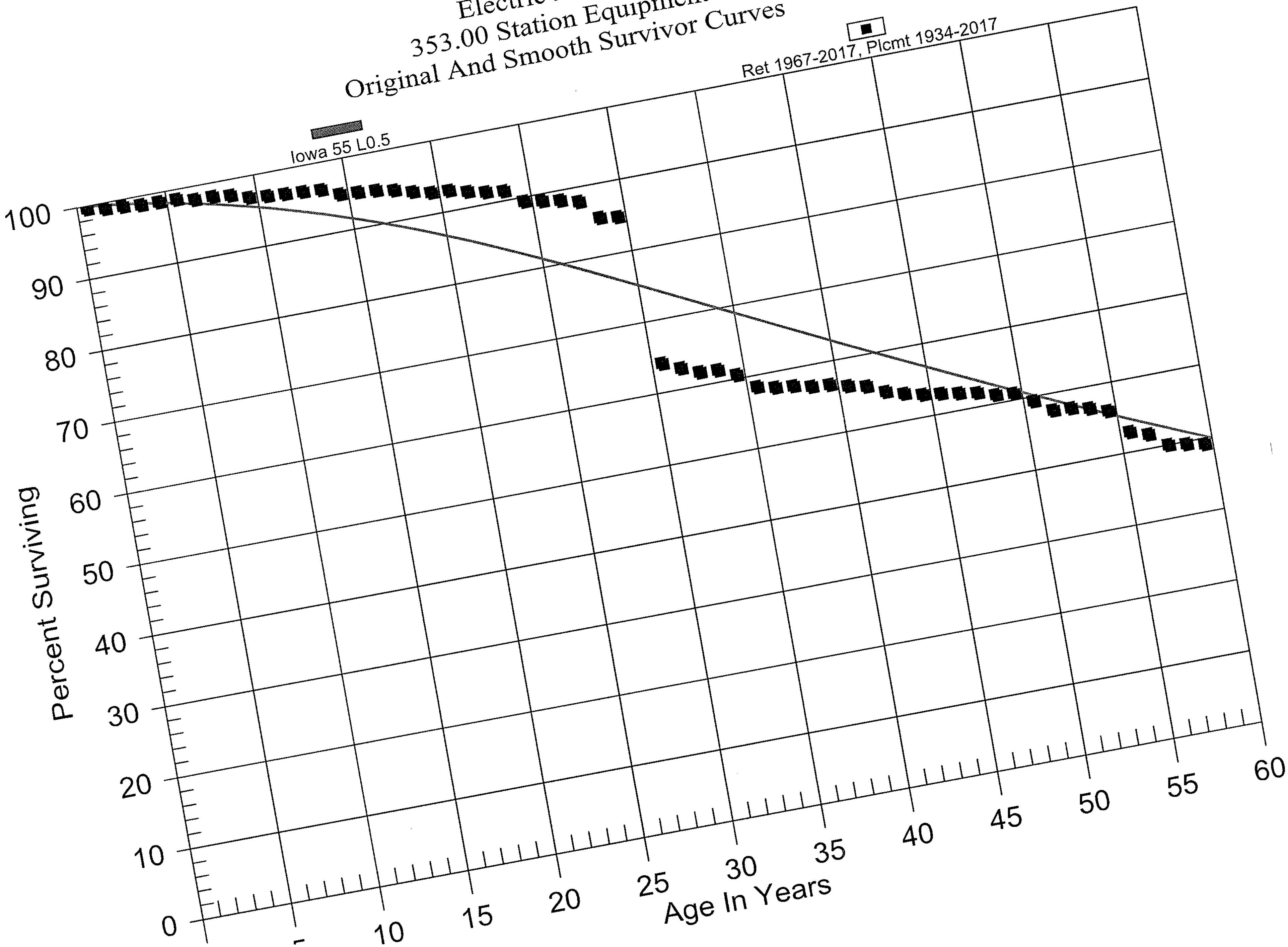
Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
73.5 - 74.5	$549,496.74	$9,091.31	0.01654	29.24
74.5 - 75.5	$522,328.51	$148.92	0.00029	28.75
75.5 - 76.5	$244,755.61	$12,396.98	0.05065	28.74
76.5 - 77.5	$217,285.64	$0.00	0.00000	27.29
77.5 - 78.5	$215,087.40	$17,762.89	0.08258	27.29
78.5 - 79.5	$189,295.22	$1.00	0.00001	25.04
79.5 - 80.5	$186,834.22	$0.00	0.00000	25.03
80.5 - 81.5	$168,072.18	$0.00	0.00000	25.03
81.5 - 82.5	$166,277.40	$3,075.80	0.01850	25.03
82.5 - 83.5	$147,163.26	$407.96	0.00277	24.57

PSO

Electric Division

353.00 Station Equipment

Original And Smooth Survivor Curves



PSO

Electric Division

356.00 Overhead Conductors and Devices

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$171,493,161.65	$15,444.00	0.00009	100.00
0.5 - 1.5	$171,000,509.21	$131,506.46	0.00077	99.99
1.5 - 2.5	$168,108,832.70	$106,532.31	0.00063	99.91
2.5 - 3.5	$164,770,555.23	$241,442.20	0.00147	99.85
3.5 - 4.5	$161,233,146.60	$379,685.50	0.00235	99.70
4.5 - 5.5	$157,689,650.72	$294,733.08	0.00187	99.47
5.5 - 6.5	$154,918,347.24	$453,450.03	0.00293	99.28
6.5 - 7.5	$150,668,138.95	$178,619.32	0.00119	98.99
7.5 - 8.5	$138,626,182.97	$119,665.82	0.00086	98.88
8.5 - 9.5	$134,634,546.69	$415,087.03	0.00308	98.79
9.5 - 10.5	$125,363,435.80	$151,460.17	0.00121	98.49
10.5 - 11.5	$114,643,193.92	$222,705.00	0.00194	98.37
11.5 - 12.5	$111,755,957.52	$61,785.86	0.00055	98.18
12.5 - 13.5	$112,494,902.01	$136,967.94	0.00122	98.12
13.5 - 14.5	$109,470,509.93	$503,672.75	0.00460	98.00
14.5 - 15.5	$106,513,208.30	$609,283.42	0.00572	97.55
15.5 - 16.5	$97,508,627.63	$110,192.86	0.00113	96.99
16.5 - 17.5	$93,629,552.59	$118,376.30	0.00126	96.88
17.5 - 18.5	$93,530,140.30	$588,457.94	0.00629	96.76
18.5 - 19.5	$92,058,491.11	$772,842.50	0.00840	96.15
19.5 - 20.5	$90,531,208.75	$143,674.55	0.00159	95.35
20.5 - 21.5	$88,769,634.40	$135,966.73	0.00153	95.19
21.5 - 22.5	$87,108,295.79	$66,449.27	0.00076	95.05
22.5 - 23.5	$87,077,689.43	$586,903.10	0.00674	94.98
23.5 - 24.5	$82,280,304.00	$142,637.46	0.00173	94.34
24.5 - 25.5	$78,511,779.99	$345,037.87	0.00439	94.17
25.5 - 26.5	$78,075,186.15	$421,501.44	0.00540	93.76
26.5 - 27.5	$70,376,698.54	$55,490.01	0.00079	93.25
27.5 - 28.5	$67,946,986.35	$145,196.15	0.00214	93.18
28.5 - 29.5	$64,742,357.05	$463,919.44	0.00717	92.98
29.5 - 30.5	$63,635,520.80	$227,614.88	0.00358	92.31
30.5 - 31.5	$62,774,715.93	$83,004.31	0.00132	91.98
31.5 - 32.5	$60,867,096.03	$136,054.96	0.00224	91.86
32.5 - 33.5	$60,053,593.05	$265,324.04	0.00442	91.66
33.5 - 34.5	$44,444,000.87	$968,414.41	0.02179	91.25
34.5 - 35.5	$42,530,306.68	$159,891.59	0.00376	89.26
35.5 - 36.5	$42,043,015.57	$176,088.48	0.00419	88.93

PSO
Electric Division
356.00 Overhead Conductors and Devices
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$41,264,768.06	$57,885.22	0.00140	88.55
37.5 - 38.5	$37,404,257.70	$912,726.36	0.02440	88.43
38.5 - 39.5	$32,401,957.39	$256,524.08	0.00792	86.27
39.5 - 40.5	$29,230,572.48	$150,025.90	0.00513	85.59
40.5 - 41.5	$26,936,700.47	$1,362,009.46	0.05056	85.15
41.5 - 42.5	$24,994,259.98	$229,974.85	0.00920	80.84
42.5 - 43.5	$22,884,218.08	$489,070.91	0.02137	80.10
43.5 - 44.5	$19,451,976.40	$93,720.93	0.00482	78.39
44.5 - 45.5	$18,953,547.05	$23,036.35	0.00122	78.01
45.5 - 46.5	$18,247,706.12	$50,556.17	0.00277	77.92
46.5 - 47.5	$14,945,036.51	$71,742.41	0.00480	77.70
47.5 - 48.5	$13,784,054.98	$57,941.78	0.00420	77.33
48.5 - 49.5	$13,126,097.44	$22,046.39	0.00168	77.00
49.5 - 50.5	$12,762,682.66	$370,402.20	0.02902	76.87
50.5 - 51.5	$10,001,185.15	$208,233.76	0.02082	74.64
51.5 - 52.5	$9,522,485.05	$423,672.38	0.04449	73.09
52.5 - 53.5	$7,962,849.02	$234,528.57	0.02945	69.84
53.5 - 54.5	$6,693,383.03	$248,316.00	0.03710	67.78
54.5 - 55.5	$6,214,416.69	$6,416.48	0.00103	65.26
55.5 - 56.5	$5,901,813.59	$55,016.53	0.00932	65.20
56.5 - 57.5	$5,374,946.24	$51,272.96	0.00954	64.59
57.5 - 58.5	$4,590,813.92	$12,391.71	0.00270	63.97
58.5 - 59.5	$4,421,379.98	$29,711.62	0.00672	63.80
59.5 - 60.5	$4,149,423.56	$66,027.38	0.01591	63.37
60.5 - 61.5	$3,530,582.71	$2,918.91	0.00083	62.36
61.5 - 62.5	$3,477,912.01	$46,397.79	0.01334	62.31
62.5 - 63.5	$3,371,627.72	$127,126.36	0.03770	61.48
63.5 - 64.5	$2,241,945.65	$10,735.29	0.00479	59.16
64.5 - 65.5	$1,987,017.87	$9,271.64	0.00467	58.88
65.5 - 66.5	$1,904,017.59	$592.45	0.00031	58.60
66.5 - 67.5	$1,855,360.48	$330.00	0.00018	58.59
67.5 - 68.5	$1,790,376.38	$18,998.28	0.01061	58.58
68.5 - 69.5	$1,582,499.56	$7,314.47	0.00462	57.95
69.5 - 70.5	$1,542,158.76	$17,975.88	0.01166	57.69
70.5 - 71.5	$1,524,182.88	$3,115.83	0.00204	57.01
71.5 - 72.5	$1,435,248.82	$6,580.05	0.00458	56.90
72.5 - 73.5	$1,428,668.77	$15,003.94	0.01050	56.64

PSO

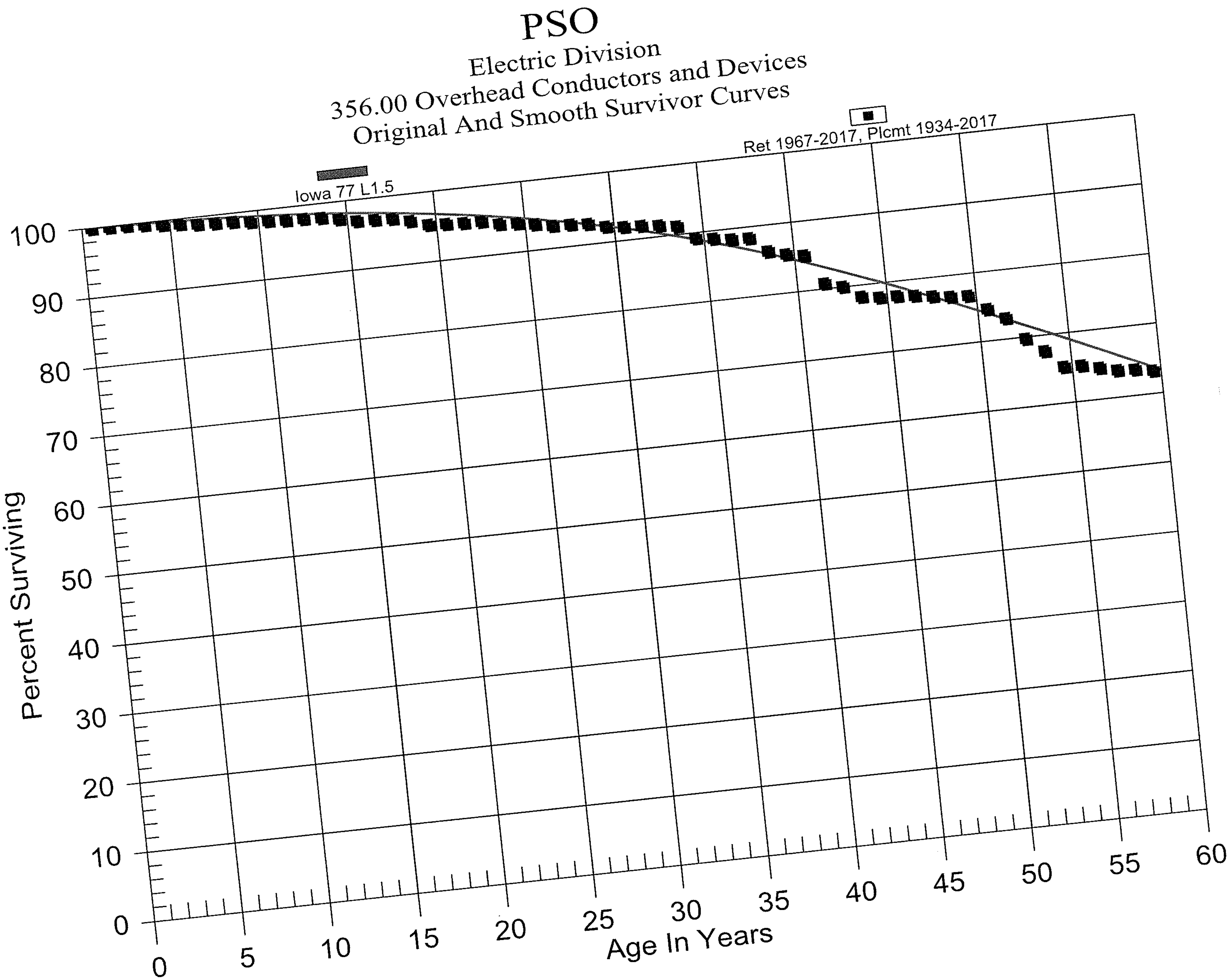
Electric Division

356.00 Overhead Conductors and Devices

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$1,412,056.31	$3.00	0.00000	56.04
74.5 - 75.5	$1,403,153.20	$269,642.18	0.19217	56.04
75.5 - 76.5	$1,129,955.39	$281,709.97	0.24931	45.27
76.5 - 77.5	$715,438.01	$292.04	0.00041	33.99
77.5 - 78.5	$703,260.47	$0.00	0.00000	33.97
78.5 - 79.5	$690,987.70	$90,873.58	0.13151	33.97
79.5 - 80.5	$600,114.12	$7,212.79	0.01202	29.50
80.5 - 81.5	$588,407.45	$1.00	0.00000	29.15
81.5 - 82.5	$588,406.45	$0.00	0.00000	29.15
82.5 - 83.5	$474,715.46	$71,860.31	0.15138	29.15


PSO
Electric Division
356.00 Overhead Conductors and Devices
Original And Smooth Survivor Curves
Iowa 77 L1.5
Ret 1967-2017, Plcmt 1934-2017
Percent Surviving
100
90
80
70
60
50
40
30
20
10
0
Age In Years
0
5
10
15
20
25
30
35
40
45
50
55
60

PSO
Electric Division
362.00 Station Equipment
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$362,182,160.32	$233,918.42	0.00065	100.00
0.5 - 1.5	$330,531,929.26	$271,181.18	0.00082	99.94
1.5 - 2.5	$309,337,248.32	$1,096,359.19	0.00354	99.85
2.5 - 3.5	$283,638,784.73	$776,236.73	0.00274	99.50
3.5 - 4.5	$256,176,601.99	$765,894.32	0.00299	99.23
4.5 - 5.5	$226,307,104.34	$735,156.73	0.00325	98.93
5.5 - 6.5	$213,682,900.44	$487,504.89	0.00228	98.61
6.5 - 7.5	$202,817,418.53	$1,250,018.86	0.00616	98.38
7.5 - 8.5	$193,675,727.34	$421,651.97	0.00218	97.78
8.5 - 9.5	$180,716,642.04	$632,893.34	0.00350	97.56
9.5 - 10.5	$171,360,005.59	$1,668,741.13	0.00974	97.22
10.5 - 11.5	$157,804,584.69	$1,362,775.96	0.00864	96.28
11.5 - 12.5	$151,677,652.16	$578,439.93	0.00381	95.45
12.5 - 13.5	$148,918,139.60	$1,636,479.48	0.01099	95.08
13.5 - 14.5	$145,047,271.46	$636,419.60	0.00439	94.04
14.5 - 15.5	$138,857,971.32	$1,134,440.21	0.00817	93.62
15.5 - 16.5	$133,812,427.81	$924,131.53	0.00691	92.86
16.5 - 17.5	$128,820,219.41	$534,770.61	0.00415	92.22
17.5 - 18.5	$127,338,763.10	$908,549.94	0.00713	91.83
18.5 - 19.5	$120,129,203.85	$550,069.86	0.00458	91.18
19.5 - 20.5	$113,586,731.67	$858,148.78	0.00756	90.76
20.5 - 21.5	$107,742,644.94	$590,729.93	0.00548	90.08
21.5 - 22.5	$103,249,988.48	$432,458.23	0.00419	89.58
22.5 - 23.5	$102,901,138.59	$1,053,940.31	0.01024	89.21
23.5 - 24.5	$98,020,870.33	$519,914.11	0.00530	88.29
24.5 - 25.5	$94,023,453.29	$819,590.59	0.00872	87.83
25.5 - 26.5	$89,800,628.00	$667,056.82	0.00743	87.06
26.5 - 27.5	$82,266,947.50	$560,950.44	0.00682	86.41
27.5 - 28.5	$76,088,404.57	$277,704.71	0.00365	85.82
28.5 - 29.5	$71,737,802.88	$620,421.26	0.00865	85.51
29.5 - 30.5	$69,447,077.08	$1,045,587.53	0.01506	84.77
30.5 - 31.5	$67,595,358.21	$464,792.26	0.00688	83.49
31.5 - 32.5	$66,025,023.63	$1,235,620.26	0.01871	82.92
32.5 - 33.5	$63,758,126.21	$962,762.25	0.01510	81.37
33.5 - 34.5	$60,470,135.62	$678,026.71	0.01121	80.14
34.5 - 35.5	$57,032,910.35	$717,178.30	0.01257	79.24
35.5 - 36.5	$53,548,638.66	$411,216.53	0.00768	78.24

PSO
Electric Division
362.00 Station Equipment
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

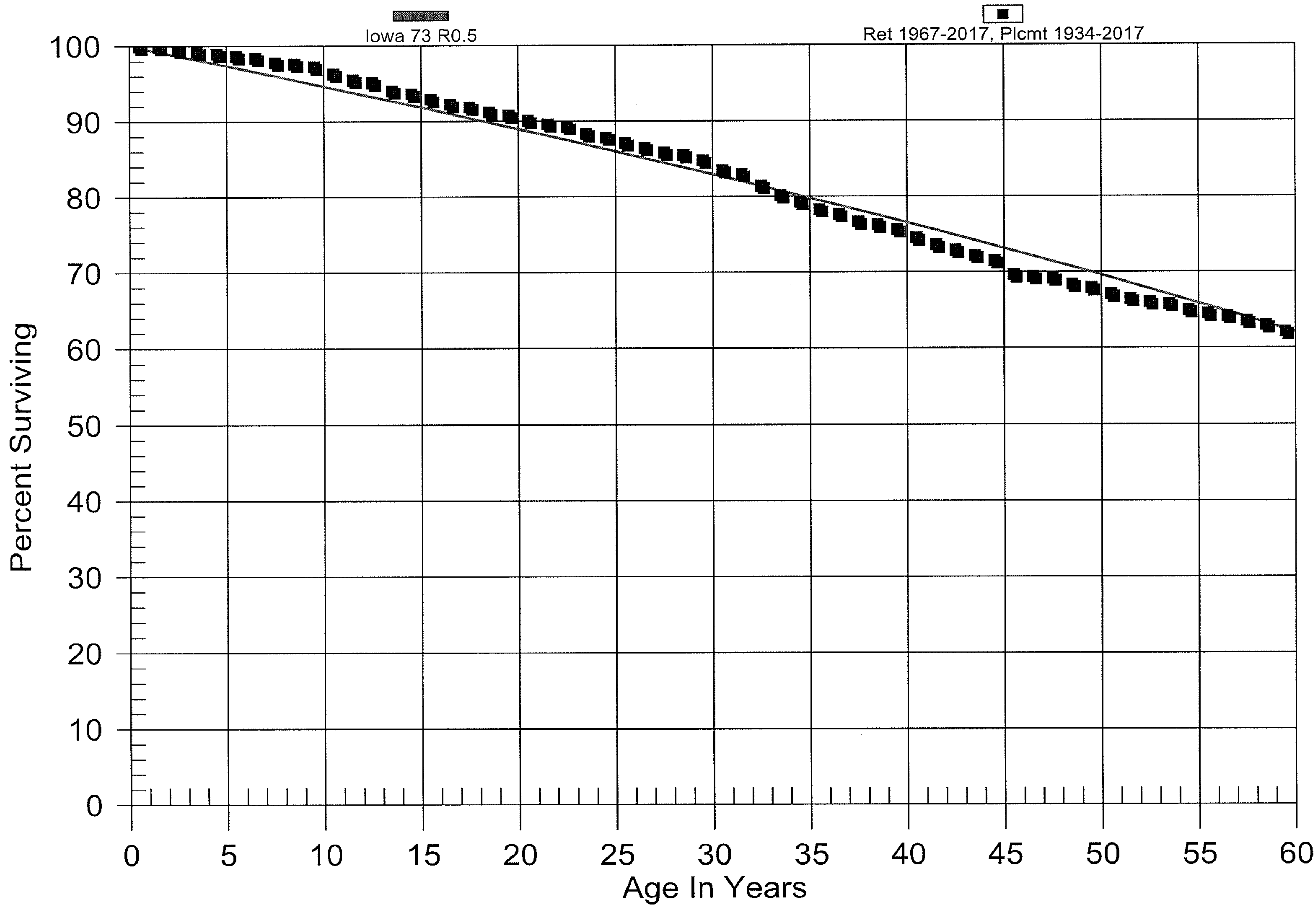
Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$52,765,149.25	$683,870.06	0.01296	77.64
37.5 - 38.5	$49,841,721.67	$264,667.91	0.00531	76.64
38.5 - 39.5	$47,752,171.33	$396,639.92	0.00831	76.23
39.5 - 40.5	$43,544,276.75	$616,382.32	0.01416	75.60
40.5 - 41.5	$41,791,020.69	$537,437.48	0.01286	74.53
41.5 - 42.5	$38,928,485.39	$365,959.78	0.00940	73.57
42.5 - 43.5	$35,134,462.24	$318,930.41	0.00908	72.88
43.5 - 44.5	$33,290,079.59	$330,472.87	0.00993	72.22
44.5 - 45.5	$31,208,231.03	$810,178.63	0.02596	71.50
45.5 - 46.5	$28,631,384.18	$98,576.23	0.00344	69.64
46.5 - 47.5	$27,564,722.19	$77,625.90	0.00282	69.40
47.5 - 48.5	$26,336,570.48	$319,677.90	0.01214	69.21
48.5 - 49.5	$24,622,564.32	$168,665.53	0.00685	68.37
49.5 - 50.5	$22,498,460.25	$266,325.58	0.01184	67.90
50.5 - 51.5	$21,132,036.46	$203,291.93	0.00962	67.10
51.5 - 52.5	$19,472,982.17	$115,027.01	0.00591	66.45
52.5 - 53.5	$17,545,845.12	$77,704.75	0.00443	66.06
53.5 - 54.5	$16,339,006.75	$194,998.31	0.01193	65.76
54.5 - 55.5	$15,405,279.50	$108,027.61	0.00701	64.98
55.5 - 56.5	$14,364,497.48	$76,298.66	0.00531	64.52
56.5 - 57.5	$13,263,082.93	$129,902.49	0.00979	64.18
57.5 - 58.5	$12,147,155.95	$107,746.84	0.00887	63.55
58.5 - 59.5	$10,903,046.02	$152,402.42	0.01398	62.99
59.5 - 60.5	$9,418,280.67	$30,821.15	0.00327	62.11
60.5 - 61.5	$7,742,684.30	$45,649.04	0.00590	61.91
61.5 - 62.5	$6,654,416.82	$51,655.73	0.00776	61.54
62.5 - 63.5	$5,399,223.17	$61,349.10	0.01136	61.06
63.5 - 64.5	$4,048,528.65	$55,884.28	0.01380	60.37
64.5 - 65.5	$3,170,881.11	$10,941.53	0.00345	59.54
65.5 - 66.5	$2,411,333.10	$7,920.31	0.00328	59.33
66.5 - 67.5	$2,123,543.06	$50,198.90	0.02364	59.14
67.5 - 68.5	$1,727,787.02	$45,907.00	0.02657	57.74
68.5 - 69.5	$1,266,679.73	$22,969.42	0.01813	56.20
69.5 - 70.5	$988,700.63	$1,800.00	0.00182	55.18
70.5 - 71.5	$883,833.50	$30,795.47	0.03484	55.08
71.5 - 72.5	$840,425.31	$15,901.32	0.01892	53.16
72.5 - 73.5	$783,119.24	$0.00	0.00000	52.16

PSO
Electric Division
362.00 Station Equipment
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$725,283.85	$13,257.13	0.01828	52.16
74.5 - 75.5	$698,178.50	$4,955.56	0.00710	51.21
75.5 - 76.5	$599,468.48	$22,937.04	0.03826	50.84
76.5 - 77.5	$554,366.09	$12,069.66	0.02177	48.90
77.5 - 78.5	$531,280.89	$5,939.55	0.01118	47.83
78.5 - 79.5	$474,080.76	$11,797.17	0.02488	47.30
79.5 - 80.5	$411,010.16	$661.77	0.00161	46.12
80.5 - 81.5	$286,253.01	$5,130.14	0.01792	46.05
81.5 - 82.5	$263,404.41	$2,045.74	0.00777	45.22
82.5 - 83.5	$147,991.02	$0.00	0.00000	44.87

PSO

Electric Division
362.00 Station Equipment
Original And Smooth Survivor Curves



PSO

Electric Division

364.00 Poles, Towers, and Fixtures

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$449,132,277.17	$627,268.69	0.00140	100.00
0.5 - 1.5	$425,226,900.14	$1,228,878.03	0.00289	99.86
1.5 - 2.5	$396,852,023.47	$1,408,890.55	0.00355	99.57
2.5 - 3.5	$373,101,024.59	$1,630,398.67	0.00437	99.22
3.5 - 4.5	$348,363,723.54	$2,226,523.89	0.00639	98.78
4.5 - 5.5	$326,028,903.98	$1,629,080.67	0.00500	98.15
5.5 - 6.5	$305,352,030.34	$1,577,203.36	0.00517	97.66
6.5 - 7.5	$287,773,502.92	$1,362,802.14	0.00474	97.16
7.5 - 8.5	$274,925,269.40	$1,533,857.61	0.00558	96.70
8.5 - 9.5	$264,200,582.64	$1,750,873.00	0.00663	96.16
9.5 - 10.5	$246,119,944.55	$1,450,616.18	0.00589	95.52
10.5 - 11.5	$230,910,876.31	$1,335,230.26	0.00578	94.96
11.5 - 12.5	$216,673,274.03	$1,282,323.01	0.00592	94.41
12.5 - 13.5	$204,210,957.91	$1,261,873.30	0.00618	93.85
13.5 - 14.5	$191,267,654.11	$1,535,512.18	0.00803	93.27
14.5 - 15.5	$183,599,454.33	$1,264,885.11	0.00689	92.52
15.5 - 16.5	$178,505,240.57	$1,261,131.85	0.00706	91.88
16.5 - 17.5	$168,305,433.67	$1,232,288.22	0.00732	91.24
17.5 - 18.5	$155,266,712.26	$2,219,926.92	0.01430	90.57
18.5 - 19.5	$142,520,660.50	$1,980,791.32	0.01390	89.27
19.5 - 20.5	$130,338,894.04	$1,302,210.80	0.00999	88.03
20.5 - 21.5	$121,164,863.10	$1,043,561.18	0.00861	87.15
21.5 - 22.5	$108,954,807.86	$849,988.85	0.00780	86.40
22.5 - 23.5	$102,576,498.77	$837,990.07	0.00817	85.73
23.5 - 24.5	$97,031,101.16	$803,144.63	0.00828	85.03
24.5 - 25.5	$91,300,336.37	$795,387.22	0.00871	84.32
25.5 - 26.5	$86,560,510.92	$1,191,924.79	0.01377	83.59
26.5 - 27.5	$81,546,956.06	$1,017,721.35	0.01248	82.44
27.5 - 28.5	$77,261,033.32	$710,736.47	0.00920	81.41
28.5 - 29.5	$72,651,809.19	$656,478.50	0.00904	80.66
29.5 - 30.5	$68,374,925.43	$825,905.50	0.01208	79.93
30.5 - 31.5	$63,524,708.59	$865,076.87	0.01362	78.97
31.5 - 32.5	$59,630,168.79	$682,938.50	0.01145	77.89
32.5 - 33.5	$55,592,743.69	$737,063.85	0.01326	77.00
33.5 - 34.5	$50,743,069.79	$660,035.94	0.01301	75.98
34.5 - 35.5	$46,914,647.87	$644,090.20	0.01373	74.99
35.5 - 36.5	$42,236,578.77	$652,914.68	0.01546	73.96

PSO

Electric Division

364.00 Poles, Towers, and Fixtures

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$39,215,582.45	$666,646.14	0.01700	72.82
37.5 - 38.5	$36,597,697.36	$947,463.83	0.02589	71.58
38.5 - 39.5	$33,089,667.80	$875,276.58	0.02645	69.73
39.5 - 40.5	$30,301,303.69	$840,931.00	0.02775	67.88
40.5 - 41.5	$28,032,483.84	$680,031.19	0.02426	66.00
41.5 - 42.5	$26,033,689.44	$569,435.08	0.02187	64.40
42.5 - 43.5	$24,316,778.79	$633,017.27	0.02603	62.99
43.5 - 44.5	$22,348,840.08	$603,596.65	0.02701	61.35
44.5 - 45.5	$20,445,702.74	$800,275.65	0.03914	59.69
45.5 - 46.5	$18,464,460.40	$610,395.32	0.03306	57.35
46.5 - 47.5	$16,713,097.33	$456,509.84	0.02731	55.46
47.5 - 48.5	$15,168,160.97	$343,415.80	0.02264	53.94
48.5 - 49.5	$13,802,579.68	$264,648.19	0.01917	52.72
49.5 - 50.5	$12,550,208.12	$221,372.16	0.01764	51.71
50.5 - 51.5	$11,873,821.41	$257,383.92	0.02168	50.80
51.5 - 52.5	$11,063,698.81	$200,027.71	0.01808	49.70
52.5 - 53.5	$10,039,209.51	$144,879.86	0.01443	48.80
53.5 - 54.5	$9,752,677.13	$160,775.32	0.01649	48.10
54.5 - 55.5	$8,851,633.90	$202,945.23	0.02293	47.30
55.5 - 56.5	$7,948,249.48	$267,738.55	0.03369	46.22
56.5 - 57.5	$6,975,285.26	$163,979.13	0.02351	44.66
57.5 - 58.5	$6,188,014.90	$143,231.21	0.02315	43.61
58.5 - 59.5	$5,565,829.01	$119,354.19	0.02144	42.60
59.5 - 60.5	$4,917,976.89	$105,667.74	0.02149	41.69
60.5 - 61.5	$4,243,405.83	$122,087.54	0.02877	40.79
61.5 - 62.5	$3,645,334.09	$208,085.95	0.05708	39.62
62.5 - 63.5	$3,063,377.61	$90,021.10	0.02939	37.36
63.5 - 64.5	$2,672,832.46	$81,975.99	0.03067	36.26
64.5 - 65.5	$2,115,232.29	$73,446.37	0.03472	35.15
65.5 - 66.5	$1,739,920.95	$58,115.05	0.03340	33.93
66.5 - 67.5	$1,374,012.35	$47,344.16	0.03446	32.79
67.5 - 68.5	$1,045,283.03	$32,356.08	0.03095	31.66
68.5 - 69.5	$745,720.15	$22,674.13	0.03041	30.68
69.5 - 70.5	$499,574.61	$14,354.92	0.02873	29.75
70.5 - 71.5	$326,165.03	$6,491.06	0.01990	28.90
71.5 - 72.5	$265,815.49	$2,957.05	0.01112	28.32
72.5 - 73.5	$246,747.08	$5,479.70	0.02221	28.01

PSO

Electric Division

364.00 Poles, Towers, and Fixtures

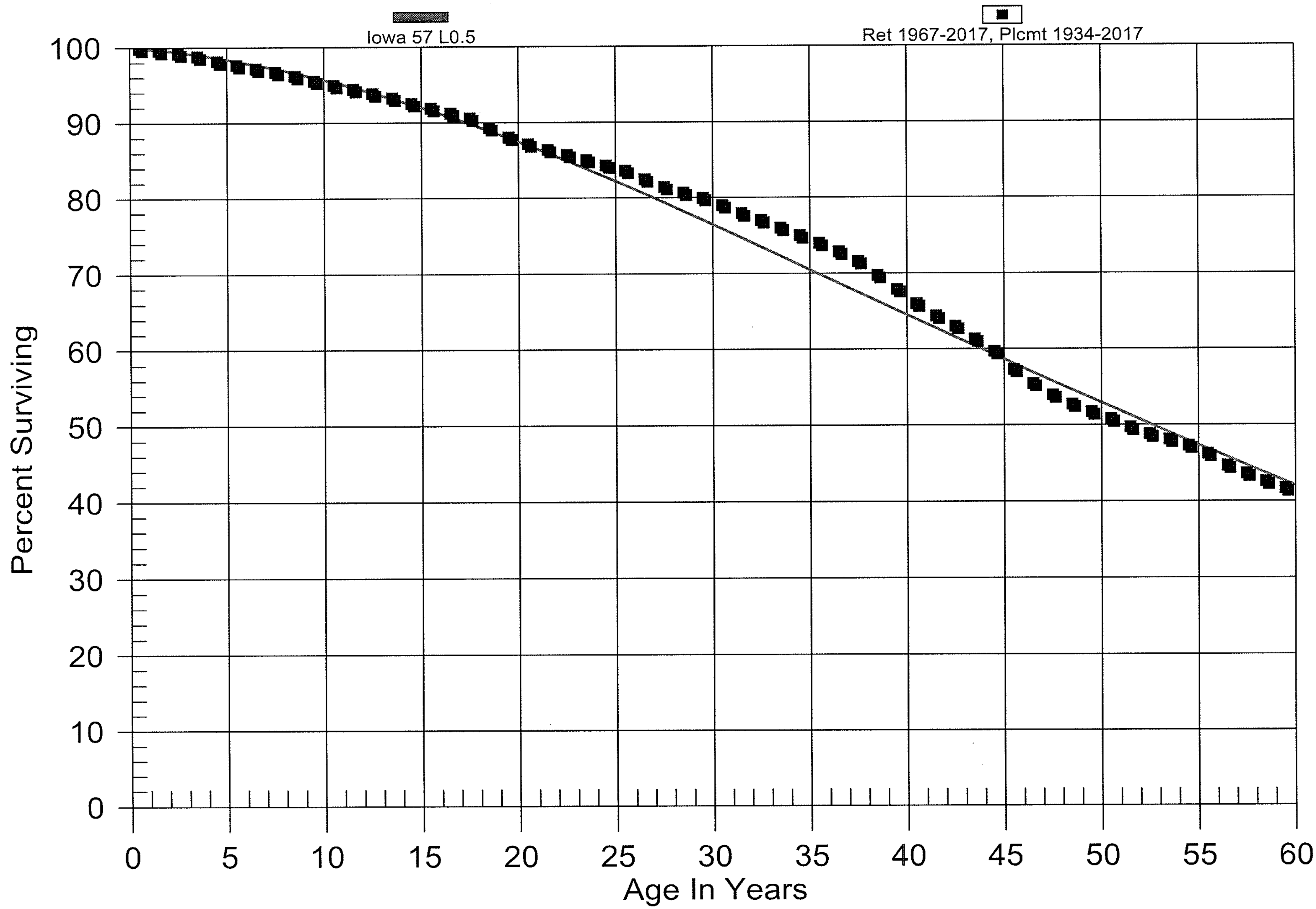
Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$225,538.79	$3,870.61	0.01716	27.38
74.5 - 75.5	$209,579.15	$2,468.31	0.01178	26.91
75.5 - 76.5	$196,243.89	$2,011.03	0.01025	26.60
76.5 - 77.5	$191,120.83	$1,429.02	0.00748	26.32
77.5 - 78.5	$184,472.43	$1,454.48	0.00788	26.13
78.5 - 79.5	$177,057.41	$1,810.02	0.01022	25.92
79.5 - 80.5	$170,104.25	$2,834.76	0.01666	25.66
80.5 - 81.5	$155,734.92	$7,225.38	0.04640	25.23
81.5 - 82.5	$141,811.37	$7,976.26	0.05625	24.06
82.5 - 83.5	$29,165.13	$1,652.74	0.05667	22.71

PSO

Electric Division
364.00 Poles, Towers, and Fixtures
Original And Smooth Survivor Curves



PSO
Electric Division
366.00 Underground Conduit
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1937 TO 2017

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	$80,711,764.88	$4,522.15	0.00006	100.00
0.5 - 1.5	$74,948,450.85	$33,969.12	0.00045	99.99
1.5 - 2.5	$68,786,228.20	$25,517.97	0.00037	99.95
2.5 - 3.5	$63,833,720.64	$28,712.56	0.00045	99.91
3.5 - 4.5	$54,133,586.44	$36,402.20	0.00067	99.87
4.5 - 5.5	$51,155,641.08	$18,001.95	0.00035	99.80
5.5 - 6.5	$47,340,421.16	$19,862.87	0.00042	99.76
6.5 - 7.5	$44,984,826.88	$22,102.50	0.00049	99.72
7.5 - 8.5	$41,962,259.89	$29,368.72	0.00070	99.67
8.5 - 9.5	$32,813,324.16	$26,376.62	0.00080	99.60
9.5 - 10.5	$26,387,078.78	$31,723.21	0.00120	99.52
10.5 - 11.5	$22,913,093.27	$15,617.37	0.00068	99.40
11.5 - 12.5	$20,630,807.99	$31,740.33	0.00154	99.34
12.5 - 13.5	$19,398,909.82	$31,822.95	0.00164	99.18
13.5 - 14.5	$17,961,597.22	$70,489.83	0.00392	99.02
14.5 - 15.5	$13,761,010.23	$22,624.15	0.00164	98.63
15.5 - 16.5	$8,828,917.79	$36,432.98	0.00413	98.47
16.5 - 17.5	$7,877,899.04	$20,945.23	0.00266	98.06
17.5 - 18.5	$8,013,809.86	$37,836.74	0.00472	97.80
18.5 - 19.5	$7,396,219.62	$14,259.69	0.00193	97.34
19.5 - 20.5	$6,314,276.24	$82,918.34	0.01313	97.15
20.5 - 21.5	$5,430,288.71	$23,520.33	0.00433	95.88
21.5 - 22.5	$4,344,045.71	$13,959.26	0.00321	95.46
22.5 - 23.5	$4,238,909.16	$80,530.17	0.01900	95.16
23.5 - 24.5	$4,127,909.53	$4,024.30	0.00097	93.35
24.5 - 25.5	$4,123,559.50	$7,232.73	0.00175	93.26
25.5 - 26.5	$4,111,043.70	$61,273.10	0.01490	93.09
26.5 - 27.5	$4,009,210.65	$8,037.47	0.00200	91.71
27.5 - 28.5	$3,623,084.69	$4,220.49	0.00116	91.52
28.5 - 29.5	$3,651,862.57	$61,125.66	0.01674	91.42
29.5 - 30.5	$3,782,727.24	$6,142.45	0.00162	89.89
30.5 - 31.5	$3,418,944.88	$7,436.68	0.00218	89.74
31.5 - 32.5	$3,317,641.27	$6,030.43	0.00182	89.54
32.5 - 33.5	$3,306,190.84	$15,234.31	0.00461	89.38
33.5 - 34.5	$3,126,256.67	$18,898.02	0.00604	88.97
34.5 - 35.5	$2,945,578.32	$27,197.13	0.00923	88.43
35.5 - 36.5	$2,901,381.19	$7,053.59	0.00243	87.62

PSO
Electric Division
366.00 Underground Conduit
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1937 TO 2017

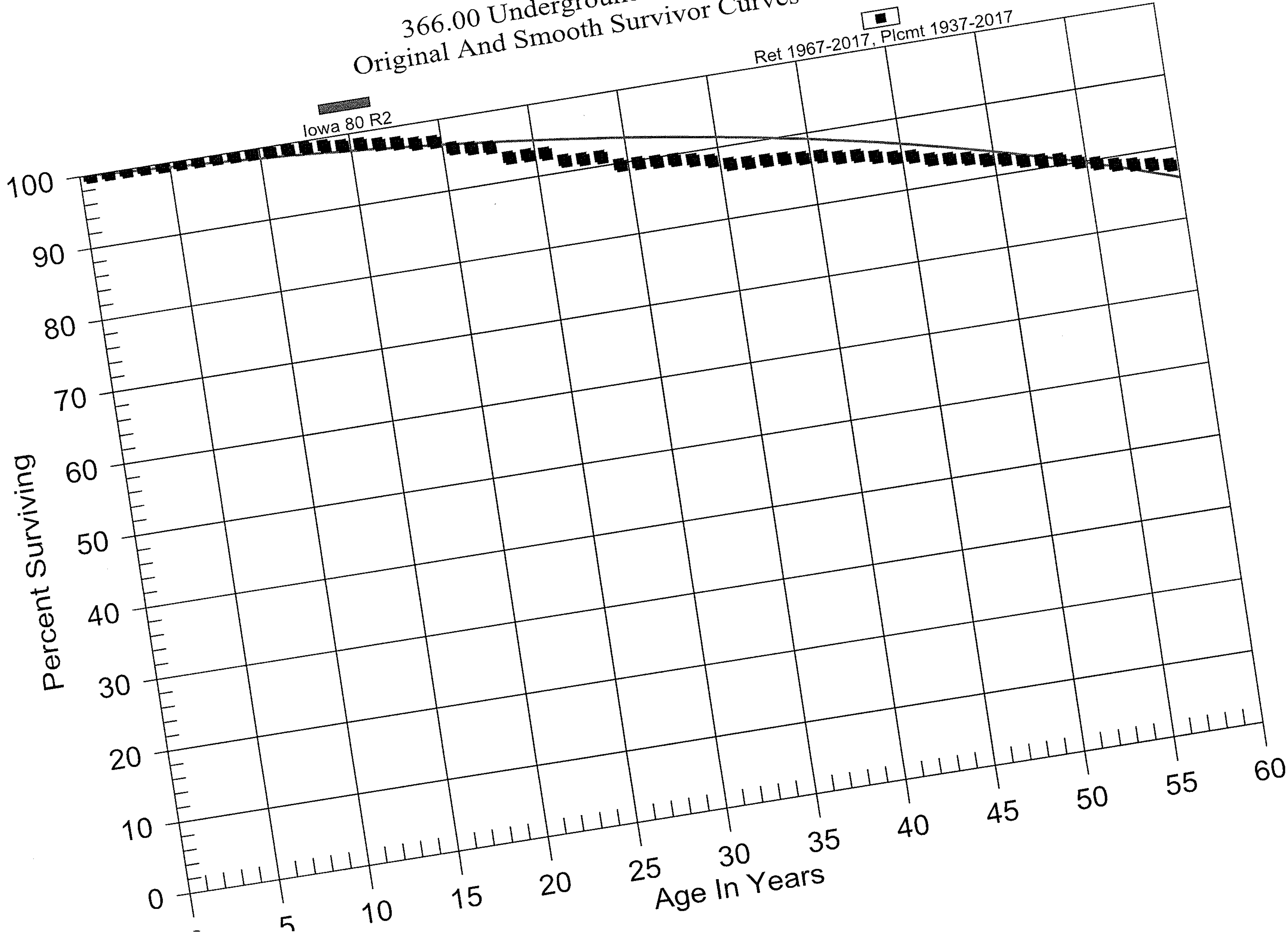
Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$2,890,624.65	$3,642.12	0.00126	87.40
37.5 - 38.5	$2,819,456.39	$5,155.27	0.00183	87.29
38.5 - 39.5	$2,513,341.08	$9,176.01	0.00365	87.13
39.5 - 40.5	$2,392,161.55	$4,177.00	0.00175	86.81
40.5 - 41.5	$2,240,389.97	$14,608.10	0.00652	86.66
41.5 - 42.5	$2,189,815.08	$5,253.96	0.00240	86.10
42.5 - 43.5	$2,033,660.61	$12,520.04	0.00616	85.89
43.5 - 44.5	$2,001,517.78	$12,392.86	0.00619	85.36
44.5 - 45.5	$1,720,969.63	$4,717.58	0.00274	84.83
45.5 - 46.5	$1,600,999.40	$15,494.99	0.00968	84.60
46.5 - 47.5	$1,568,694.64	$6,313.39	0.00402	83.78
47.5 - 48.5	$1,562,381.25	$6,597.72	0.00422	83.45
48.5 - 49.5	$1,543,907.66	$11,305.49	0.00732	83.09
49.5 - 50.5	$1,503,540.19	$5,688.86	0.00378	82.48
50.5 - 51.5	$1,461,298.76	$10,460.52	0.00716	82.17
51.5 - 52.5	$1,431,548.15	$6,422.44	0.00449	81.58
52.5 - 53.5	$1,406,919.87	$5,113.79	0.00363	81.22
53.5 - 54.5	$1,342,596.95	$12,152.29	0.00905	80.92
54.5 - 55.5	$1,308,932.45	$9,369.77	0.00716	80.19
55.5 - 56.5	$1,288,328.51	$9,511.04	0.00738	79.62
56.5 - 57.5	$1,220,169.50	$5,853.88	0.00480	79.03
57.5 - 58.5	$1,127,294.37	$5,586.60	0.00496	78.65
58.5 - 59.5	$1,053,543.00	$6,470.78	0.00614	78.26
59.5 - 60.5	$1,003,144.41	$3,904.33	0.00389	77.78
60.5 - 61.5	$870,924.45	$4,001.44	0.00459	77.48
61.5 - 62.5	$741,343.46	$3,456.54	0.00466	77.12
62.5 - 63.5	$737,886.92	$2,907.03	0.00394	76.76
63.5 - 64.5	$462,823.46	$2,300.69	0.00497	76.46
64.5 - 65.5	$455,948.56	$3,496.32	0.00767	76.08
65.5 - 66.5	$452,452.24	$16,000.52	0.03536	75.50
66.5 - 67.5	$434,991.28	$10,326.45	0.02374	72.83
67.5 - 68.5	$291,813.79	$6,655.12	0.02281	71.10
68.5 - 69.5	$170,984.67	$3,135.80	0.01834	69.48
69.5 - 70.5	$167,848.87	$6,731.95	0.04011	68.20
70.5 - 71.5	$161,109.16	$9,407.16	0.05839	65.47
71.5 - 72.5	$148,931.49	$1,469.49	0.00987	61.64
72.5 - 73.5	$147,462.00	$2,161.00	0.01465	61.03

PSO
Electric Division
366.00 Underground Conduit
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1937 TO 2017

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	$145,301.00	$2,483.85	0.01709	60.14
74.5 - 75.5	$142,817.15	$1,366.69	0.00957	59.11
75.5 - 76.5	$141,450.46	$1,365.36	0.00965	58.55
76.5 - 77.5	$140,045.15	$1,970.57	0.01407	57.98
77.5 - 78.5	$137,218.21	$3,254.06	0.02371	57.17
78.5 - 79.5	$131,769.59	$2,507.07	0.01903	55.81
79.5 - 80.5	$119,718.00	$1,769.25	0.01478	54.75

PSO

Electric Division
366.00 Underground Conduit
Original And Smooth Survivor Curves



PSO
Electric Division
367.00 Underground Conductors and Devices
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$375,500,714.40	$1,053,725.52	0.00281	100.00
0.5 - 1.5	$357,822,818.44	$2,967,303.70	0.00829	99.72
1.5 - 2.5	$330,609,812.90	$3,177,688.29	0.00961	98.89
2.5 - 3.5	$307,560,490.24	$3,075,262.38	0.01000	97.94
3.5 - 4.5	$288,618,375.72	$4,011,471.79	0.01390	96.96
4.5 - 5.5	$272,487,387.25	$3,567,233.39	0.01309	95.61
5.5 - 6.5	$255,125,038.76	$3,997,978.81	0.01567	94.36
6.5 - 7.5	$239,799,130.33	$2,009,025.75	0.00838	92.88
7.5 - 8.5	$224,567,811.14	$2,255,095.33	0.01004	92.11
8.5 - 9.5	$205,083,147.51	$1,651,462.33	0.00805	91.18
9.5 - 10.5	$169,459,965.62	$1,113,005.55	0.00657	90.45
10.5 - 11.5	$150,636,638.98	$745,154.15	0.00495	89.85
11.5 - 12.5	$138,229,627.35	$512,232.87	0.00371	89.41
12.5 - 13.5	$129,746,116.63	$271,087.14	0.00209	89.08
13.5 - 14.5	$121,268,921.67	$334,366.08	0.00276	88.89
14.5 - 15.5	$117,663,829.21	$240,608.07	0.00204	88.65
15.5 - 16.5	$113,163,842.55	$257,554.26	0.00228	88.46
16.5 - 17.5	$107,336,857.84	$203,043.95	0.00189	88.26
17.5 - 18.5	$97,410,897.45	$224,658.44	0.00231	88.10
18.5 - 19.5	$88,930,141.43	$285,004.50	0.00320	87.89
19.5 - 20.5	$80,101,365.21	$249,255.78	0.00311	87.61
20.5 - 21.5	$71,219,153.22	$180,455.38	0.00253	87.34
21.5 - 22.5	$58,599,255.49	$128,873.21	0.00220	87.12
22.5 - 23.5	$58,070,988.35	$110,979.44	0.00191	86.93
23.5 - 24.5	$50,851,225.71	$118,326.53	0.00233	86.76
24.5 - 25.5	$46,880,033.13	$97,104.64	0.00207	86.56
25.5 - 26.5	$44,063,455.94	$84,111.54	0.00191	86.38
26.5 - 27.5	$39,910,472.16	$85,224.45	0.00214	86.21
27.5 - 28.5	$36,670,622.38	$52,564.86	0.00143	86.03
28.5 - 29.5	$34,272,401.14	$82,963.25	0.00242	85.91
29.5 - 30.5	$32,431,254.96	$54,372.95	0.00168	85.70
30.5 - 31.5	$30,637,174.38	$55,731.99	0.00182	85.55
31.5 - 32.5	$29,019,152.32	$50,313.23	0.00173	85.40
32.5 - 33.5	$26,023,556.60	$52,947.43	0.00203	85.25
33.5 - 34.5	$23,177,374.99	$38,158.46	0.00165	85.08
34.5 - 35.5	$20,951,109.91	$22,519.70	0.00107	84.94
35.5 - 36.5	$19,073,418.93	$30,013.22	0.00157	84.85

PSO

Electric Division

367.00 Underground Conductors and Devices

Observed Life Table

Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

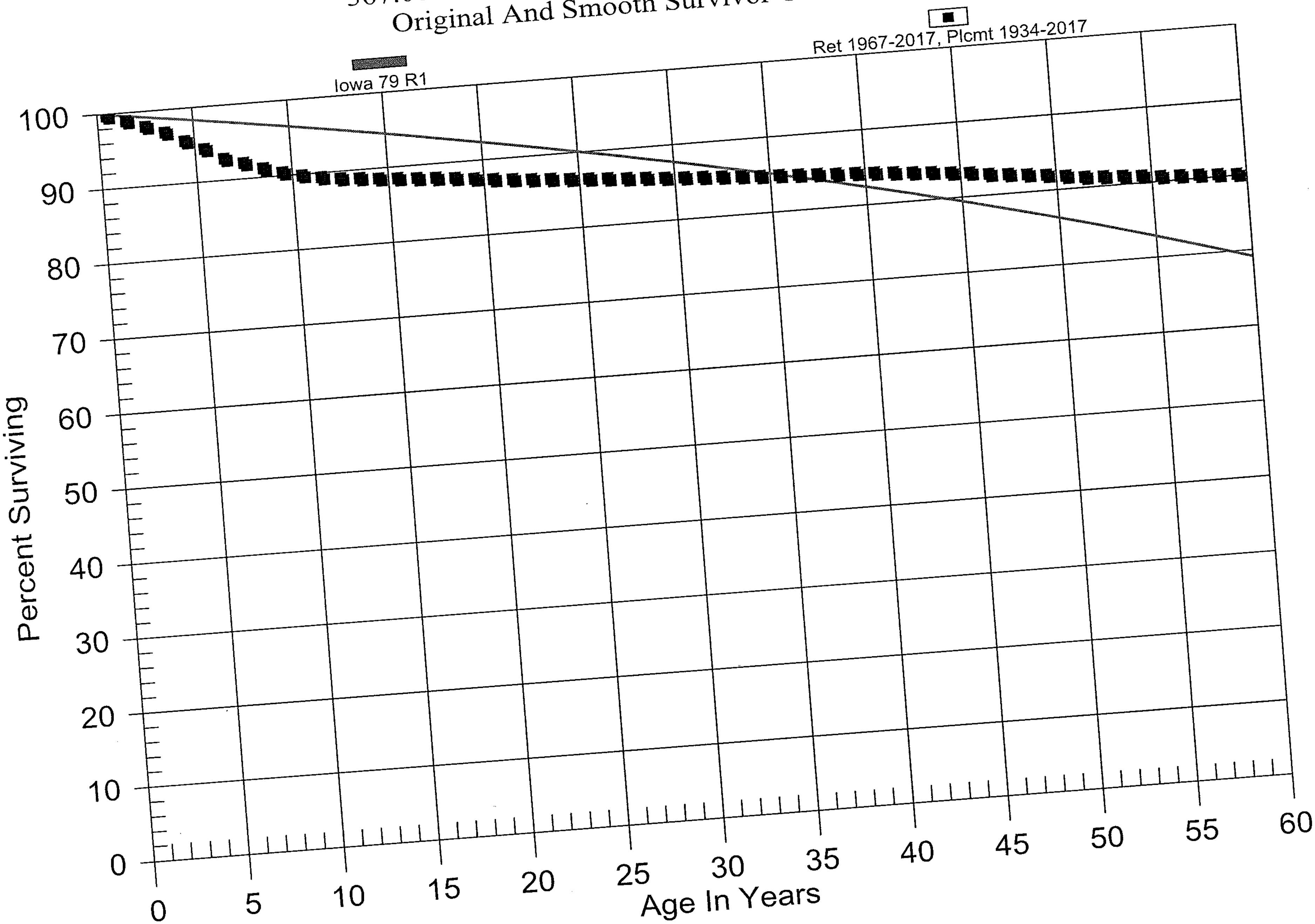
Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$17,114,282.61	$29,937.05	0.00175	84.71
37.5 - 38.5	$15,078,499.18	$22,759.34	0.00151	84.56
38.5 - 39.5	$12,942,162.51	$17,862.70	0.00138	84.44
39.5 - 40.5	$11,021,537.73	$17,526.06	0.00159	84.32
40.5 - 41.5	$9,549,366.83	$24,438.49	0.00256	84.19
41.5 - 42.5	$8,509,830.37	$18,813.81	0.00221	83.97
42.5 - 43.5	$7,147,719.29	$13,896.27	0.00194	83.79
43.5 - 44.5	$6,156,894.21	$17,467.60	0.00284	83.62
44.5 - 45.5	$4,503,886.90	$12,363.70	0.00275	83.39
45.5 - 46.5	$3,782,754.04	$16,233.84	0.00429	83.16
46.5 - 47.5	$3,188,250.46	$9,191.46	0.00288	82.80
47.5 - 48.5	$2,837,816.07	$7,968.34	0.00281	82.56
48.5 - 49.5	$2,511,058.19	$7,850.24	0.00313	82.33
49.5 - 50.5	$2,242,057.89	$9,028.00	0.00403	82.07
50.5 - 51.5	$1,832,869.65	$7,740.23	0.00422	81.74
51.5 - 52.5	$1,650,806.44	$2,294.40	0.00139	81.40
52.5 - 53.5	$1,506,128.74	$3,014.97	0.00200	81.28
53.5 - 54.5	$1,381,769.15	$3,114.95	0.00225	81.12
54.5 - 55.5	$1,323,871.92	$3,839.57	0.00290	80.94
55.5 - 56.5	$1,263,733.60	$1,732.38	0.00137	80.70
56.5 - 57.5	$1,220,145.26	$1,998.31	0.00164	80.59
57.5 - 58.5	$1,135,490.03	$1,959.19	0.00173	80.46
58.5 - 59.5	$1,015,292.01	$1,557.38	0.00153	80.32
59.5 - 60.5	$919,668.65	$2,422.63	0.00263	80.20
60.5 - 61.5	$769,393.17	$7,285.94	0.00947	79.99
61.5 - 62.5	$565,080.20	$2,028.08	0.00359	79.23
62.5 - 63.5	$559,000.23	$7,162.73	0.01281	78.94
63.5 - 64.5	$211,773.58	$2,323.70	0.01097	77.93
64.5 - 65.5	$201,577.73	$1,169.00	0.00580	77.08
65.5 - 66.5	$200,408.73	$2,331.39	0.01163	76.63
66.5 - 67.5	$194,577.70	$3,713.89	0.01909	75.74
67.5 - 68.5	$97,032.34	$2,197.67	0.02265	74.29
68.5 - 69.5	$49,425.32	$2,954.01	0.05977	72.61
69.5 - 70.5	$46,471.31	($650.64)	-0.01400	68.27
70.5 - 71.5	$46,070.92	($344.00)	-0.00747	69.23
71.5 - 72.5	$45,373.84	($2,435.52)	-0.05368	69.74
72.5 - 73.5	$47,809.36	$0.00	0.00000	73.49

PSO
Electric Division
367.00 Underground Conductors and Devices
Observed Life Table
Retirement Expr. 1967 TO 2017
Placement Years 1934 TO 2017

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	$47,809.36	$0.00	0.00000	73.49
74.5 - 75.5	$47,809.36	$0.00	0.00000	73.49
75.5 - 76.5	$47,809.36	$37.02	0.00077	73.49
76.5 - 77.5	$46,545.29	$134.42	0.00289	73.43
77.5 - 78.5	$41,929.61	$259.06	0.00618	73.22
78.5 - 79.5	$33,306.30	$1,034.25	0.03105	72.77

PSO

Electric Division
367.00 Underground Conductors and Devices
Original And Smooth Survivor Curves



PSO

Electric Division

353.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 55 *Survivor Curve: L0.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1934	146,755.30	55.00	2,668.23	21.23	56,653.76
1935	16,038.34	55.00	291.60	21.46	6,256.93
1936	1,794.78	55.00	32.63	21.68	707.60
1937	18,762.04	55.00	341.12	21.91	7,475.32
1938	2,460.00	55.00	44.73	22.15	990.62
1939	8,029.29	55.00	145.98	22.38	3,267.47
1940	2,198.24	55.00	39.97	22.62	904.02
1941	15,072.99	55.00	274.05	22.86	6,264.27
1942	277,423.98	55.00	5,043.99	23.10	116,516.61
1943	18,076.92	55.00	328.67	23.34	7,672.61
1944	9,533.18	55.00	173.33	23.59	4,089.39
1945	15,241.43	55.00	277.11	23.84	6,607.07
1946	6,578.69	55.00	119.61	24.09	2,881.95
1947	20,806.49	55.00	378.29	24.35	9,211.09
1948	139,219.74	55.00	2,531.23	24.61	62,284.41
1949	68,762.87	55.00	1,250.21	24.87	31,090.41
1950	997,744.35	55.00	18,140.51	25.13	455,875.15
1951	77,760.85	55.00	1,413.81	25.40	35,904.00
1952	793,230.20	55.00	14,422.13	25.66	370,115.20
1953	493,881.12	55.00	8,979.51	25.93	232,871.50
1954	990,906.73	55.00	18,016.19	26.21	472,152.94
1955	299,942.31	55.00	5,453.41	26.48	144,430.83
1956	1,053,490.20	55.00	19,154.06	26.76	512,623.22
1957	762,620.62	55.00	13,865.60	27.04	374,992.06
1958	1,659,532.63	55.00	30,172.83	27.33	824,603.15
1959	762,816.26	55.00	13,869.16	27.62	383,022.63
1960	431,211.24	55.00	7,840.08	27.91	218,803.96

PSO

Electric Division

353.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 55 *Survivor Curve: L0.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1961	1,304,932.99	55.00	23,725.67	28.20	669,097.61
1962	339,470.63	55.00	6,172.09	28.50	175,889.28
1963	419,485.84	55.00	7,626.89	28.80	219,629.26
1964	1,578,528.63	55.00	28,700.05	29.10	835,142.25
1965	1,198,305.11	55.00	21,787.01	29.40	640,633.64
1966	2,145,907.85	55.00	39,015.87	29.71	1,159,300.17
1967	1,597,709.68	55.00	29,048.80	30.02	872,187.70
1968	1,287,942.65	55.00	23,416.76	30.34	710,453.06
1969	501,093.54	55.00	9,110.64	30.66	279,308.35
1970	2,208,345.92	55.00	40,151.09	30.98	1,243,820.75
1971	2,272,723.98	55.00	41,321.58	31.30	1,293,511.26
1972	1,643,611.07	55.00	29,883.35	31.63	945,240.64
1973	2,170,980.29	55.00	39,471.73	31.96	1,261,591.18
1974	878,510.72	55.00	15,972.66	32.30	515,856.52
1975	1,415,680.21	55.00	25,739.22	32.63	839,973.20
1976	2,238,234.03	55.00	40,694.50	32.98	1,341,910.37
1977	1,419,458.96	55.00	25,807.93	33.32	859,926.61
1978	3,402,364.22	55.00	61,860.16	33.67	2,082,731.49
1979	4,683,792.25	55.00	85,158.48	34.02	2,897,101.59
1980	4,005,286.53	55.00	72,822.21	34.38	2,503,299.33
1981	367,002.86	55.00	6,672.67	34.73	231,772.14
1982	593,601.29	55.00	10,792.58	35.10	378,791.90
1983	2,659,890.07	55.00	48,360.85	35.46	1,715,061.52
1984	5,972,960.25	55.00	108,597.52	35.83	3,891,487.52
1985	2,487,307.02	55.00	45,223.03	36.21	1,637,439.64
1986	1,783,937.10	55.00	32,434.69	36.59	1,186,675.95
1987	556,922.98	55.00	10,125.71	36.97	374,354.12

PSO

Electric Division

353.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 55 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1988	475,858.61	55.00	8,651.83	37.36	323,239.07
1989	4,844,778.20	55.00	88,085.45	37.76	3,326,001.97
1990	4,554,103.67	55.00	82,800.54	38.17	3,160,102.78
1991	4,897,817.45	55.00	89,049.78	38.58	3,435,614.41
1992	3,237,438.84	55.00	58,861.57	39.01	2,295,978.59
1993	4,087,541.38	55.00	74,317.73	39.44	2,931,202.95
1994	4,849,955.30	55.00	88,179.57	39.89	3,517,483.97
1996	5,049,774.26	55.00	91,812.59	40.82	3,748,240.13
1997	2,648,373.09	55.00	48,151.46	41.31	1,989,255.38
1998	3,167,155.31	55.00	57,583.71	41.81	2,407,811.10
1999	5,617,538.22	55.00	102,135.40	42.33	4,323,245.34
2000	746,857.08	55.00	13,579.00	42.86	582,002.09
2001	4,508,602.91	55.00	81,973.27	43.41	3,558,266.47
2002	6,541,976.11	55.00	118,943.09	43.97	5,229,975.76
2003	7,154,238.62	55.00	130,074.96	44.55	5,794,709.08
2004	5,238,386.81	55.00	95,241.85	45.14	4,299,330.85
2005	11,122,200.55	55.00	202,218.55	45.75	9,252,132.65
2006	12,292,609.04	55.00	223,498.36	46.38	10,366,213.99
2007	33,580,914.89	55.00	610,552.18	47.03	28,712,326.81
2008	25,559,983.72	55.00	464,719.44	47.69	22,162,016.75
2009	10,813,834.40	55.00	196,611.98	48.37	9,509,832.67
2010	14,654,536.58	55.00	266,441.80	49.06	13,072,560.98
2011	11,787,553.94	55.00	214,315.69	49.78	10,668,644.87
2012	9,883,536.49	55.00	179,697.75	50.52	9,077,546.25
2013	8,057,320.09	55.00	146,494.35	51.27	7,510,959.31
2014	79,712,728.38	55.00	1,449,298.82	52.05	75,434,104.82
2015	9,936,012.93	55.00	180,651.85	52.85	9,546,763.68

PSO

Electric Division

353.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 55   *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2016	18,904,783.40	55.00	343,717.76	53.68	18,449,755.76
2017	19,369,957.70	55.00	352,175.34	54.54	19,209,402.57
Total	393,520,245.43	55.00	7,154,797.47	45.98	329,005,176.25

Composite Average Remaining Life ... 45.98 Years

PSO

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 77 Survivor Curve: L1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1934	402,855.15	77.00	5,231.72	31.33	163,917.70
1935	113,690.99	77.00	1,476.46	31.60	46,650.12
1937	4,493.88	77.00	58.36	32.13	1,874.99
1939	12,272.77	77.00	159.38	32.66	5,205.14
1940	11,885.50	77.00	154.35	32.93	5,082.35
1941	132,807.41	77.00	1,724.72	33.19	57,249.23
1942	3,555.63	77.00	46.18	33.46	1,545.19
1943	8,900.11	77.00	115.58	33.74	3,899.19
1944	1,608.52	77.00	20.89	34.01	710.36
1946	85,818.23	77.00	1,114.49	34.56	38,513.16
1948	33,026.33	77.00	428.90	35.11	15,060.45
1949	188,878.54	77.00	2,452.89	35.40	86,825.81
1950	64,654.10	77.00	839.64	35.68	29,961.25
1951	48,064.66	77.00	624.20	35.97	22,453.07
1952	73,728.64	77.00	957.48	36.26	34,721.72
1953	244,192.49	77.00	3,171.23	36.56	115,939.14
1954	1,002,555.71	77.00	13,019.80	36.86	479,895.55
1955	59,886.50	77.00	777.72	37.16	28,902.68
1956	49,751.79	77.00	646.11	37.47	24,211.15
1957	552,813.47	77.00	7,179.17	37.79	271,276.04
1958	242,244.80	77.00	3,145.94	38.11	119,878.16
1959	157,042.23	77.00	2,039.45	38.43	78,378.01
1960	732,859.36	77.00	9,517.36	38.76	368,916.50
1961	471,850.82	77.00	6,127.74	39.10	239,599.90
1962	306,186.62	77.00	3,976.32	39.45	156,850.02
1963	230,650.34	77.00	2,995.36	39.80	119,210.47
1964	1,034,937.42	77.00	13,440.32	40.16	539,753.81

PSO

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 77 *Survivor Curve:* L1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1965	1,135,963.65	77.00	14,752.31	40.53	597,879.91
1966	270,466.34	77.00	3,512.44	40.90	143,675.63
1967	2,391,095.31	77.00	31,052.21	41.29	1,282,156.81
1968	341,368.39	77.00	4,433.22	41.69	184,810.07
1969	600,015.76	77.00	7,792.17	42.09	327,993.39
1970	1,089,239.12	77.00	14,145.52	42.51	601,290.57
1971	3,252,113.44	77.00	42,233.91	42.94	1,813,326.97
1972	682,804.58	77.00	8,867.31	43.37	384,593.06
1973	404,708.42	77.00	5,255.79	43.82	230,305.71
1974	2,943,170.77	77.00	38,221.80	44.28	1,692,524.85
1975	1,880,067.05	77.00	24,415.69	44.75	1,092,715.02
1976	580,431.03	77.00	7,537.83	45.24	341,012.49
1977	2,143,846.11	77.00	27,841.28	45.74	1,273,422.89
1978	2,914,860.83	77.00	37,854.15	46.26	1,751,004.12
1979	4,089,573.95	77.00	53,109.68	46.78	2,484,733.63
1980	3,802,625.14	77.00	49,383.19	47.33	2,337,176.02
1981	602,159.03	77.00	7,820.00	47.89	374,498.31
1982	327,399.52	77.00	4,251.81	48.46	206,058.84
1983	945,279.78	77.00	12,275.98	49.05	602,164.99
1984	15,344,268.14	77.00	199,269.95	49.66	9,894,803.76
1985	1,319,046.93	77.00	17,129.94	50.28	861,302.47
1986	2,018,270.70	77.00	26,210.48	50.91	1,334,503.05
1987	633,580.99	77.00	8,228.07	51.56	424,264.10
1988	655,236.81	77.00	8,509.30	52.23	444,451.70
1989	3,059,433.15	77.00	39,731.65	52.91	2,102,147.16
1990	2,410,478.95	77.00	31,303.94	53.60	1,677,842.97
1991	7,289,596.67	77.00	94,667.11	54.31	5,140,927.30

PSO

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 77 *Survivor Curve: L1.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1992	851,483.91	77.00	11,057.89	55.02	608,415.26
1993	3,683,826.38	77.00	47,840.40	55.75	2,666,982.20
1994	4,240,760.65	77.00	55,073.08	56.48	3,110,786.75
1995	1,795.43	77.00	23.32	57.24	1,334.61
1996	1,525,371.88	77.00	19,809.40	58.00	1,148,939.25
1997	1,718,267.16	77.00	22,314.46	58.77	1,311,454.44
1998	754,788.86	77.00	9,802.14	59.56	583,813.64
1999	962,469.78	77.00	12,499.21	60.36	754,402.00
2000	204,053.44	77.00	2,649.96	61.16	162,080.00
2001	3,958,055.92	77.00	51,401.71	61.99	3,186,183.96
2002	8,558,256.72	77.00	111,142.70	62.82	6,981,702.52
2003	2,638,780.08	77.00	34,268.79	63.66	2,181,546.13
2004	3,188,417.79	77.00	41,406.72	64.51	2,671,271.93
2005	576,304.47	77.00	7,484.24	65.38	489,338.24
2006	2,730,703.90	77.00	35,462.57	66.26	2,349,705.68
2007	10,699,322.50	77.00	138,947.88	67.15	9,329,672.65
2008	9,814,255.07	77.00	127,453.85	68.05	8,672,705.08
2009	4,873,680.77	77.00	63,292.57	68.95	4,364,239.42
2010	12,138,212.83	77.00	157,634.18	69.87	11,013,914.22
2011	4,660,169.19	77.00	60,519.78	70.80	4,284,718.77
2012	2,997,165.05	77.00	38,923.00	71.73	2,792,090.95
2013	3,559,224.52	77.00	46,222.24	72.68	3,359,263.77
2014	3,749,867.15	77.00	48,698.04	73.63	3,585,444.73
2015	4,435,593.92	77.00	57,603.31	74.59	4,296,359.75
2016	4,126,843.01	77.00	53,593.68	75.55	4,048,901.99
2017	943,603.64	77.00	12,254.21	76.52	937,641.61

PSO

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 77 *Survivor Curve:* L1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	166,989,586.59	77.00	2,168,627.81	58.82	127,550,976.47

Composite Average Remaining Life ... 58.82 *Years*

PSO

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 73 Survivor Curve: R0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1934	147,991.02	73.00	2,027.24	26.65	54,032.25
1935	113,367.65	73.00	1,552.96	27.10	42,088.62
1936	17,718.46	73.00	242.72	27.55	6,687.82
1937	124,095.38	73.00	1,699.91	28.01	47,613.57
1938	51,273.43	73.00	702.37	28.47	19,994.48
1939	51,260.58	73.00	702.19	28.93	20,313.04
1940	11,015.54	73.00	150.90	29.39	4,435.21
1941	22,165.35	73.00	303.63	29.86	9,066.25
1942	93,754.46	73.00	1,284.29	30.33	38,952.43
1943	13,848.22	73.00	189.70	30.80	5,843.33
1944	57,835.39	73.00	792.25	31.28	24,781.18
1945	41,404.75	73.00	567.18	31.76	18,013.26
1946	12,612.72	73.00	172.77	32.24	5,570.57
1947	103,067.13	73.00	1,411.86	32.73	46,206.44
1948	255,009.68	73.00	3,493.23	33.22	116,034.92
1949	415,200.29	73.00	5,687.59	33.71	191,723.38
1950	345,557.14	73.00	4,733.59	34.20	161,911.87
1951	279,869.73	73.00	3,833.78	34.70	133,045.04
1952	748,606.48	73.00	10,254.73	35.20	361,016.33
1953	821,763.26	73.00	11,256.87	35.71	401,986.77
1954	1,289,345.42	73.00	17,662.01	36.22	639,688.30
1955	1,203,537.92	73.00	16,486.58	36.73	605,538.61
1956	1,042,618.44	73.00	14,282.23	37.24	531,932.57
1957	1,644,775.22	73.00	22,530.84	37.76	850,801.60
1958	1,332,362.93	73.00	18,251.28	38.28	698,691.92
1959	1,136,363.09	73.00	15,566.39	38.81	604,076.27
1960	986,024.49	73.00	13,506.99	39.33	531,269.23

PSO

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 73 *Survivor Curve: R0.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1961	1,025,115.89	73.00	14,042.48	39.86	559,779.95
1962	932,754.41	73.00	12,777.27	40.40	516,150.71
1963	738,728.94	73.00	10,119.43	40.93	414,202.22
1964	1,129,133.62	73.00	15,467.36	41.47	641,444.30
1965	1,812,110.04	73.00	24,823.06	42.01	1,042,871.56
1966	1,455,762.36	73.00	19,941.66	42.56	848,639.89
1967	1,100,098.21	73.00	15,069.62	43.10	649,564.53
1968	1,955,438.54	73.00	26,786.44	43.65	1,169,332.53
1969	1,394,328.26	73.00	19,100.11	44.21	844,360.34
1970	1,150,525.81	73.00	15,760.40	44.76	705,470.88
1971	968,085.76	73.00	13,261.25	45.32	600,996.44
1972	1,766,668.22	73.00	24,200.58	45.88	1,110,340.70
1973	1,751,375.69	73.00	23,991.10	46.44	1,114,227.27
1974	1,525,452.24	73.00	20,896.30	47.01	982,295.25
1975	3,428,063.37	73.00	46,959.08	47.58	2,234,142.50
1976	2,325,097.82	73.00	31,850.19	48.15	1,533,453.71
1977	1,136,873.74	73.00	15,573.38	48.72	758,706.58
1978	3,811,254.66	73.00	52,208.20	49.29	2,573,449.00
1979	1,824,882.43	73.00	24,998.02	49.87	1,246,594.04
1980	2,239,557.52	73.00	30,678.42	50.45	1,547,608.46
1981	372,272.88	73.00	5,099.55	51.03	260,208.64
1982	2,767,093.39	73.00	37,904.83	51.61	1,956,152.52
1983	2,759,198.56	73.00	37,796.69	52.19	1,972,638.58
1984	2,325,228.34	73.00	31,851.98	52.78	1,681,000.74
1985	1,958,012.17	73.00	26,821.69	53.36	1,431,242.19
1986	1,472,496.60	73.00	20,170.89	53.95	1,088,216.39
1987	917,236.57	73.00	12,564.70	54.54	685,263.32

PSO

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 73 *Survivor Curve: R0.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1988	2,002,781.09	73.00	27,434.95	55.13	1,512,479.04
1989	4,241,730.43	73.00	58,105.04	55.72	3,237,683.53
1990	5,732,688.86	73.00	78,528.83	56.31	4,422,255.77
1991	6,936,769.21	73.00	95,022.84	56.91	5,407,574.46
1992	3,451,621.80	73.00	47,281.80	57.50	2,718,842.69
1993	3,736,083.41	73.00	51,178.47	58.10	2,973,395.29
1994	3,892,617.05	73.00	53,322.74	58.70	3,129,826.09
1996	3,986,976.98	73.00	54,615.32	59.89	3,271,037.38
1997	5,009,554.67	73.00	68,623.03	60.49	4,151,120.59
1998	6,224,179.41	73.00	85,261.48	61.09	5,208,768.16
1999	6,760,701.51	73.00	92,610.99	61.69	5,713,470.73
2000	2,063,621.29	73.00	28,268.37	62.30	1,760,982.46
2001	4,608,457.90	73.00	63,128.63	62.90	3,970,655.76
2002	4,400,869.31	73.00	60,285.00	63.50	3,828,233.98
2003	6,905,836.28	73.00	94,599.11	64.11	6,064,464.71
2004	3,452,911.32	73.00	47,299.46	64.71	3,060,899.71
2005	4,233,215.50	73.00	57,988.40	65.32	3,787,806.96
2006	6,945,025.70	73.00	95,135.94	65.93	6,272,107.24
2007	13,435,496.02	73.00	184,045.19	66.54	12,245,864.19
2008	10,714,078.23	73.00	146,766.04	67.15	9,854,942.28
2009	14,326,426.15	73.00	196,249.53	67.76	13,297,523.14
2010	9,446,627.50	73.00	129,403.96	68.37	8,847,487.45
2011	11,639,698.32	73.00	159,445.58	68.98	10,999,258.36
2012	13,699,075.94	73.00	187,655.82	69.60	13,060,599.96
2013	30,490,199.52	73.00	417,667.84	70.22	29,326,582.00
2014	28,059,841.80	73.00	384,375.75	70.83	27,226,047.16
2015	26,257,227.08	73.00	359,682.76	71.45	25,699,477.54

PSO

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 73 *Survivor Curve: R0.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2016	23,387,671.38	73.00	320,374.36	72.07	23,089,280.19
2017	33,057,961.83	73.00	452,842.15	72.69	32,917,107.78
Total	357,505,235.70	73.00	4,897,260.11	63.99	313,395,443.10

Composite Average Remaining Life ... 63.99 Years

PSO

Electric Division

364.00 Poles, Towers, and Fixtures

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1934	27,512.39	57.00	482.67	22.69	10,953.42
1935	104,669.98	57.00	1,836.29	22.93	42,100.85
1936	6,698.17	57.00	117.51	23.16	2,721.62
1937	11,534.57	57.00	202.36	23.40	4,734.60
1938	5,143.14	57.00	90.23	23.64	2,132.68
1939	5,960.54	57.00	104.57	23.88	2,497.04
1940	5,219.38	57.00	91.57	24.12	2,208.82
1941	3,112.03	57.00	54.60	24.37	1,330.43
1942	10,866.95	57.00	190.65	24.62	4,693.18
1943	12,089.03	57.00	212.09	24.87	5,274.55
1944	15,728.59	57.00	275.94	25.12	6,932.37
1945	16,111.36	57.00	282.65	25.38	7,173.42
1946	53,858.48	57.00	944.87	25.64	24,224.42
1947	159,054.66	57.00	2,790.39	25.90	72,272.18
1948	223,471.41	57.00	3,920.49	26.16	102,574.66
1949	267,206.80	57.00	4,687.77	26.43	123,897.20
1950	281,385.16	57.00	4,936.51	26.70	131,799.32
1951	307,793.55	57.00	5,399.81	26.97	145,642.22
1952	301,864.97	57.00	5,295.80	27.25	144,287.15
1953	475,624.18	57.00	8,344.16	27.52	229,650.82
1954	300,524.05	57.00	5,272.28	27.80	146,579.68
1955	373,870.53	57.00	6,559.04	28.09	184,213.48
1956	475,984.20	57.00	8,350.48	28.37	236,904.65
1957	568,903.32	57.00	9,980.62	28.66	286,023.52
1958	528,497.93	57.00	9,271.76	28.95	268,404.32
1959	478,954.68	57.00	8,402.59	29.24	245,717.71
1960	623,291.23	57.00	10,934.78	29.54	323,003.70

PSO

Electric Division

364.00 Poles, Towers, and Fixtures

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 Survivor Curve: L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1961	705,225.67	57.00	12,372.20	29.84	369,164.65
1962	700,439.19	57.00	12,288.23	30.14	370,372.16
1963	740,267.91	57.00	12,986.97	30.45	395,405.96
1964	141,652.52	57.00	2,485.10	30.75	76,427.07
1965	824,461.59	57.00	14,464.03	31.07	449,327.09
1966	552,738.68	57.00	9,697.03	31.38	304,285.65
1967	455,014.55	57.00	7,982.60	31.70	253,025.69
1968	987,723.37	57.00	17,328.23	32.02	554,802.27
1969	1,022,165.49	57.00	17,932.47	32.34	579,946.42
1970	1,088,426.52	57.00	19,094.93	32.67	623,777.24
1971	1,140,967.75	57.00	20,016.69	33.00	660,501.33
1972	1,180,966.69	57.00	20,718.42	33.33	690,553.05
1973	1,299,540.69	57.00	22,798.63	33.67	767,553.05
1974	1,334,921.44	57.00	23,419.34	34.01	796,403.85
1975	1,147,475.57	57.00	20,130.86	34.35	691,487.70
1976	1,318,763.21	57.00	23,135.86	34.70	802,718.34
1977	1,427,888.85	57.00	25,050.32	35.05	877,902.25
1978	1,913,087.53	57.00	33,562.46	35.40	1,188,069.48
1979	2,560,565.73	57.00	44,921.56	35.76	1,606,204.44
1980	1,951,238.95	57.00	34,231.77	36.12	1,236,311.68
1981	2,368,081.64	57.00	41,544.69	36.48	1,515,537.80
1982	4,033,978.90	57.00	70,770.54	36.85	2,607,691.39
1983	3,168,385.98	57.00	55,584.92	37.22	2,068,778.50
1984	4,112,610.05	57.00	72,150.02	37.59	2,712,343.06
1985	3,714,970.78	57.00	65,173.99	37.97	2,474,812.44
1986	3,512,817.36	57.00	61,627.49	38.36	2,363,857.55
1987	4,049,586.40	57.00	71,044.35	38.75	2,752,810.78

PSO

Electric Division

364.00 Poles, Towers, and Fixtures

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 *Survivor Curve: L0.5*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1988	3,709,471.55	57.00	65,077.51	39.15	2,547,545.55
1989	3,972,544.65	57.00	69,692.76	39.55	2,756,556.99
1990	3,341,912.08	57.00	58,629.19	39.97	2,343,318.17
1991	3,931,843.20	57.00	68,978.71	40.39	2,786,289.67
1992	4,069,304.92	57.00	71,390.29	40.83	2,914,722.38
1993	5,044,129.59	57.00	88,492.23	41.28	3,652,524.25
1994	4,828,045.61	57.00	84,701.34	41.73	3,534,922.19
1995	5,688,069.82	57.00	99,789.26	42.21	4,211,623.56
1996	11,337,863.38	57.00	198,907.02	42.69	8,490,953.33
1997	8,103,830.50	57.00	142,170.42	43.19	6,139,839.01
1998	10,836,596.34	57.00	190,112.99	43.70	8,307,691.93
1999	11,086,220.50	57.00	194,492.30	44.23	8,601,440.45
2000	12,542,548.85	57.00	220,041.55	44.76	9,850,032.42
2001	9,688,683.91	57.00	169,974.47	45.32	7,703,460.76
2002	4,536,425.18	57.00	79,585.26	45.89	3,652,421.37
2003	6,814,364.70	57.00	119,548.54	46.48	5,556,655.98
2004	12,608,288.58	57.00	221,194.87	47.08	10,414,101.94
2005	11,915,756.53	57.00	209,045.36	47.70	9,971,625.86
2006	13,970,465.63	57.00	245,092.37	48.34	11,846,857.66
2007	14,902,626.95	57.00	261,445.84	48.99	12,807,677.11
2008	17,351,165.19	57.00	304,402.03	49.65	15,114,690.87
2009	10,105,991.09	57.00	177,295.54	50.34	8,925,016.68
2010	12,351,252.64	57.00	216,685.53	51.04	11,060,252.78
2011	17,148,192.31	57.00	300,841.16	51.76	15,572,614.52
2012	20,231,418.21	57.00	354,932.06	52.50	18,633,980.25
2013	21,216,261.74	57.00	372,209.77	53.26	19,823,982.76
2014	24,451,135.51	57.00	428,961.12	54.04	23,181,665.24

PSO

Electric Division

364.00 Poles, Towers, and Fixtures

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 57 *Survivor Curve: L0.5*

Year (1)	*Original Cost* (2)	*Avg. Service Life* (3)	*Avg. Annual Accrual* (4)	*Avg. Remaining Life* (5)	*Future Annual Accruals* (6)
2015	23,667,898.73	57.00	415,220.33	54.85	22,773,211.76
2016	28,932,810.78	57.00	507,585.88	55.67	28,259,409.73
2017	24,818,427.84	57.00	435,404.76	56.54	24,619,626.65
Total	416,302,440.80	57.00	7,303,446.62	47.73	348,602,730.70

Composite Average Remaining Life ... 47.73 Years

PSO

Electric Division

366.00 Underground Conduit

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 80 *Survivor Curve: R2*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1937	117,948.75	80.00	1,474.36	21.89	32,278.67
1938	9,544.52	80.00	119.31	22.37	2,668.94
1939	2,194.56	80.00	27.43	22.85	626.91
1940	856.37	80.00	10.70	23.34	249.88
1941	39.95	80.00	0.50	23.84	11.91
1946	2,770.51	80.00	34.63	26.44	915.79
1947	7.76	80.00	0.10	26.99	2.62
1949	114,174.00	80.00	1,427.17	28.09	40,090.79
1950	132,851.04	80.00	1,660.64	28.66	47,589.69
1951	1,460.44	80.00	18.26	29.23	533.58
1953	4,574.21	80.00	57.18	30.39	1,737.67
1954	272,156.43	80.00	3,401.95	30.99	105,411.98
1956	125,579.55	80.00	1,569.74	32.19	50,530.89
1957	128,315.63	80.00	1,603.94	32.80	52,613.67
1958	43,927.81	80.00	549.10	33.42	18,353.55
1959	68,164.77	80.00	852.06	34.05	29,013.65
1960	87,021.25	80.00	1,087.76	34.68	37,727.75
1961	58,647.97	80.00	733.10	35.32	25,894.85
1962	11,234.17	80.00	140.43	35.97	5,051.30
1963	21,512.21	80.00	268.90	36.62	9,848.09
1964	59,209.13	80.00	740.11	37.28	27,592.58
1965	18,205.84	80.00	227.57	37.95	8,635.42
1966	19,290.09	80.00	241.13	38.62	9,312.13
1967	36,552.57	80.00	456.91	39.30	17,954.85
1968	29,061.98	80.00	363.27	39.98	14,523.50
1969	11,875.87	80.00	148.45	40.67	6,037.08
1971	16,809.77	80.00	210.12	42.07	8,839.07

PSO
Electric Division
366.00 Underground Conduit

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2017
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 80 *Survivor Curve: R2*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1972	115,252.65	80.00	1,440.66	42.77	61,620.83
1973	268,155.29	80.00	3,351.94	43.48	145,757.11
1974	19,622.79	80.00	245.28	44.20	10,842.76
1975	150,900.51	80.00	1,886.25	44.93	84,746.28
1976	35,966.79	80.00	449.58	45.66	20,526.70
1977	147,594.58	80.00	1,844.93	46.39	85,587.95
1978	112,003.52	80.00	1,400.04	47.13	65,988.15
1979	300,960.04	80.00	3,761.99	47.88	180,117.09
1980	67,526.14	80.00	844.08	48.63	41,045.79
1981	3,702.95	80.00	46.29	49.38	2,285.78
1982	17,000.00	80.00	212.50	50.15	10,655.96
1983	161,780.33	80.00	2,022.25	50.91	102,955.68
1984	164,699.86	80.00	2,058.74	51.68	106,399.60
1985	5,420.00	80.00	67.75	52.46	3,553.94
1986	93,866.93	80.00	1,173.33	53.24	62,467.47
1987	357,639.91	80.00	4,470.49	54.02	241,516.01
1988	383.00	80.00	4.79	54.81	262.42
1989	3,359.76	80.00	42.00	55.61	2,335.38
1990	383,209.45	80.00	4,790.11	56.41	270,208.23
1991	44,994.82	80.00	562.43	57.21	32,178.84
1992	5,344.54	80.00	66.81	58.02	3,876.23
1993	325.73	80.00	4.07	58.83	239.55
1994	30,469.46	80.00	380.87	59.65	22,719.97
1995	91,177.29	80.00	1,139.71	60.47	68,924.06
1996	1,062,722.67	80.00	13,284.01	61.30	814,317.80
1997	813,145.29	80.00	10,164.30	62.13	631,511.48
1998	1,068,657.93	80.00	13,358.20	62.97	841,118.75

PSO

Electric Division

366.00 Underground Conduit

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 80 *Survivor Curve:* R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1999	585,504.50	80.00	7,318.79	63.81	466,975.79
2000	3,248.91	80.00	40.61	64.65	2,625.42
2001	1,060,702.47	80.00	13,258.76	65.49	868,364.94
2002	4,913,126.59	80.00	61,413.97	66.35	4,074,565.44
2003	4,130,097.16	80.00	51,626.12	67.20	3,469,299.80
2004	1,411,821.62	80.00	17,647.74	68.06	1,201,081.97
2005	1,582,995.89	80.00	19,787.41	68.92	1,363,758.78
2006	2,266,667.91	80.00	28,333.30	69.79	1,977,323.74
2007	3,585,696.78	80.00	44,821.13	70.66	3,166,956.56
2008	6,575,945.65	80.00	82,199.17	71.53	5,879,773.15
2009	9,167,575.05	80.00	114,594.48	72.41	8,297,483.25
2010	3,074,705.96	80.00	38,433.76	73.29	2,816,777.05
2011	2,444,191.60	80.00	30,552.34	74.17	2,266,160.19
2012	3,884,489.82	80.00	48,556.04	75.06	3,644,626.00
2013	2,954,633.73	80.00	36,932.86	75.95	2,805,070.18
2014	9,703,822.62	80.00	121,297.57	76.85	9,321,205.45
2015	4,993,951.13	80.00	62,424.28	77.74	4,853,050.51
2016	6,171,762.92	80.00	77,146.90	78.64	6,067,082.81
2017	5,779,084.44	80.00	72,238.43	79.55	5,746,311.56
Total	81,209,894.13	80.00	1,015,121.86	71.67	72,756,299.20

Composite Average Remaining Life ... 71.67 *Years*

PSO

Electric Division

367.00 Underground Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 79   Survivor Curve: R1

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1938	32,272.05	79.00	408.50	28.77	11,752.21
1939	8,364.25	79.00	105.87	29.26	3,097.49
1940	4,481.26	79.00	56.72	29.75	1,687.33
1941	1,227.05	79.00	15.53	30.24	469.70
1946	1,041.08	79.00	13.18	32.78	431.96
1947	1,051.03	79.00	13.30	33.30	443.04
1949	45,409.35	79.00	574.79	34.36	19,747.15
1950	93,831.47	79.00	1,187.72	34.89	41,440.20
1951	3,499.64	79.00	44.30	35.43	1,569.45
1953	7,872.15	79.00	99.65	36.52	3,638.92
1954	340,063.92	79.00	4,304.53	37.07	159,576.36
1955	4,051.89	79.00	51.29	37.63	1,929.89
1956	197,027.03	79.00	2,493.97	38.19	95,239.72
1957	147,852.85	79.00	1,871.52	38.75	72,525.91
1958	94,065.98	79.00	1,190.69	39.32	46,821.76
1959	118,238.83	79.00	1,496.67	39.90	59,712.18
1960	82,656.92	79.00	1,046.27	40.47	42,347.09
1961	41,855.96	79.00	529.81	41.06	21,751.89
1962	56,298.75	79.00	712.63	41.64	29,676.81
1963	54,782.28	79.00	693.43	42.23	29,286.84
1964	121,344.62	79.00	1,535.98	42.83	65,784.19
1965	142,383.30	79.00	1,802.29	43.43	78,271.53
1966	174,322.98	79.00	2,206.58	44.03	97,159.94
1967	400,160.24	79.00	5,065.23	44.64	226,104.63
1968	261,150.06	79.00	3,305.64	45.25	149,576.68
1969	318,789.54	79.00	4,035.24	45.87	185,076.94
1970	341,242.93	79.00	4,319.46	46.48	200,784.17

PSO
Electric Division
367.00 Underground Conductors and Devices
Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2017
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 79 *Survivor Curve: R1*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1971	578,269.74	79.00	7,319.75	47.11	344,801.63
1972	708,769.16	79.00	8,971.61	47.73	428,225.32
1973	1,635,539.71	79.00	20,702.68	48.36	1,001,229.82
1974	976,928.81	79.00	12,365.98	49.00	605,875.18
1975	1,343,297.27	79.00	17,003.47	49.63	843,908.85
1976	1,015,097.97	79.00	12,849.12	50.27	645,937.09
1977	1,454,644.84	79.00	18,412.91	50.92	937,506.50
1978	1,902,762.08	79.00	24,085.19	51.56	1,241,877.68
1979	2,113,577.33	79.00	26,753.69	52.21	1,396,834.58
1980	2,005,846.38	79.00	25,390.03	52.86	1,342,227.94
1981	1,929,123.10	79.00	24,418.87	53.52	1,306,889.26
1982	1,855,171.28	79.00	23,482.78	54.18	1,272,238.68
1983	2,188,106.62	79.00	27,697.08	54.84	1,518,849.02
1984	2,793,234.18	79.00	35,356.80	55.50	1,962,384.01
1985	2,942,282.97	79.00	37,243.46	56.17	2,091,894.57
1986	1,562,290.07	79.00	19,775.49	56.84	1,123,961.81
1987	1,739,197.18	79.00	22,014.78	57.51	1,265,987.89
1988	1,811,339.90	79.00	22,927.96	58.18	1,333,953.05
1989	2,389,750.72	79.00	30,249.50	58.86	1,780,334.51
1990	3,166,983.67	79.00	40,087.72	59.53	2,386,492.26
1991	4,079,494.38	79.00	51,638.29	60.21	3,109,159.56
1992	2,721,069.62	79.00	34,443.34	60.89	2,097,339.10
1993	3,852,866.05	79.00	48,769.63	61.58	3,002,998.90
1994	7,108,783.20	79.00	89,983.07	62.26	5,602,314.24
1995	399,393.93	79.00	5,055.53	62.95	318,230.75
1996	12,439,448.35	79.00	157,458.70	63.64	10,019,966.52
1997	8,636,044.89	79.00	109,315.17	64.33	7,031,784.52

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Electric Division

367.00 Underground Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 79 *Survivor Curve:* R1

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1998	8,549,097.24	79.00	108,214.59	65.02	7,035,884.12
1999	8,256,211.58	79.00	104,507.24	65.71	6,867,513.87
2000	9,783,168.62	79.00	123,835.48	66.41	8,223,896.37
2001	5,673,870.95	79.00	71,819.93	67.11	4,819,722.65
2002	4,263,399.70	79.00	53,966.17	67.81	3,659,394.06
2003	3,270,726.38	79.00	41,400.90	68.51	2,836,516.82
2004	8,218,303.70	79.00	104,027.40	69.22	7,200,669.73
2005	8,520,241.21	79.00	107,849.33	69.93	7,541,551.72
2006	11,666,322.16	79.00	147,672.46	70.64	10,431,107.22
2007	17,925,988.93	79.00	226,907.41	71.35	16,190,067.23
2008	34,148,209.29	79.00	432,248.49	72.07	31,150,588.32
2009	17,337,779.97	79.00	219,461.85	72.78	15,973,354.81
2010	13,355,390.83	79.00	169,052.72	73.51	12,426,361.82
2011	11,428,501.34	79.00	144,662.12	74.23	10,738,171.47
2012	13,856,336.39	79.00	175,393.69	74.96	13,146,697.09
2013	12,182,727.99	79.00	154,209.13	75.68	11,671,164.00
2014	15,941,738.14	79.00	201,790.74	76.42	15,420,213.86
2015	20,076,644.55	79.00	254,130.44	77.15	19,606,555.74
2016	24,490,525.14	79.00	310,001.40	77.89	24,145,684.67
2017	16,880,115.26	79.00	213,668.73	78.63	16,800,585.80
Total	344,269,950.18	79.00	4,357,773.65	69.66	303,544,808.58

Composite Average Remaining Life ... 69.66 *Years*

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Electric Division

367.00 Underground Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2017

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 79 *Survivor Curve: R1*

Year	Original Cost	Avg. Service Life	Avg. Annual Accrual	Avg. Remaining Life	Future Annual Accruals
(1)	(2)	(3)	(4)	(5)	(6)

AFFIDAVIT OF DAVID J. GARRETT

STATE OF OKLAHOMA)
)
COUNTY OF OKLAHOMA)

On the 10th day of January, 2019, before me appeared David J. Garrett, to me personally known, who, being by me first duly sworn, states that he is the President of Resolve Utility Consulting PLLC, and acknowledges that he has read the above and foregoing testimony and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

David J. Garrett

Subscribed and sworn to before me this 10th day of January, 2019.

GARRY GARRETT
NOTARY
17000773
EXP. 01/25/21
PUBLIC
STATE OF OKLAHOMA

Notary Public

My Commission expires: 1/25/21

CERTIFICATE OF MAILING

This is to certify that on this 10th day of January, 2019, a true and correct copy of the above and foregoing was emailed, addressed to:

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