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JOSE R. OLIVA
Speaker of the House of Representatives

May 15, 2020

Mr. Gary F. Clark, Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Docket No. 20190155-EI, 20190156-EI and 2010174-EI

Dear Ms. Stauffer,

Please find enclosed for filing in the above referenced docket the Direct Testimony and Exhibits of David J. Garrett. This filing is being made via the Florida Public Service Commission's Web Based Electronic Filing portal.

If you have any questions or concerns; please do not hesitate to contact me. Thank you for your assistance in this matter.

Sincerely,

/s/Patricia A. Christensen
Patricia A. Christensen
Associate Public Counsel

cc: All Parties of Record

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition for establishment of regulatory assets for expenses not recovered during restoration for Hurricane Michael, by Florida Public Utilities Company.	DOCKET NO. 20190155-EI
In re: Petition for a limited proceeding to recover incremental storm restoration costs, capital costs, revenue reduction for permanently lost customers, and regulatory assets related to Hurricane Michael, by Florida Public Utilities Company.	DOCKET NO. 20190156-EI
In re: Petition for approval of 2019 depreciation study by Florida Public Utilities Company.	DOCKET NO. 20190174-EI

DIRECT TESTIMONY
OF
DAVID J. GARRETT

ON BEHALF OF THE FLORIDA OFFICE OF PUBLIC COUNSEL

J. R. Kelly
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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.

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 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 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 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]

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[1] Exhibit DJG-1.

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

A. I am testifying on behalf of the Florida Office of Public Counsel ("OPC") in response to the Petition for approval of the 2019 depreciation study by Florida Public Utilities Company ("FPUC" or the "Company"). I will address the depreciation rates and parameters proposed by FPUC and sponsored in the direct testimony of Company witness Patricia Lee.

II. EXECUTIVE SUMMARY

Q. SUMMARIZE THE KEY POINTS OF YOUR TESTIMONY REGARDING DEPRECIATION.

A. In the context of utility ratemaking, "depreciation" refers to a cost allocation system designed to measure the rate by which a utility may recover its capital investments in a systematic and rational manner. There are two primary components of depreciation rates that must be estimated and are often the most pertinent issues in regulatory proceedings – service life and net salvage. Typically, the service lives proposed in depreciation studies are based on voluminous amounts of historical data. Through a combination of actuarial and simulated analysis, depreciation analysts can observe retirement patterns and trends in the historical data in order to make reasonably accurate projections of remaining life. In this case, however, FPUC did not provide the historical data required to conduct an accurate, company-specific analysis of the service life of its assets. Instead, FPUC based its service life proposals on the approved service lives of other Florida utilities. It is my understanding that some of the approved service lives among the Florida peer group on which FPUC relied were also based on a similar peer group comparison. In other words, FPUC is basing its service life proposals on a Florida peer group average, and those service lives (at least in part), were based on other prior Florida peer group averages. Repeating this process case after case has the effect of creating a type of echo chamber or feedback loop among the approved service lives of some Florida utilities. As noted in Ms. Lee's testimony, the approach used in the Company's depreciation study in this case "is similar to that used in each FPUC electric depreciation study for the last 20+ years."[2] To the extent some of the peer group utilities have taken a similar approach over the same period of time, it means that some of FPUC's service lives might be based on information that is decades old, and such information may have never been originally based on company-specific historical service life data. In other words, FPUC's proposed service lives in this case are based on a copy of a copy of a copy of the same approved service lives of an echo-chamber peer group for over 20 years. This is not how service lives are typically estimated.

As discussed further in my testimony, the legal standards governing depreciation rates require that the utility make a convincing showing that its proposed depreciation rates are not excessive. Again, this showing is typically based, at the very least, on adequate amounts of historical retirement data upon which reasonable service life estimates can be made. The fact that FPUC has not provided such information in this case does not absolve it from its burden to make a convincing showing that its proposed depreciation rates (including service lives) are reasonable. By simply relying on an echo chamber of

[2] Direct Testimony of Patricia Lee, p. 12, lines 7-9.

approved service lives for other utilities, FPUC's proposed service lives are not well supported. This is especially true in light of the fact that the approved service lives for utilities outside of the echo chamber for several key accounts are notably longer than those proposed by FPUC for the same accounts. All else held constant, longer service lives result in lower depreciation rates and expense.

Since FPUC did not provide adequate historical retirement data upon which to conduct an accurate service life analysis, a peer group comparison is an approach we can use to establish a relatively objective basis for service life estimates. My testimony not only discusses the service lives of other Florida utilities, but also looks at the approved service lives of other utilities in coastal and midwestern service territories. There are two notable benefits to this approach. First, it considers approved service lives outside of the echo chamber. Second, the approved service lives from these other areas were based on the type of actuarial analysis typically conducted to estimate service lives. It is important for the Commission to see the approved service lives of utilities that are not only in other regions, but that were also based on a thorough statistical analysis of voluminous amounts of historical retirement data. The costal utilities group provides a comparison of utilities in similar environmental conditions outside of Florida. The Midwestern utilities group provides a comparison of service lives that were developed through extensive analysis of actuarial data. Even though the Midwest region differs Florida in terms of climate, it nonetheless has its own environmental challenges, including tornados, hail, and ice storms. The results of my peer group analyses are summarized in the table below.

Figure 1:
Peer Group Analysis Summary

Acct	Description	FPUC Proposed	Midwest Avg	Coastal Avg	Florida Avg	Weighted Avg
	TRANSMISSION PLANT					
353	Station Equipment	45	65	59	44	53
355	Poles & Fixtures	43	54	56	43	50
	DISTRIBUTION PLANT					
362	Station Equipment	50	66	56	49	55
364	Poles, Towers, & Fixtures	38	54	45	38	44
366	UG Conduit	60	71	58	65	64
367	Underground Conductors	35	60	48	39	47
368	Line Transformers	30	43	41	30	36
369	Services	40	56	49	44	48

The numbers in the table represent the average approved service lives from multiple companies over three regions: the Midwest, Coastal, and Florida regions. The specific companies and approved service lives will be discussed in more detail below in the discussions by account. It is clear from the information presented in this table alone, however, that the service lives proposed by FPUC in this case are notably and consistently shorter than the approved service lives for the same accounts in the Midwest and Coastal regions. This further indicates that the effect of using the echo chamber approach for over 20 years has resulted in inaccurately short service life estimates for FPUC.

Q. PLEASE DESCRIBE THE ANALYTICAL WEIGHTINGS YOU APPLIED TO THE PEER GROUP AVERAGES.

I considered the average approved service lives from each of the three peer group regions in my analysis. As an objective approach, I applied an analytical weighting to each of the peer group averages, as follows: Midwest – 20%, Coastal – 35%, and Florida – 45%. My rational behind giving the Florida group the highest weighting is because it is my understanding that the Commission has consistently relied on an average of the Florida peer group. To the extent that some of the approved service lives in the Florida peer group are based on actuarial analysis of adequate historical data, it is reasonable to give the Florida group the highest weighting, despite my noted concerns regarding the echo chamber effect. I applied the next highest weighting of 35% to the Coastal peer group because these companies have service territories that are relatively comparable to FPUC's in terms of proximity and environment. Finally, I applied the lowest weighting to the Midwest peer group. Although I was directly involved in the depreciation analysis in each of the cases comprising the Midwest peer group and I know that the service lives were based on the actuarial analysis of reliable historical data, I gave this group the lowest weighting because the service territories in which the utilities in this group operate are relatively less comparable to FPUC's service territory.

Q. PLEASE SUMMARIZE THE IMPACT OF YOUR PROPOSED SERVICE LIVES ON FPUC'S PROPOSED ANNUAL DEPRECIATION ACCRUAL

A. Using FPUC's plant and reserve balances as of January 1, 2020, I applied my proposed service life adjustment for the eight accounts summarized in the table above to calculate my proposed depreciation rates and accrual amounts. The results are summarized in the table below.

Figure 2:
Summary Depreciation Accrual Adjustment

Plant Function	Plant Balance 1/1/2020	FPUC Proposed Accrual	OPC Proposed Accrual	**OPC Accrual Adjustment**
Transmission	19,106,966	518,046	425,184	(92,862)
Distribution	125,915,937	4,163,199	3,443,120	(720,079)
General	9,909,111	432,892	431,590	(1,302)
Total Plant Studied	$ 154,932,014	$ 4,985,663	$ 4,171,420	**$ (814,243)**

Adopting my proposed depreciation rates would reduce the Company's proposed depreciation accrual by $814,243.[3]

Q. ARE YOU RECOMMENDING ANY ADJUSTMENTS TO FPUC'S PROPOSED NET SALVAGE RATES?

A. No. In my opinion, FPUC's proposed net salvage rates are reasonable given the information provided to support such net salvage rates.

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

A. Under the rate base rate of return model, the utility is allowed to recover the original cost of its prudent investments required to provide service. Depreciation systems are designed to allocate those costs in a systematic and rational manner – specifically, over the service life of the utility's assets. If depreciation rates are overestimated (i.e., service lives are underestimated), it encourages economic inefficiency. Unlike competitive firms, regulated

[3] *See also* Exhibit DJG-2.

utility companies are not always incentivized by natural market forces to make the most economically efficient decisions. If a utility is allowed to recover the cost of an asset before the end of its useful life, this could incentivize the utility to unnecessarily replace the asset in order to increase its rate base, which results in economic waste. Thus, from a public policy perspective, it is preferable for regulators to ensure that assets are not depreciated before the end of their true useful lives. While underestimating the useful lives of depreciable assets could financially harm current ratepayers and encourage economic waste, unintentionally overestimating depreciable lives (i.e., underestimating depreciation rates) does not necessarily harm the Company financially. This is because if an asset's life is overestimated, there are a variety of measures that regulators can use to ensure the utility is not financially harmed. One such measure would be the use of a regulatory asset account. In that case, the Company's original cost investment in these assets would remain in the Company's rate base until they are recovered. Thus, the process of depreciation strives for a perfect match between actual and estimated useful life. When these estimates are not exact, however, it is better that useful lives are not underestimated for these reasons.

III. LEGAL STANDARDS

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

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

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

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

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

A. Yes. While the *Lindheimer* case and other early literature recognized depreciation as a necessary expense, the language indicated that depreciation was primarily a mechanism to determine loss of value.[7] Adoption of this "value concept" would require annual appraisals

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

[5] *Id.* (Referring to the straight-line method, the *Lindheimer* Court stated that "[a]ccording to the principle of this accounting practice, the loss is computed upon the actual cost of the property as entered upon the books, less the expected salvage, and the amount charged each year is one year's pro rata share of the total amount."). The original cost standard was reaffirmed by the Court in *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591, 606 (1944). The *Hope* Court stated: "Moreover, this Court recognized in [*Lindheimer*], supra, the propriety of basing annual depreciation on cost. By such a procedure the utility is made whole and the integrity of its investment maintained. No more is required."

[6] *Id.* at 169.

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

of extensive utility plant, and thus, is not practical in this context. Rather, the "cost allocation concept" recognizes that depreciation is a cost of providing service, and that in addition to receiving a "return on" invested capital through the allowed rate of return, a utility should also receive a "return of" its invested capital in the form of recovered depreciation expense. The cost allocation concept also satisfies several fundamental accounting principles, including verifiability, neutrality, and the matching principle.[8] The definition of "depreciation accounting" published by the American Institute of Certified Public Accountants ("AICPA") properly reflects the cost allocation concept:

> Depreciation accounting is a system of accounting that aims to distribute cost or other basic value of tangible capital assets, less salvage (if any), over the estimated useful life of the unit (which may be a group of assets) in a systematic and rational manner. It is a process of allocation, not of valuation.[9]

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

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

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

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

IV. <u>SERVICE LIFE ANALYSIS</u>

Q. DESCRIBE THE ACTUARIAL PROCESS TYPICALLY USED TO ANALYZE A UTILITY'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 analysts 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.[11] 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.[12] 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."[13] A more detailed explanation of how the Iowa curves are used in the actuarial analysis of depreciable

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[11] 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).

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

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

property is set forth in Appendix C. However, FPUC did not provide the type of aged data required to conduct actuarial analysis and traditional Iowa curve fitting techniques. As acknowledged by Ms. Lee in her testimony, "[s]urvivor curves were not generated by statistical analysis for any account in the [depreciation] Study."[14] Nonetheless, I describe the process typically used to conduct service life estimates because, in the account-specific discussion below, I will illustrate this process using the actual OLT curve and Iowa curves from the Midwest peer group in order to show how the Iowa curves selected by FPUC are notably shorter than those of the other utilities.

Q. GENERALLY DESCRIBE YOUR APPROACH IN ESTIMATING THE SERVICE LIVES OF MASS PROPERTY WHEN ADEQUATE AGED DATA ARE AVAILABLE.

A. When adequate data is available, I use all of a utility's aged property data to create an 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

[14] Direct Testimony of Patricia Lee, p. 15, lines 4-5.

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. I will illustrate this process further in the discussions below.

Q. PLEASE SUMMARIZE YOUR SERVICE LIFE ADJUSTMENTS.

A. Since FPUC did not provide the type of adequate aged data that is typically used for an accurate service life analysis, we must rely on the approved service lives of other utilities for some objective indication of an appropriate service life. Unlike FPUC, I not only considered the approved service lives of other utilities in the echo chamber, but I also considered the approved service lives of several other utilities from the Midwest and

Coastal regions. The approved service lives I considered are summarized in the tables below.[15]

Figure 3:
Midwest Peer Group Summary

Acct	Description	SWEPCO	OG&E	PSO	Avg
	TRANSMISSION PLANT				
353	Station Equipment	73	63	60	65
355	Poles & Fixtures	50	65	46	54
	DISTRIBUTION PLANT				
362	Station Equipment	55	68	75	66
364	Poles, Towers, & Fixtures	55	55	53	54
366	UG Conduit	70	65	78	71
367	Underground Conductors	50	64	65	60
368	Line Transformers	50	44	36	43
369	Services	55	53	60	56

The Midwest peer group I selected consists of three companies: Southwestern Electric Power Company, Oklahoma Gas and Electric Company, and Public Service Company of Oklahoma.[16] I selected these in part because I was involved in the depreciation analysis in each case, and the depreciation studies in these cases included voluminous historical retirement data that was adequate for actuarial analysis.

[15] *See* Exhibit DJG-3 for this information, including the weighted average calculations; *see also* Exhibit DJG-6 for depreciation rates calculated with the weighted average service life selections.

[16] *See* Exhibit DJG-4; *see also* Exhibit DJG-7 for a comparison of rates using the Midwest peer group average service lives and Exhibit DJG-8 for depreciation rates calculated with the Midwest peer group average service life selections.

Figure 4:
Coastal Peer Group Summary

Acct	Description	Duke	SCG&E	ETI	Avg
	TRANSMISSION PLANT				
353	Station Equipment	52	60	64	59
355	Poles & Fixtures	50	53	65	56
	DISTRIBUTION PLANT				
362	Station Equipment	42	60	65	56
364	Poles, Towers, & Fixtures	49	43	43	45
366	UG Conduit	55	60	60	58
367	Underground Conductors	54	49	42	48
368	Line Transformers	43	45	34	41
369	Services	50	65	31	49

For the Coastal peer group, I considered the approved service lives for Duke Energy Carolinas, South Carolina Gas and Electric, and Entergy Texas.[17] I was directly involved in the depreciation analysis in the Entergy Texas case. I selected these companies because their service territories are relatively closer in proximity and environment to FPUC's service territory.

[17] *See* Exhibit DJG-4; *see also* Exhibit DJG-9 for a comparison of rates using the Coastal peer group average service lives and Exhibit DJG-10 for depreciation rates calculated with the Coastal peer group average service life selections.

Figure 5:
Florida Peer Group Summary

Acct	Description	Duke	TECO	Gulf	FPL	Avg
	TRANSMISSION PLANT					
353	Station Equipment	47	45	40	42	44
355	Poles & Fixtures	38	38	41	55	43
	DISTRIBUTION PLANT					
362	Station Equipment	60	45	38	51	49
364	Poles, Towers, & Fixtures	32	34	38	49	38
366	UG Conduit	67	60	67	66	65
367	Underground Conductors	35	35	41	46	39
368	Line Transformers	31	20	33	34	30
369	Services	41	38	46	49	44

Finally, for the Florida peer group, I looked at the approved service lives for the same companies that FPUC relied upon in its depreciation study.[18] As discussed above, the problem with placing too much analytical weight on the approved service lives of this group relates to the echo chamber effect. If approved service lives in an area are not based on utility-specific historical data, but rather the approved lives of the same utilities year after year, it can lead to inaccurate service life estimates. The fact that FPUC's proposed service lives are notably shorter than those of the other two peer groups further indicates that the echo chamber effect has led to unreasonably short service life estimates over time. My account-specific analysis is presented below.

[18] *See* Exhibit DJG-4; *see also* Exhibit DJG-11 for a comparison of rates using the Florida peer group average service lives and Exhibit DJG-12 for depreciation rates calculated with the Florida peer group average service life selections.

A. <u>Account 353 – Transmission Station Equipment</u>

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 353 – TRANSMISSION STATION EQUIPMENT.

A. The Company's depreciation study proposes an S3-45 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[19]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer. As with several other accounts discussed in this section of my testimony, the discrepancy between FPUC's proposed service life and the average approved lives of the peer groups is so large that it is likely not reasonable to simply dismiss the discrepancy as a function of climate differences. First, the climate of the Coastal utility peer group is relative similar to that of Florida's climate. In addition, the climate of the Midwest peer group has its own unique environmental challenges. In my experience, electric utility depreciation witnesses from all regions of the country use the climate in their particular areas to attempt to justify the

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[19] *See* Exhibit PSL-1, pp. 4-5.

fact that their proposed service lives are shorter than what is otherwise indicated by other objective measures.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 65 years and 59 years respectively, and range as high as 73 years.[20] This represents a substantial discrepancy in service life estimates for the same account.

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the SWEPCO case included in my comparable analysis, an Iowa R1.5-73 curve was approved for Account 353. This Iowa curve was based on voluminous amounts of historical data provided by SWEPCO which was used to develop an OLT curve. The OLT curve is especially valuable in providing a visual representation of the historical retirement pattern of a group of assets in a particular account. The graph below shows this OLT curve along with the approved R1.5-73 Iowa curve. In addition, I have also added the S3-45 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

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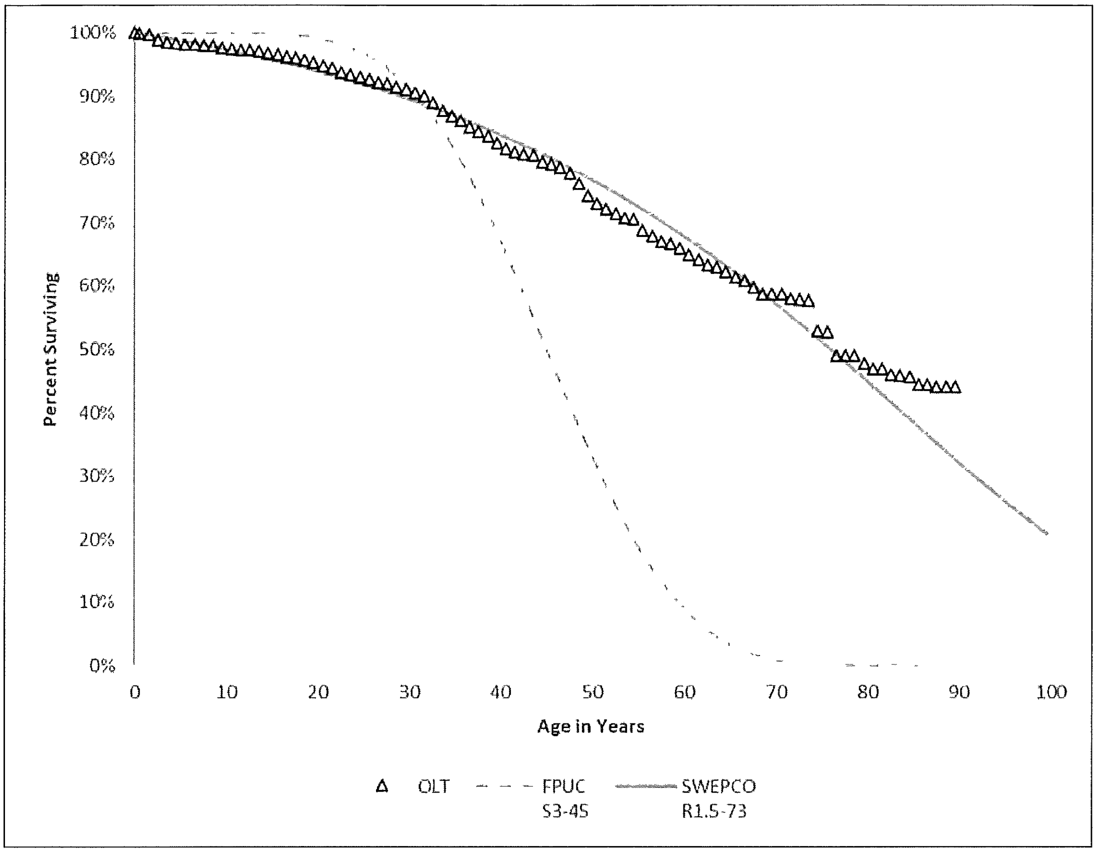
[20] Exhibit DJG-4.

Figure 6:
SWEPCO Account 353 – Station Equipment



As shown in this graph, the R1.5-73 curve provides a close fit to the observed, OLT curve for this account.[21] Again, the OLT curve is derived from SWEPCO's actual, historical retirement data for the assets in this account. This highlights one of the main benefits of Iowa curve fitting – the analyst (and regulator) can visually inspect whether a particular Iowa curve provides a good fit to the observed data as part of the curve selection process. In contrast, FPUC provided no information from which an OLT curve could be formed. As FPUC acknowledged in discovery, "[o]bserved life tables and original survivor curves

[21] Exhibit DJG-13.

were not generated for any account."[22] It is clear in the graph above that FPUC's S3-45 Iowa curve is significantly shorter than the retirement pattern indicated by the OLT curve. Of course, it is possible that the assets in FPUC's Account 353 have (and will continue to) retire in a different pattern and rate than the assets in SWEPCO's Account 353. However, FPUC has not provided any convincing evidence to show why its station equipment assets are lasting only 45 years on average – nearly 30 years shorter than the same type of assets for SWEPCO. Similarly, the average life of only 45 years proposed by FPUC for this account is notably shorter than the approved service lives for the other Midwest and Coastal peer companies.[23]

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 353?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 53 years for this account, which results in a reduction to depreciation expense of $28,155.[24]

B. Account 355 – Transmission Poles and Fixtures

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 353 – TRANSMISSION POLES AND FIXTURES.

A. FPUC's depreciation study proposes an R4-43 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives

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[22] FPUC's response to OPC's Second Set of Interrogatories, No. 14.

[23] Exhibit DJG-4.

[24] *See* Exhibit DJG-5.

of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[25]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 54 and 56 years respectively, and range as high as 65 years.[26] This represents a substantial discrepancy in service life estimates for the same account.

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the ETI case included in my comparable analysis from the Coastal peer group, an Iowa R1.5-65 curve was approved for Account 355. This Iowa curve was based on voluminous

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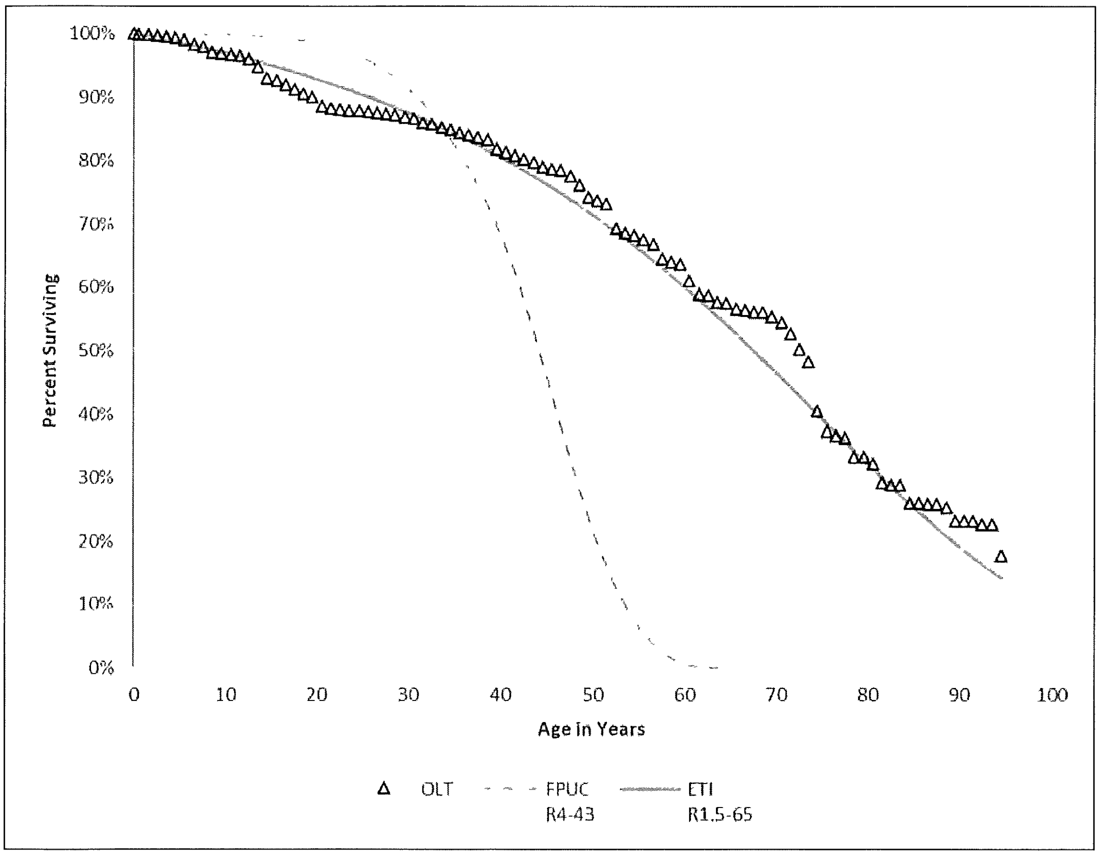
[25] *See* Exhibit PSL-1, pp. 5-6.

[26] Exhibit DJG-4.

amounts of historical data provided by ETI which was used to develop an OLT curve. The OLT curve is especially valuable in providing a visual representation of the historical retirement pattern of a group of assets in a particular account. The graph below shows this OLT curve along with the approved R1.5-65 Iowa curve. In addition, I have also added the R4-43 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

Figure 7:
ETI Account 355 – Transmission Poles and Fixtures



As shown in this graph, the R1.5-73 curve provides a close fit to the observed, OLT curve for this account.[27] Again, the OLT curve is derived from ETI's actual, historical retirement data for the assets in this account. In contrast, FPUC provided no information from which an OLT curve could be formed. It is clear in the graph above that FPUC's R4-43 Iowa curve is significantly shorter than the retirement pattern indicated by the OLT curve. Of course, it is possible that the assets in FPUC's Account 355 have different life characteristics than the assets in ETI's Account 353. However, FPUC has not provided any convincing evidence to show why its transmission poles and fixtures are lasting only 43 years on average – more than 20 years shorter than the same type of assets for ETI, which also has service territory along that gulf coast. Similarly, the average life of only 43 years proposed by FPUC for this account is notably shorter than the approved service lives for the other Midwest and Coastal peer companies.[28]

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 355?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 50 years for this account, which results in a reduction to depreciation expense of $37,823.[29]

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[27] Exhibit DJG-14.

[28] Exhibit DJG-4.

[29] *See* Exhibit DJG-5.

C. <u>Account 362 – Distribution Station Equipment</u>

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 362 – DISTRIBUTION STATION EQUIPMENT.

A. FPUC's depreciation study proposes an S3-50 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[30]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 66 and 56 years respectively, and range as high as 75 years.[31] This represents a substantial discrepancy in service life estimates for the same account.

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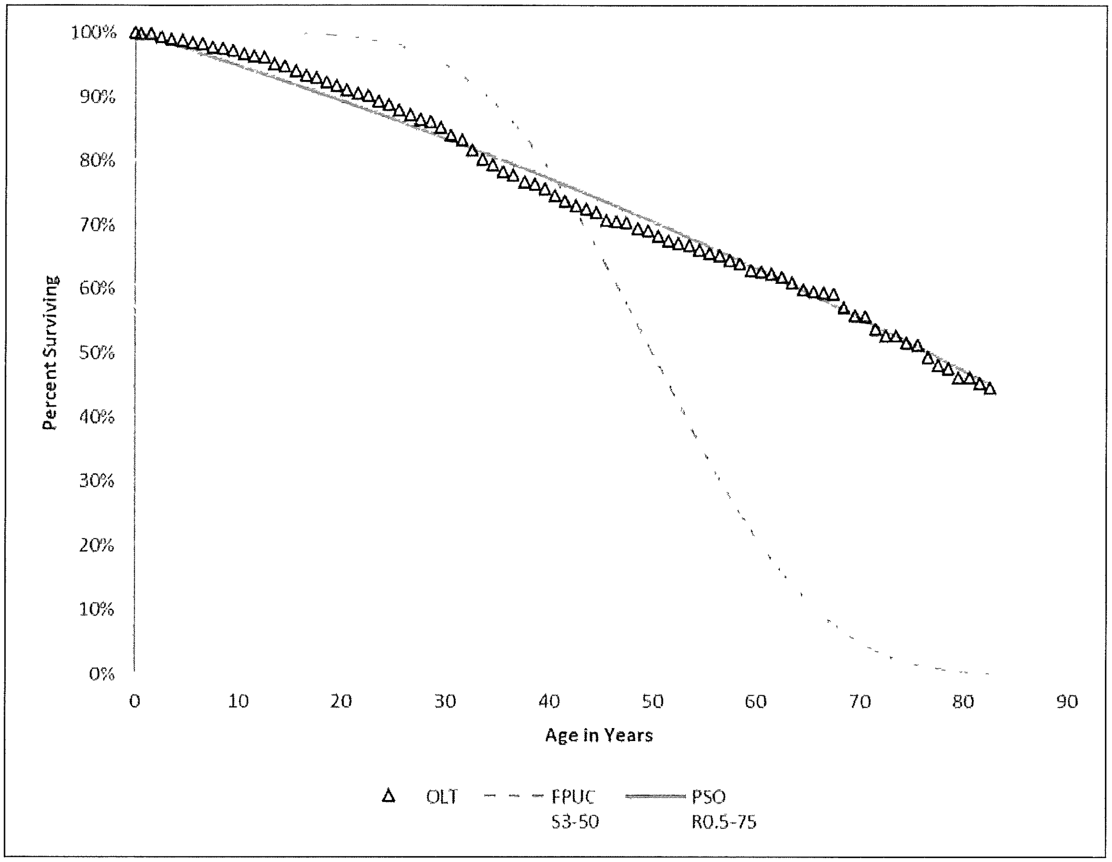
[30] *See* Exhibit PSL-1, pp. 7-8.

[31] Exhibit DJG-4.

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the PSO case included in my comparable analysis, an Iowa R0.5-75 curve was approved for Account 362. This Iowa curve was based on voluminous amounts of historical data provided by PSO which was used to develop an OLT curve. The OLT curve is especially valuable in providing a visual representation of the historical retirement pattern of a group of assets in a particular account. The graph below shows this OLT curve along with the approved R0.5-75 Iowa curve. In addition, I have also added the S3-50 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

Figure 8:
PSO Account 362 – Distribution Station Equipment



As shown in this graph, the R0.5-75 curve provides a very close fit to the observed, OLT curve for this account.[32] In other words, the fact that the historical retirement pattern in this account matches very closely with the R0.5-75 curve provides objective, reasonable, and <u>convincing</u> evidence that the R0.5-75 curve will also accurately describe the remaining life going forward in this account and result in a reasonable corresponding depreciation rate. In stark contrast to the convincing, empirical evidence presented the PSO case to support the service life estimate for Account 362, FPUC has provided no information in

[32] Exhibit DJG-15.

this case, but has rather simply relied on the same echo chamber of approved service lives from prior cases. It is clear in the graph above that FPUC's S3-50 Iowa curve is significantly shorter than the retirement pattern indicated by the OLT curve. Again, it is possible that the assets in FPUC's Account 362 have different life characteristics than the assets in PSO's Account 362. However, it is not reasonable, absent convincing evidence, to simply assume that FPUC's distribution station equipment will last 25 years less than the same assets for PSO. That is a substantial discrepancy in service lives. Additionally, the average life of only 50 years proposed by FPUC for this account is generally much shorter than the approved service lives for the other Midwest and Coastal peer companies.[33]

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 362?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 55 years for this account, which results in a reduction to depreciation expense of $25,976.[34]

D. <u>Account 364 – Distribution Poles, Towers, and Fixtures</u>

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 364 – DISTRIBUTION POLES, TOWERS, AND FIXTURES.

A. FPUC's depreciation study proposes an R4-38 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives

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[33] Exhibit DJG-4.

[34] *See* Exhibit DJG-5.

of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[35]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 54 years and 45 years respectively, and range as high as 55 years.[36] This represents a substantial discrepancy in service life estimates for the same account.

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the SWEPCO case included in my comparable analysis, an Iowa R0.5-55 curve was approved for Account 353. This Iowa curve was based on voluminous amounts of

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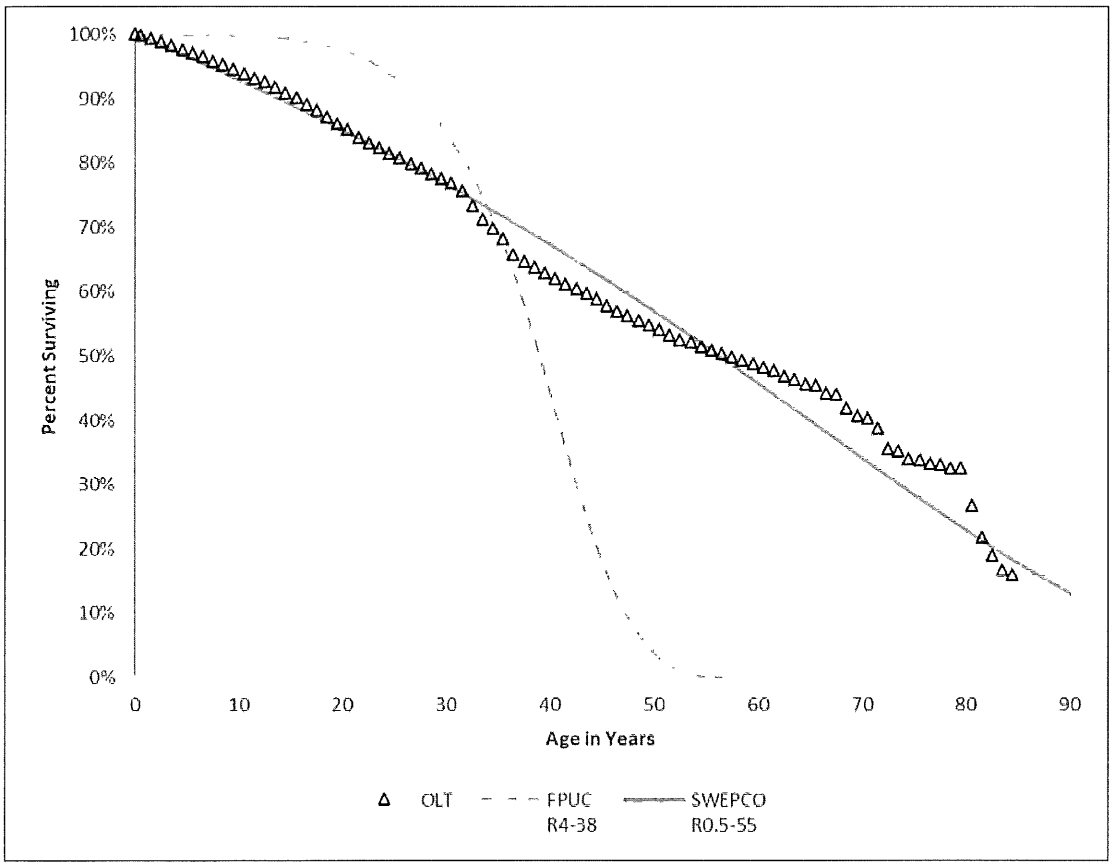
[35] *See* Exhibit PSL-1, pp. 8-9.

[36] Exhibit DJG-4.

historical data provided by SWEPCO which was used to develop the OLT curve. The graph below shows this OLT curve along with the approved R0.5-55 Iowa curve. In addition, I have also added the R4-38 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

Figure 9:
SWEPCO Account 364 – Distribution Poles, Towers, and Fixtures



As shown in this graph, the R0.5-55 curve provides a close fit to the observed, OLT curve for this account.[37] Again, the OLT curve is derived from SWEPCO's actual, historical retirement data for the assets in this account. Because this Iowa curve provides a

[37] Exhibit DJG-16.

reasonably close fit to the OLT curve, this is an objective basis on which to calculate the depreciation rate for this account. In contrast, FPUC provided no information from which an OLT curve could be formed. It is clear in the graph above that FPUC's R4-38 curve is significantly shorter than the retirement pattern indicated by the OLT curve. While it is possible that the assets in FPUC's Account 364 have different mortality characteristics than the same assets in SWEPCO's Account 353, FPUC has provided no convincing evidence why they should be expected to last nearly 20 years less. In addition, the average life of only 38 years proposed by FPUC for this account is notably shorter than the approved service lives for the other Midwest and Coastal peer companies.[38]

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 364?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 44 years for this account, which results in a reduction to depreciation expense of $182,295.[39]

E. <u>Account 366 – Distribution Underground Conduit</u>

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 366 – DISTRIBUTION UNDERGROUND CONDUIT.

A. FPUC's depreciation study proposes an R5-60 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives

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[38] Exhibit DJG-4.

[39] Exhibit DJG-5.

of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[40]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 71 and 58 years respectively, and range as high as 78 years.[41] While FPUC's proposed service life of 60 years is slightly longer than the average life of the Coastal peer group for Account 366, it is actual five years shorter than the average approved life of the Florida peer group.[42]

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[40] *See* Exhibit PSL-1, p. 9.

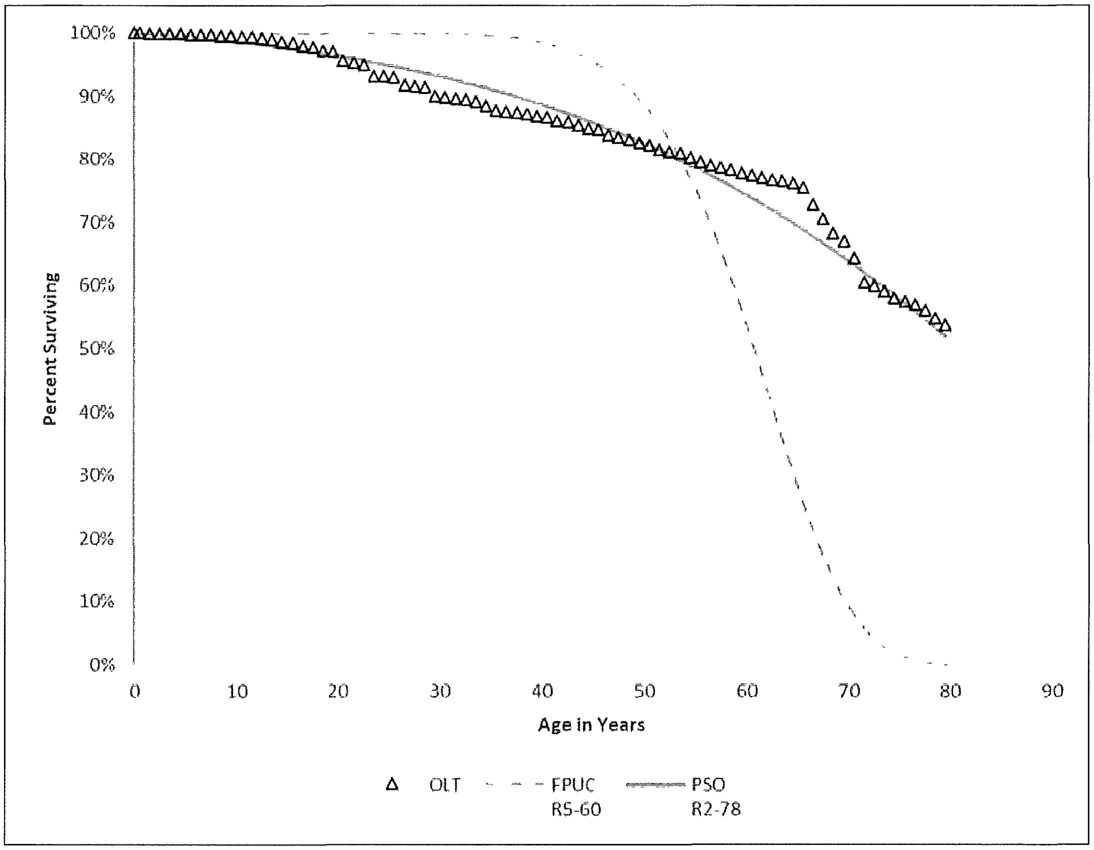
[41] Exhibit DJG-4.

[42] *Id.*

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the PSO case included in my comparable analysis, an Iowa R2-78 curve was approved for Account 366. This Iowa curve was based on voluminous amounts of historical data provided by PSO which was used to develop an OLT curve. The graph below shows this OLT curve along with the approved R2-78 Iowa curve. In addition, I have also added the R5-60 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

Figure 10:
PSO Account 366 – Distribution Underground Conduit



As shown in this graph, the R2-78 curve provides a very close fit to the observed, OLT curve for this account.[43] In other words, the fact that the historical retirement pattern in this account matches very closely with the R2-78 curve provides convincing evidence that this Iowa curve will accurately describe the remaining life going forward in this account, and that it will result in a reasonable depreciation rate. In stark contrast to the convincing, empirical evidence presented the PSO case to support the service life estimate for Account 362, FPUC has provided no such information in this case. It is clear in the graph above

[43] Exhibit DJG-17.

that FPUC's R5-60 curve is significantly shorter than the retirement pattern indicated by the OLT curve.

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 353?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 64 years for this account, which results in a reduction to depreciation expense of $9,071.[44]

F. Account 367 – Distribution Underground Conductors

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 367 – DISTRIBUTION UNDERGROUND CONDUCTORS.

A. FPUC's depreciation study proposes an R4-35 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[45]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

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[44] *See* Exhibit DJG-5.

[45] *See* Exhibit PSL-1, pp. 9-10.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 60 and 48 years respectively, and range as high as 65 years.[46] As with several other accounts at issue in this case, FPUC's proposed service life is even shorter than the average life of the Florida peer group on which the Company's proposal is based.[47]

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the PSO case included in my comparable analysis, an Iowa R2-78 curve was approved for Account 366. This Iowa curve was based on voluminous amounts of historical data provided by PSO which was used to develop an OLT curve. The graph below shows this OLT curve along with the approved R2-78 Iowa curve. In addition, I have also added the R4-35 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

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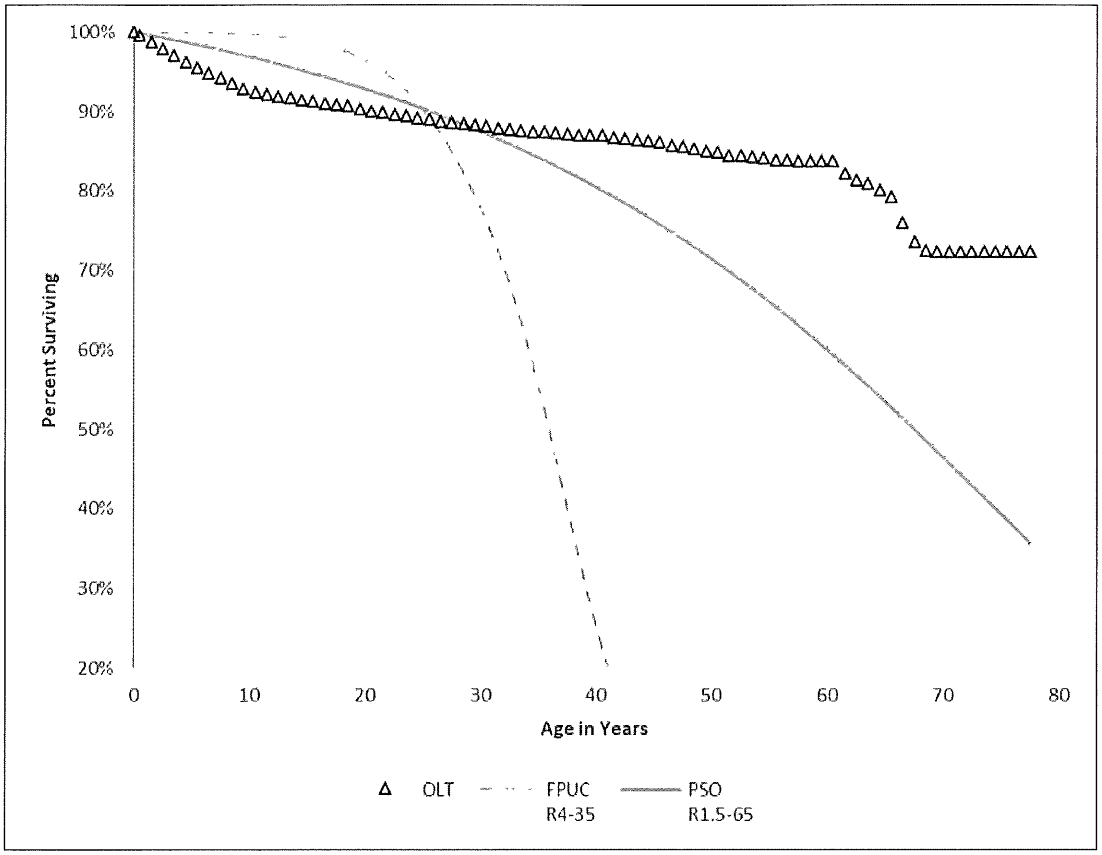
[46] Exhibit DJG-4.

[47] *Id.*

Figure 11:
PSO Account 367 – Distribution Underground Conductors



As shown in this graph, even the approved R1.5-65 curve is relatively short compared with the observed historical data plotted in the OLT curve.[48] In contrast, the R4-35 curve selected by FPUC is significantly shorter than the OLT curve for this account. Additionally, the 35-year average life proposed by FPUC for this account is notably shorter than the approved average lives for the same account among the Midwest and Coastal peer companies.[49]

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[48] Exhibit DJG-18.

[49] Exhibit DJG-4.

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 353?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 47 years for this account, which results in a reduction to depreciation expense of $119,283.[50]

G. <u>Account 368 – Distribution Line Transformers</u>

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 368 – DISTRIBUTION LINE TRANSFORMERS.

A. FPUC's depreciation study proposes an S4-30 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[51]

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

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[50] *See* Exhibit DJG-5.

[51] *See* Exhibit PSL-1, pp. 10-11.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 43 years and 41 years respectively, and range as high as 50 years.[52] This represents a substantial discrepancy in service life estimates for the same account.

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the SWEPCO case included in my comparable analysis, an Iowa L0-50 curve was approved for Account 368. This Iowa curve was based on voluminous amounts of historical data provided by SWEPCO which was used to develop the OLT curve. The graph below shows this OLT curve along with the approved L0-50 curve. In addition, I have also added the S4-30 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

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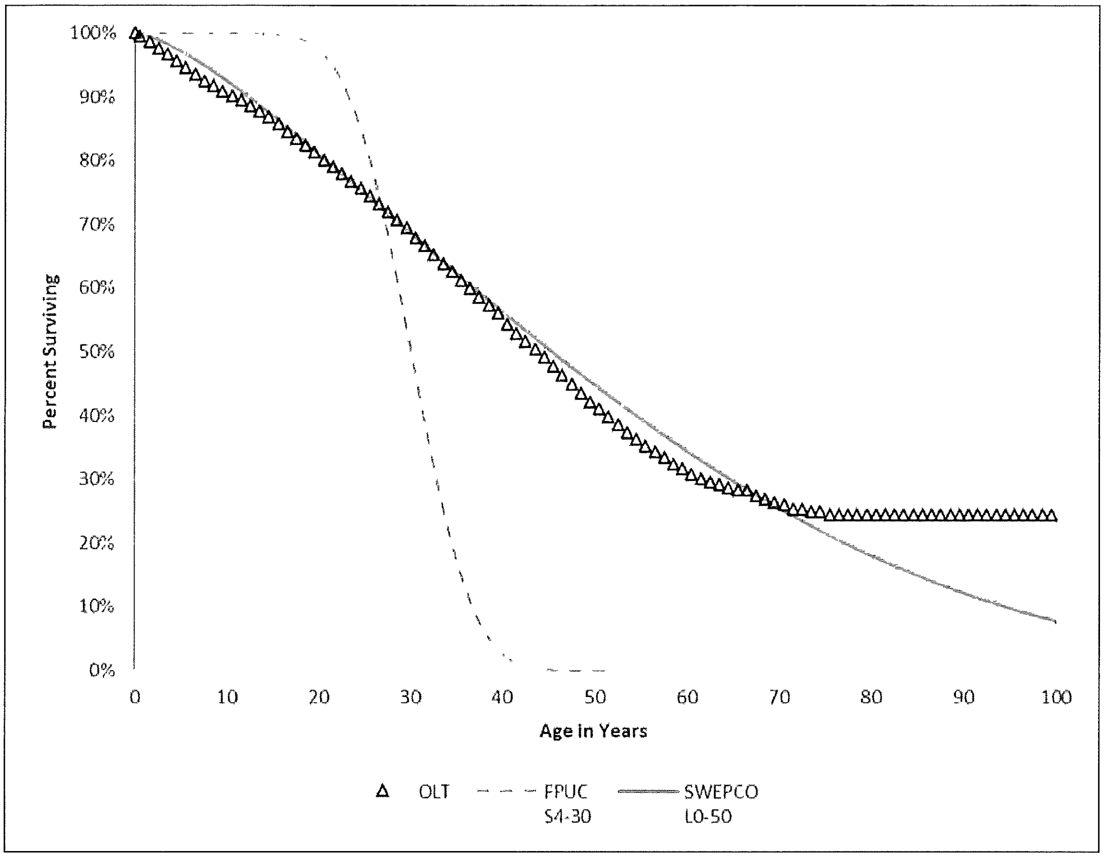
[52] Exhibit DJG-4.

Figure 12:
SWEPCO Account 368 – Distribution Line Transformers



As shown in this graph, the L0-50 curve provides a close fit to the observed, OLT curve for this account.[53] Again, the OLT curve is derived from SWEPCO's actual, historical retirement data for the assets in this account. Because this Iowa curve provides a reasonably close fit to the OLT curve, this is an objective basis on which to calculate the depreciation rate for this account. In contrast, FPUC provided no information from which an OLT curve could be formed. It is clear in the graph above that FPUC's S4-30 curve is significantly shorter than the retirement pattern indicated by the OLT curve. While it is

[53] Exhibit DJG-19.

possible that the assets in FPUC's Account 368 have different mortality characteristics than the same assets in SWEPCO's account, FPUC has provided no convincing evidence why they should be expected to survive 20 years less. In addition, the average life of only 30 years proposed by FPUC for this account is notably shorter than the approved service lives for the other Midwest and Coastal peer companies.[54]

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 364?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 36 years for this account, which results in a reduction to depreciation expense of $273,338.[55]

H. <u>Account 369 – Distribution Services</u>

Q. DISCUSS THE COMPANY'S POSITION ON ACCOUNT 369 – DISTRIBUTION SERVICES.

A. FPUC's depreciation study proposes an R5-40 Iowa curve for this account. As with the other accounts at issue in this case, FPUC bases its proposal on the approved service lives of the Florida peer group due to the lack of adequate historical data necessary for actuarial analysis.[56]

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[54] Exhibit DJG-4.

[55] Exhibit DJG-5.

[56] *See* Exhibit PSL-1, p. 11.

Q. HAS FPUC MADE A CONVINCING SHOWING THAT ITS PROPOSED DEPRECIATION EXPENSE FOR THIS ACCOUNT IS NOT EXCESSIVE?

A. No, it has not. FPUC's reliance on the approved service lives of the Florida peer group is insufficient evidence supporting its service life proposal, especially considering the approved service lives of utilities outside the peer group are notably longer.

Q. PLEASE DISCUSS THE APPROVED SERVICE LIVES FROM THE MIDWEST AND COASTAL PEER GROUPS FOR THIS ACCOUNT.

A. The average approved service lives for this account from the Midwest and Coastal peer groups are 56 and 49 years respectively, and range as high as 65 years.[57] As with several other accounts at issue in this case, FPUC's proposed service life is even shorter than the average life of the Florida peer group on which the Company's proposal is based.[58]

Q. PLEASE ILLUSTRATE THE SURVIVOR CURVE ANALYSIS FOR THIS ACCOUNT USING THE ACTUAL HISTORICAL DATA FROM ONE OF THE PEER GROUP COMPANIES.

A. In the PSO case included in my comparable analysis, an Iowa R1.5-60 curve was approved for Account 369. This Iowa curve was based on voluminous amounts of historical data provided by PSO which was used to develop an OLT curve. The graph below shows this OLT curve along with the approved R1.5-60 curve. In addition, I have also added the R5-

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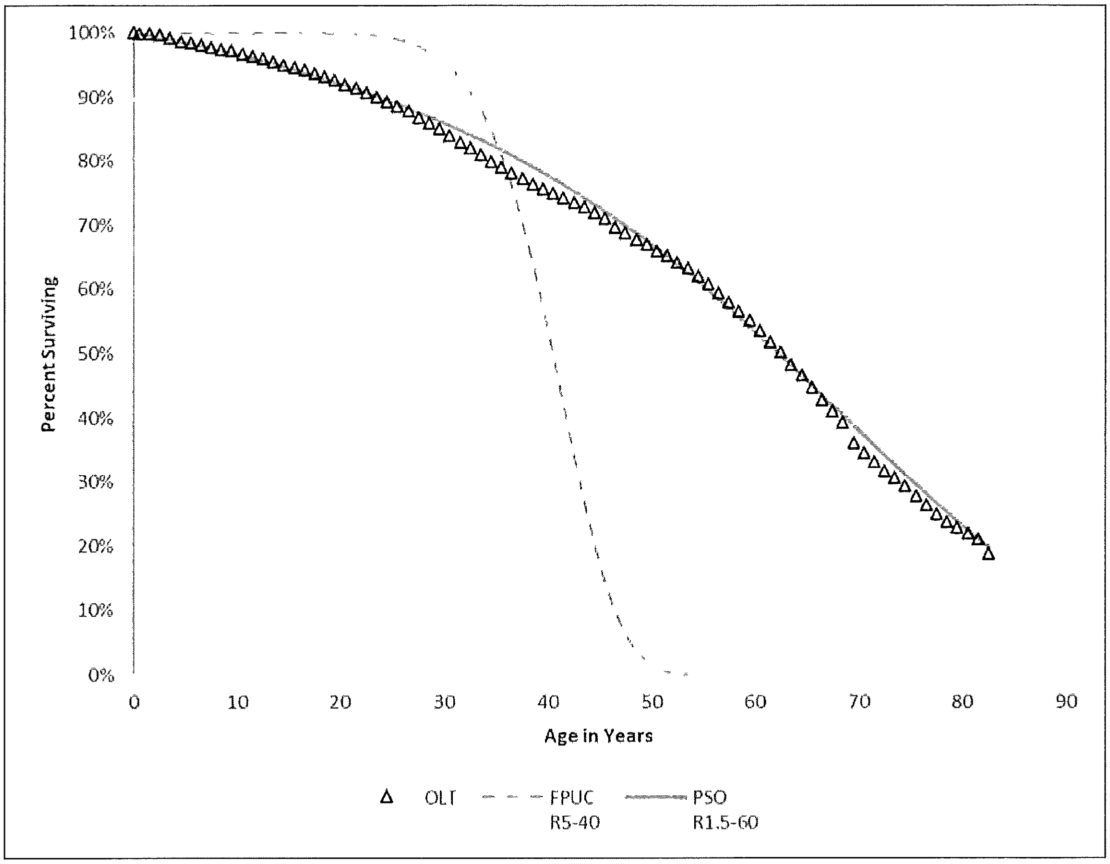
[57] Exhibit DJG-4.

[58] *Id.*

40 curve proposed by FPUC in this case to illustrate the discrepancy between these service life estimates.

Figure 13:
PSO Account 369 – Distribution Services



As shown in this graph, the R1.5-60 curve approved for this account provides a very close fit to the historical retirement pattern reflected in the OLT curve.[59] In contrast, the R5-40 curve selected by FPUC, as with the other accounts discussed in my testimony, is significantly shorter than the OLT curve for this account. Additionally, the 40-year average

[59] Exhibit DJG-20.

life proposed by FPUC for this account is notably shorter than most of the approved average lives for the same account among the Midwest and Coastal peer companies.[60]

Q. WHAT IS YOUR RECOMMENDATION FOR ACCOUNT 353?

A. Using the weighted average approach discussed in the executive summary of my testimony, I propose a service life of 48 years for this account, which results in a reduction to depreciation expense of $106,699.[61]

V. CONCLUSION AND RECOMMENDATIONS

Q. PLEASE SUMMARIZE THE KEY POINTS OF YOUR TESTIMONY.

A. In this case, FPUC has failed to make a convincing showing that its proposed depreciation rates are not excessive, particularly for the eight accounts discussed in my testimony. While FPUC provided adequate data to support its net salvage rate, it did not provide adequate data to support its service life proposals. Instead, FPUC simply based its proposed service lives on the approved service lives of several other Florida utilities. According to FPUC, the Company has taken a similar approach regarding its service life proposals for over 20 years. Over time, this has created an echo chamber effect, where subsequent service life estimates based on nothing more than previously approved service life estimates under the same peer-group approach has resulted in service life estimates that are not based on adequate and reliable company-specific data. Since there is no company-

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[60] Exhibit DJG-4.

[61] *See* Exhibit DJG-5.

specific, aged property data available, a peer group analysis can provide an objective basis on which to make service life estimates for FPUC's assets. However, my review of several companies in service territories outside of Florida has revealed that FPUC's proposed service lives for the eight accounts at issue are remarkably short. Unreasonably short service lives result in unreasonably high depreciation rates. I did not rely exclusively on any one company or region for my service life proposals; instead, I incorporated information from all of the peer companies, including those from Florida, as part of an objective analytical weighting approach.

Q. WHAT IS YOUR RECOMMENDATION TO THE COMMISSION?

A. I recommend the Commission adopt the depreciation rates listed in Exhibit DJG-5.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes. To the extent I have not addressed a particular issue raised by the Company, it does not constitute my agreement with such issue.

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.[62] 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.[63] The figure below illustrates the basic concept of a depreciation system and includes some of the available parameters.[64]

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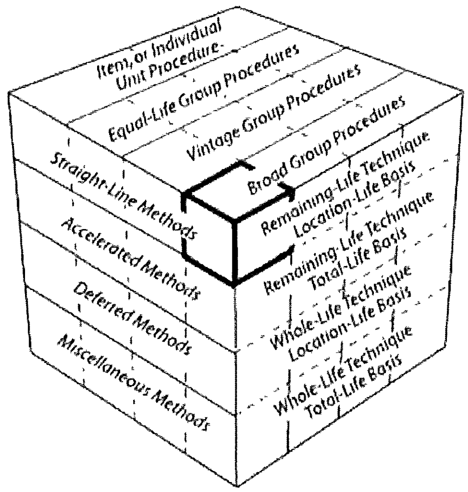
[62] Wolf *supra* n. 7, at 69-70.

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

[64] 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 14:
The Depreciation System Cube



1. Allocation Methods

The "method" refers to the pattern of depreciation in relation to the accounting periods. The method most commonly used in the regulatory context is the "straight-line method" – a type of age-life method in which the depreciable cost of plant is charged in equal amounts to each accounting period over the service life of plant.[65] 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.[66] The basic formula for the straight-line method is as follows:[67]

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

[66] *Id.*

[67] *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.[68] 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:[69]

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.[70] 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

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[68] *Id.* at 57.

[69] *Id.* at 56.

[70] Wolf *supra* n. 7, 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.[71] 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.[72]

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.[73] 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.[74] Under the equal life procedure the property is divided into subgroups that each has a common life.[75]

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

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[71] *Id.* at 74.

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

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

[74] *Id.* at 75.

[75] *Id.*

technique applies the depreciation rate on the estimated average service life of a group, while the remaining life technique seeks to recover undepreciated costs over the remaining life of the plant.[76]

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.[77] 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.[78] 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

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

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

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

in the annual accrual.[79] 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:[80]

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.[81]

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.[82] A continuous property group is created when vintage groups are combined to form a common group. Over time, the characteristics of the property may change, but the continuous property group will continue. The two analysis models

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

[80] *Id.* at 64.

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

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

used among practitioners, the "broad group" and the "vintage group," are two ways of viewing the life and salvage characteristics of the vintage groups that have been combined to 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.[83] 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.[84] 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

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

[84] *Id.* at 23.

representing the life characteristics of each group of property.[85] They generalized the 65 curves into 13 survivor curve types and published their results in *Bulletin 103: Life Characteristics of Physical Property*. The 13 type curves were designed to be used as valuable aids in forecasting 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.[86] 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."[87] 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.[88] 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

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[85] *Id.* at 34.

[86] *Id.*

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

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

technique applied to each age interval, it is not possible to recreate the exact original published table values. In the 1970s, John Russo collected data from over 2,000 property accounts reflecting observations during the period 1965 – 1975 as part of his Ph.D. dissertation at Iowa State. Russo essentially repeated Winfrey's data collection, testing, and analysis methods used to develop the original Iowa curves, except that Russo studied industrial property in service several decades after Winfrey published the original Iowa curves. Russo drew three major conclusions from his research:[89]

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.[90]

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

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

[90] *Id.*

used to depict retirements which are all planned to occur at a given age. Finally, analysts commonly rely on several "half curves" derived from the original Iowa curves. Thus, the term "Iowa curves" could be said to describe up to 31 standardized survivor curves.

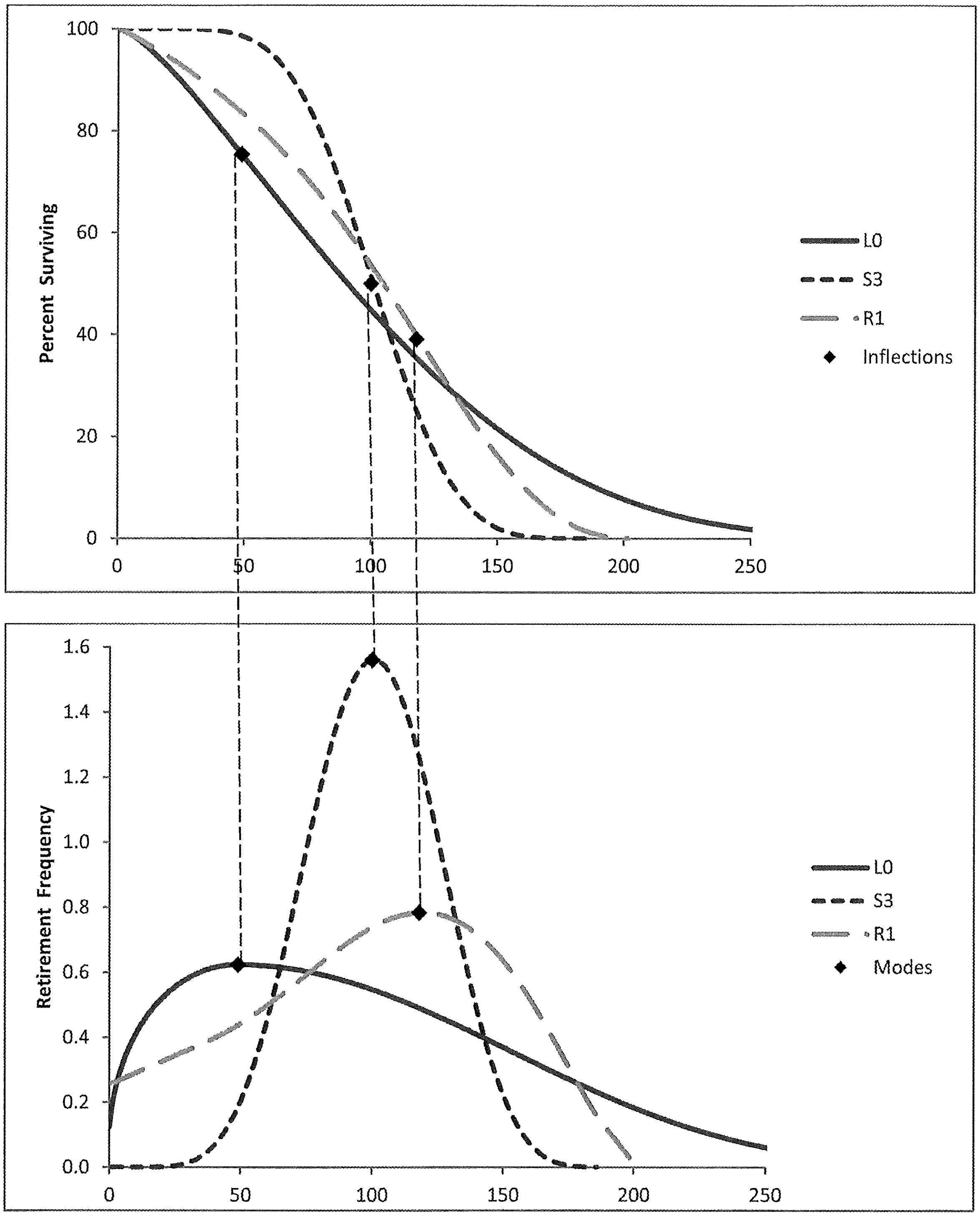
2. Classification

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).[91] 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.

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

Figure 15:
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."[92]

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

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

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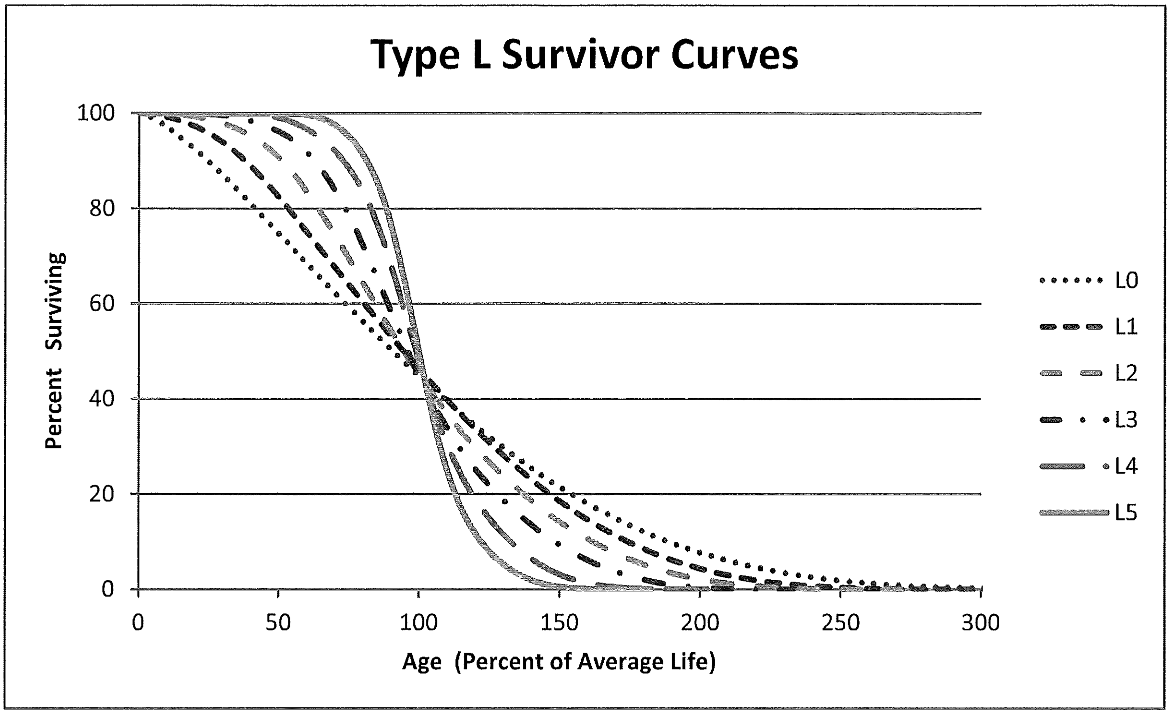
[92] Winfrey *supra* n. 166, at 60.

Figure 16:
Type L Survivor and Frequency Curves



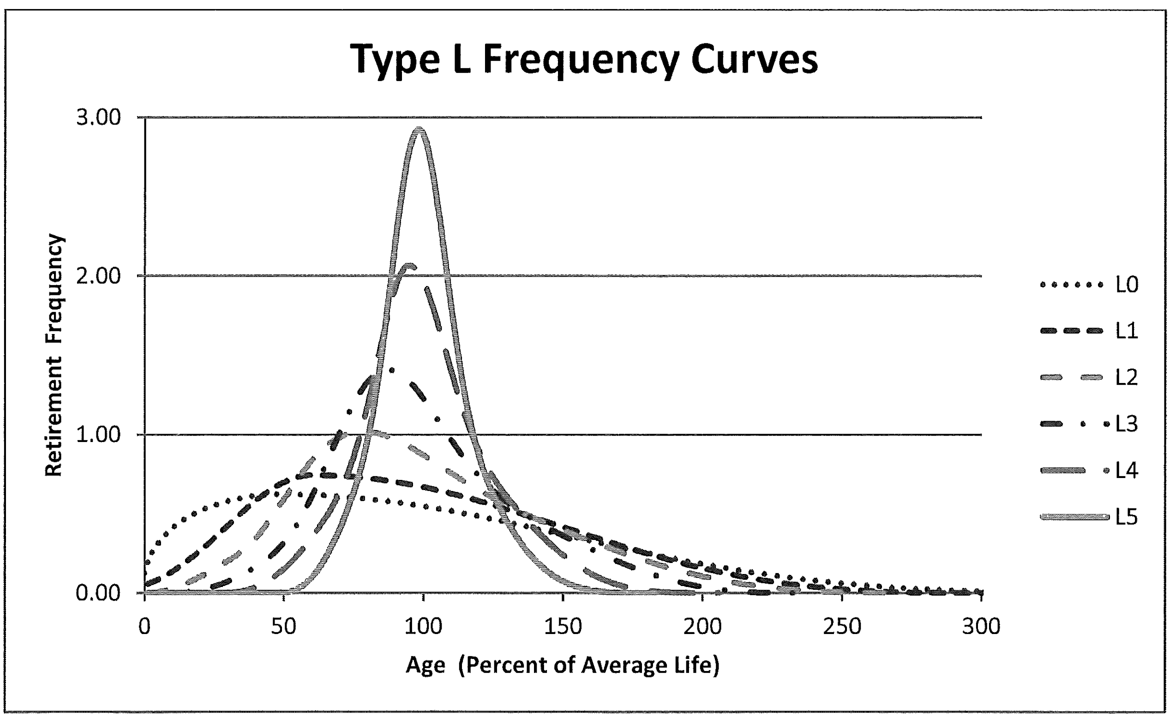
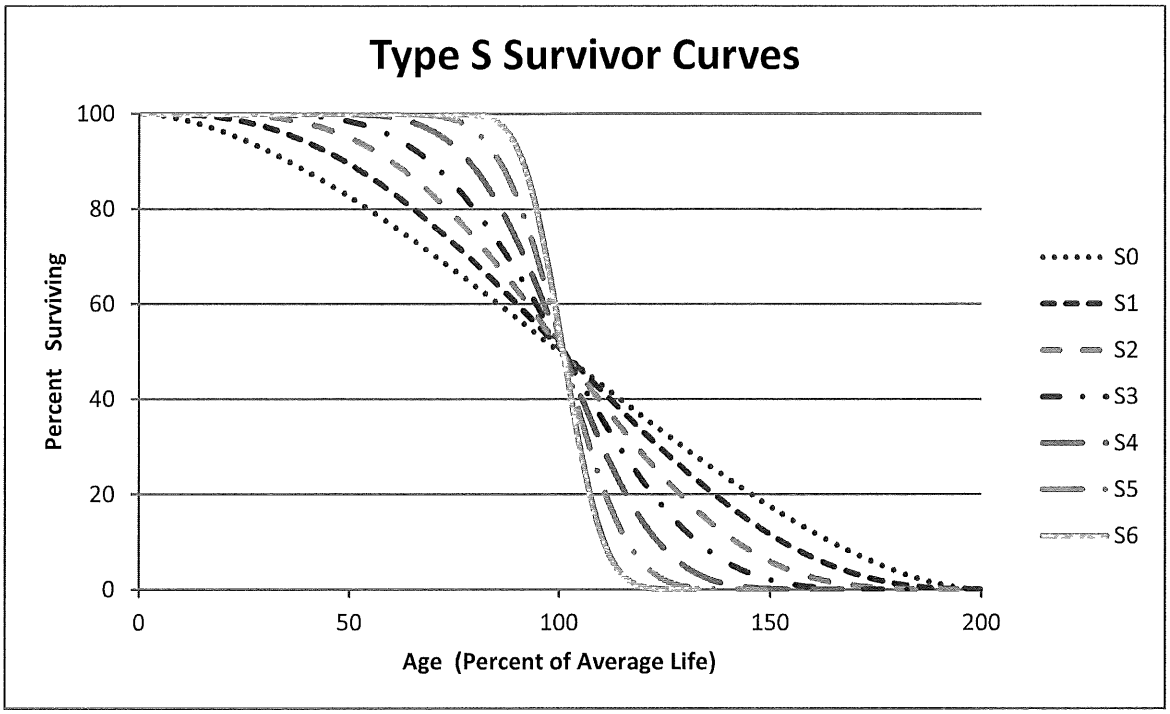


Figure 17:
Type S Survivor and Frequency Curves



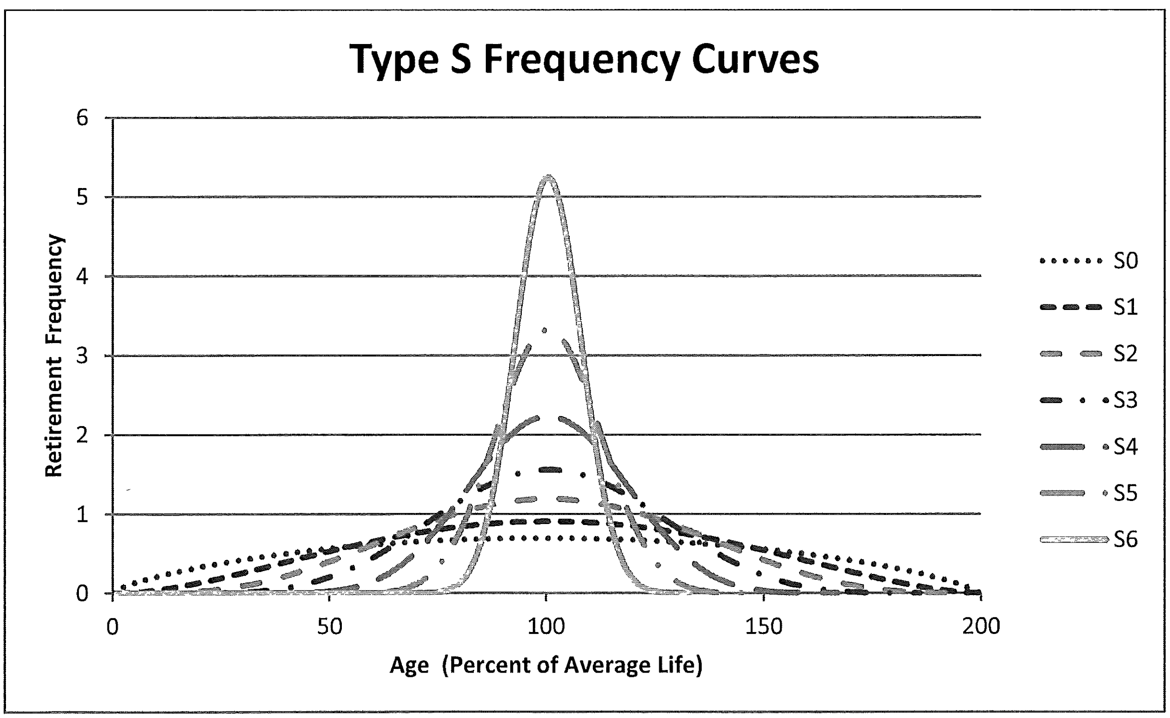
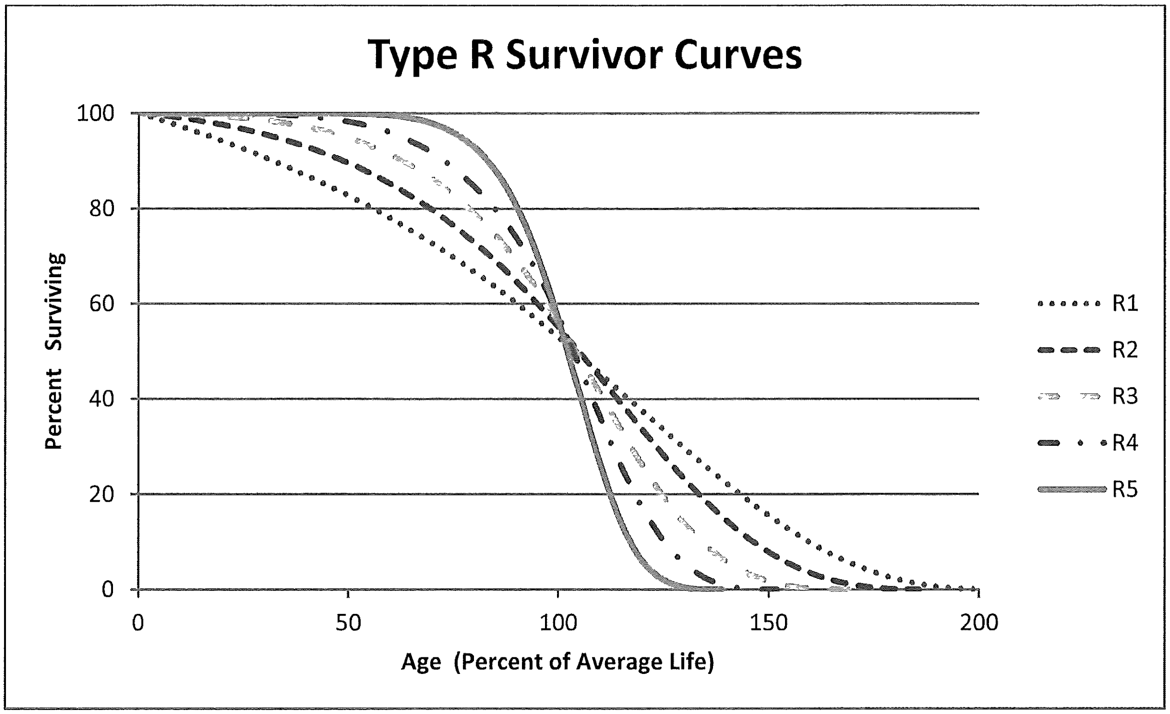
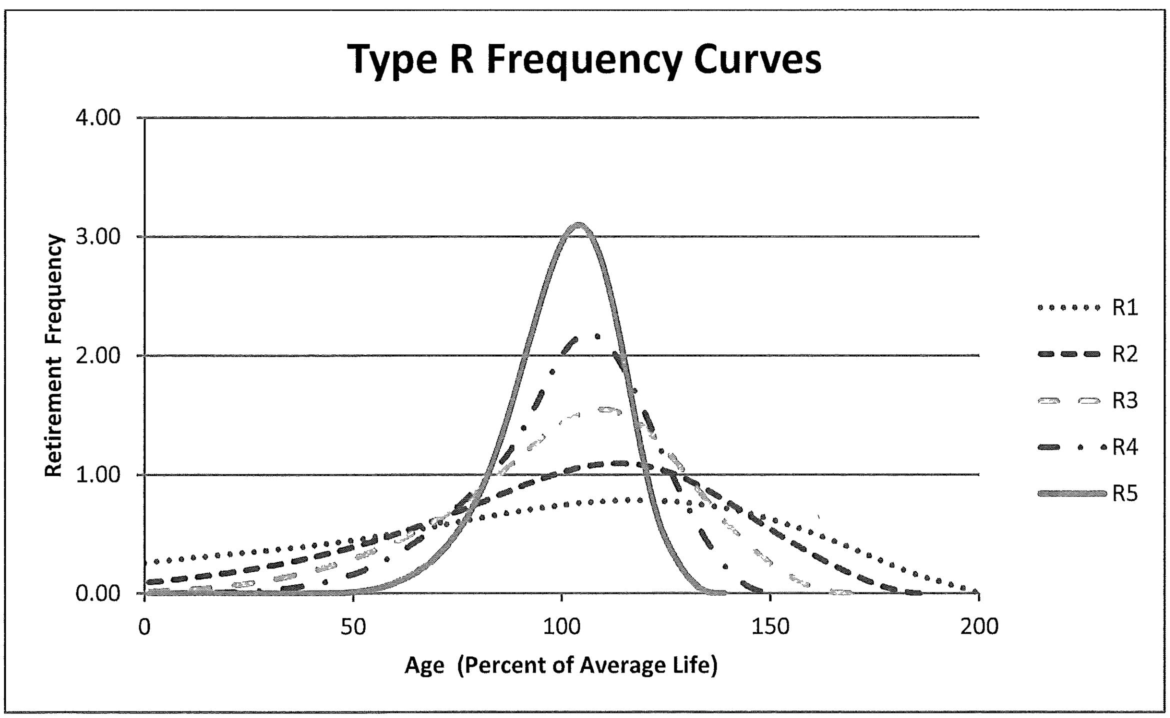


Figure 18:
Type R Survivor and Frequency Curves





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

3. Types of Lives

Several other important statistical analyses and types of lives may be derived from an Iowa curve. These include: 1) average life; 2) realized life; 3) remaining life; and 4) probable life. The figure below illustrates these concepts. It shows the frequency curve, survivor curve, and probable life curve. Age M_x on the x-axis represents the modal age, while age AL_x represents the average age. Thus, this figure illustrates an "L type" Iowa curve since the mode occurs before the average.[93]

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:[94]

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

[93] 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.

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

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

Realized life is similar to average life, except that realized life is the average years of service experienced to date from the vintage's original installations.[95] As shown in the figure below, realized life is the area under the survivor curve from zero to age RL_X. Likewise, unrealized life is the area under the survivor curve from age RL_X to maximum life. Thus, it could be said that average life equals realized life plus unrealized life.

Average remaining life represents the future years of service expected from the surviving property.[96] 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 S_X). Thus, the average remaining life formula is:

Equation 5:
Average Remaining Life

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

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

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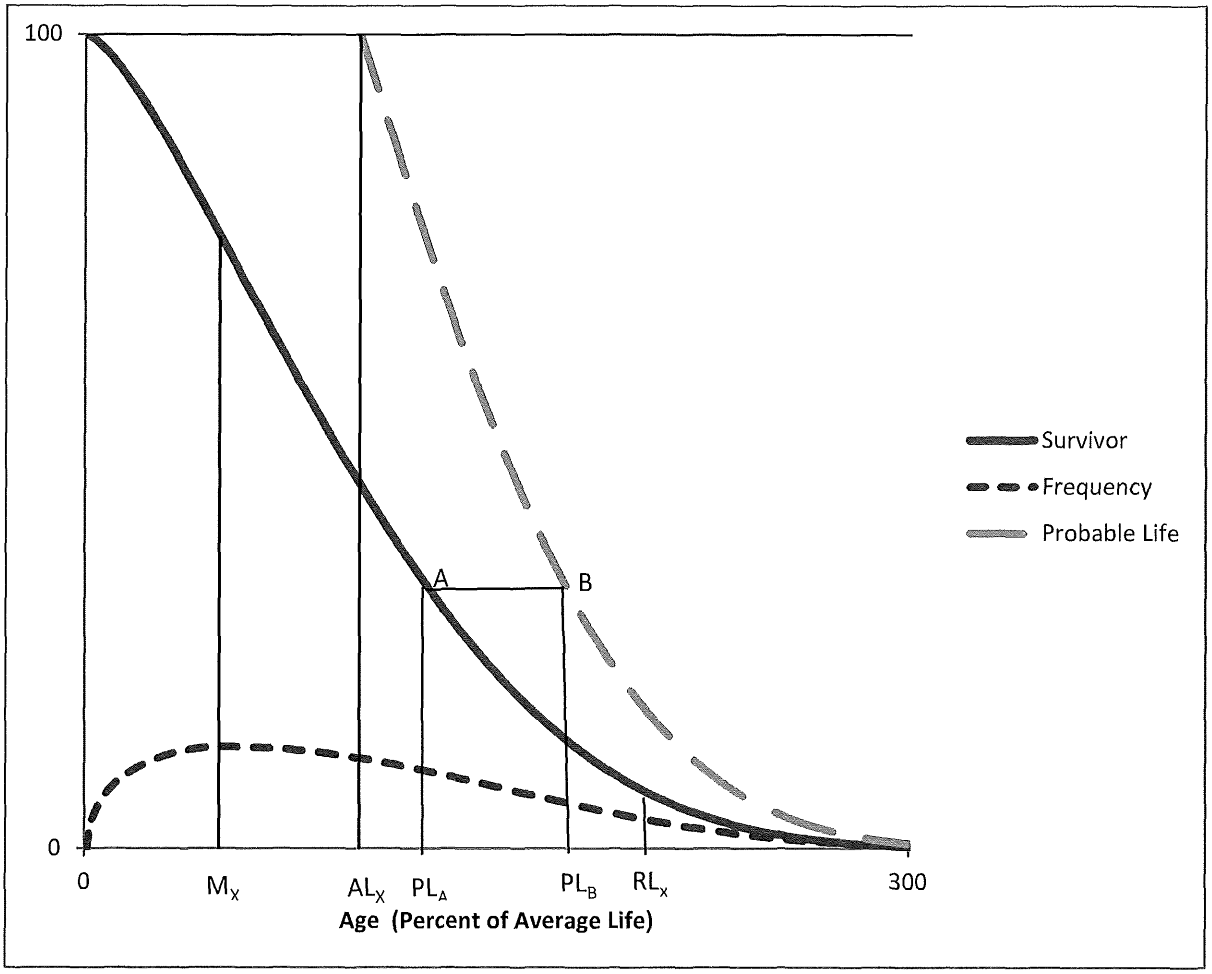
[95] *Id.* at 73.

[96] *Id.* at 74.

**Figure 19:
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.[97] The probable life is also illustrated in this figure. The probable life at age PL_A is the age at point PL_B. Thus, to read the probable life at age PL_A, see the corresponding point on the survivor curve above at point "A," then horizontally to point "B" on

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

the probable life curve, and back down to the age corresponding to point "B." It is no coincidence that the vertical line from AL_X connects at the top of the probable life curve. This 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.[98]

Figure 20:
Forces of Retirement

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

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

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

units; 2) the association of costs with such units; and 3) the dates of installation and removal of plant. Since actuarial analysis includes the examination of historical data to forecast future retirements, the historical data used in the analysis should not contain events that are anomalous or unlikely to recur.[99] Historical data is used in the retirement rate actuarial method, which is discussed further below.

The Retirement Rate Method

There are several systematic actuarial methods that use historical data 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.[100] 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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[99] *Id.* at 112-13.

[100] 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.[101] 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 21:
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	

[101] 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 22:
Retirement Matrix

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

These matrices help visualize how exposure and retirement data are calculated for each age interval. An age interval is typically one year. A common convention is to assume that any unit installed during the year is installed in the middle of the calendar year (i.e., July 1st). This convention is called the "half-year convention" and effectively assumes that all units are installed uniformly during the year.[102] 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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[102] Wolf *supra* n. 7, at 22.

The same calculation is applied to each number in the column. The amounts retired during the year in the retirements matrix affect the exposures at the beginning of each year in the exposures matrix. For example, the amount exposed to retirement in 2008 from the 2003 vintage is $261,000. The amount retired during 2008 from the 2003 vintage is $16,000. Thus, the amount exposed to retirement 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 23:
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			

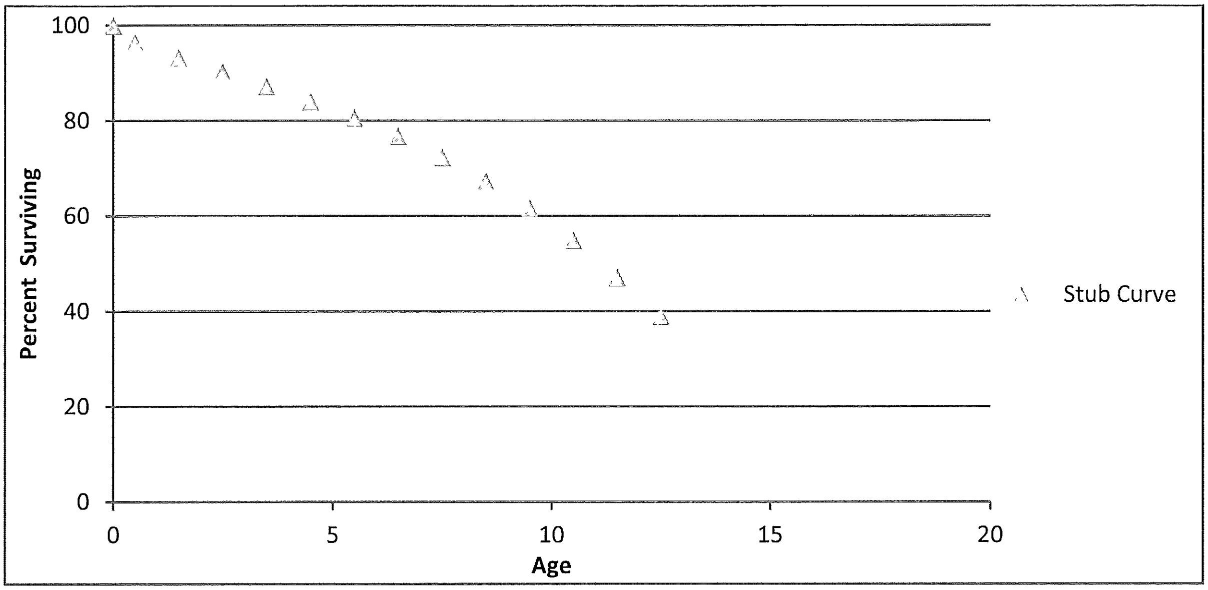
Column F on the right shows the percentages surviving at the beginning of each age interval. This column starts at 100% surviving. Each consecutive number below is calculated by multiplying the percent surviving from the previous age interval by the corresponding survivor ratio for that age interval. 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)[103].

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

[103] 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 24:
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.

Banding

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.[104] 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.[105]

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.

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

[105] *Id.*

Figure 25:
Placement Bands

	Experience Years Exposures at January 1 of Each Year (Dollars in 000's)									
Placement Years	2008	2009	2010	2011	2012	2013	2014	2015	Total at Start of Age Interval	Age Interval
2003	261	245	228	211	192	173	152	131		11.5 - 12.5
2004	267	252	236	220	202	184	165	145		10.5 - 11.5
2005	304	291	277	263	248	232	216	198	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.[106] 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

[106] Wolf *supra* n. 7, 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.[107]

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.

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

Figure 26:
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.[108] 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

[108] *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.

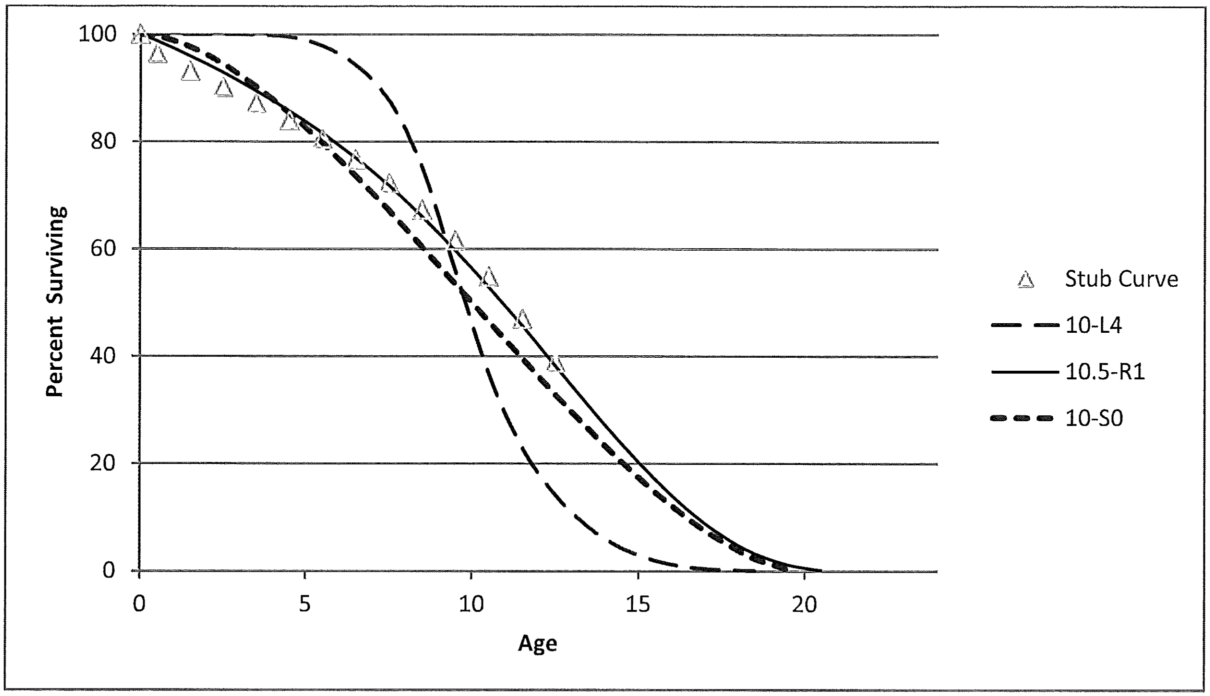
Curve Fitting

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."[109]

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.

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

Figure 27:
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.[110]

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."[111]

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.

---

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

[111] *Id.* at 48.

Figure 28:
Mathematical Fitting

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

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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 – 2018
Participate in management of operations, attend meetings, review performance, compensation, and financial records. Assist in fundraising events.

Group Facilitator & Fundraiser — 2014 – 2018
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
Public Utility Commission of Texas	Southwestern Public Service Company	PUC 49831	Depreciation rates, service lives, net salvage	Alliance of Xcel Municipalities
South Carolina Public Service Commission	Blue Granite Water Company	2019-290-WS	Depreciation rates, service lives, net salvage	South Carolina Office of Regulatory Staff
Railroad Commission of Texas	CenterPoint Energy Resources	GUD 10920	Depreciation rates and grouping procedure	Alliance of CenterPoint Municipalities
Pennsylvania Public Utility Commission	Aqua Pennsylvania Wastewater	A-2019-3009052	Fair market value estimates for wastewater assets	Pennsylvania Office of Consumer Advocate
New Mexico Public Regulation Commission	Southwestern Public Service Company	19-00170-UT	Cost of capital and authorized rate of return	The New Mexico Large Customer Group; Occidental Permian
Indiana Utility Regulatory Commission	Duke Energy Indiana	45253	Cost of capital, depreciation rates, net salvage	Indiana Office of Utility Consumer Counselor
Maryland Public Service Commission	Columbia Gas of Maryland	9609	Depreciation rates, service lives, net salvage	Maryland Office of People's Counsel
Washington Utilities & Transportation Commission	Avista Corporation	UE-190334	Cost of capital, awarded rate of return, capital structure	Washington Office of Attorney General
Indiana Utility Regulatory Commission	Indiana Michigan Power Company	45235	Cost of capital, depreciation rates, net salvage	Indiana Office of Utility Consumer Counselor
Public Utilities Commission of the State of California	Pacific Gas & Electric Company	18-12-009	Depreciation rates, service lives, net salvage	The Utility Reform Network
Oklahoma Corporation Commission	The Empire District Electric Company	PUD 201800133	Cost of capital, authorized ROE, depreciation rates	Oklahoma Industrial Energy Consumers and Oklahoma Energy Results
Arkansas Public Service Commission	Southwestern Electric Power Company	19-008-U	Cost of capital, depreciation rates, net salvage	Western Arkansas Large Energy Consumers
Public Utility Commission of Texas	CenterPoint Energy Houston Electric	PUC 49421	Depreciation rates, service lives, net salvage	Texas Coast Utilities Coalition
Massachusetts Department of Public Utilities	Massachusetts Electric Company and Nantucket Electric Company	D.P.U 18-150	Depreciation rates, service lives, net salvage	Massachusetts Office of the Attorney General, Office of Ratepayer Advocacy
Oklahoma Corporation Commission	Oklahoma Gas & Electric Company	PUD 201800140	Cost of capital, authorized ROE, depreciation rates	Oklahoma Industrial Energy Consumers and Oklahoma Energy Results
Public Service Commission of the State of Montana	Montana-Dakota Utilities Company	D2018.9.60	Depreciation rates, service lives, net salvage	Montana Consumer Counsel and Denbury Onshore
Indiana Utility Regulatory Commission	Northern Indiana Public Service Company	45159	Depreciation rates, grouping procedure, demolition costs	Indiana Office of Utility Consumer Counselor

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Public Service Commission of the State of Montana	NorthWestern Energy	D2018.2.12	Depreciation rates, service lives, net salvage	Montana Consumer Counsel
Oklahoma Corporation Commission	Public Service Company of Oklahoma	PUD 201800097	Depreciation rates, service lives, net salvage	Oklahoma Industrial Energy Consumers and Wal-Mart
Nevada Public Utilities Commission	Southwest Gas Corporation	18-05031	Depreciation rates, service lives, net salvage	Nevada Bureau of Consumer Protection
Public Utility Commission of Texas	Texas-New Mexico Power Company	PUC 48401	Depreciation rates, service lives, net salvage	Alliance of Texas-New Mexico Power Municipalities
Oklahoma Corporation Commission	Oklahoma Gas & Electric Company	PUD 201700496	Depreciation rates, service lives, net salvage	Oklahoma Industrial Energy Consumers and Oklahoma Energy Results
Maryland Public Service Commission	Washington Gas Light Company	9481	Depreciation rates, service lives, net salvage	Maryland Office of People's Counsel
Indiana Utility Regulatory Commission	Citizens Energy Group	45039	Depreciation rates, service lives, net salvage	Indiana Office of Utility Consumer Counselor
Public Utility Commission of Texas	Entergy Texas, Inc	PUC 48371	Depreciation rates, decommissioning costs	Texas Municipal Group
Washington Utilities & Transportation Commission	Avista Corporation	UE-180167	Depreciation rates, service lives, net salvage	Washington Office of Attorney General
New Mexico Public Regulation Commission	Southwestern Public Service Company	17-00255-UT	Cost of capital and authorized rate of return	HollyFrontier Navajo Refining; Occidental Permian
Public Utility Commission of Texas	Southwestern Public Service Company	PUC 47527	Depreciation rates, plant service lives	Alliance of Xcel Municipalities
Public Service Commission of the State of Montana	Montana-Dakota Utilities Company	D2017.9.79	Depreciation rates, service lives, net salvage	Montana Consumer Counsel
Florida Public Service Commission	Florida City Gas	20170179-GU	Cost of capital, depreciation rates	Florida Office of Public Counsel
Washington Utilities & Transportation Commission	Avista Corporation	UE-170485	Cost of capital and authorized rate of return	Washington Office of Attorney General
Wyoming Public Service Commission	Powder River Energy Corporation	10014-182-CA-17	Credit analysis, cost of capital	Private customer
Oklahoma Corporation Commission	Public Service Co. of Oklahoma	PUD 201700151	Depreciation, terminal salvage, risk analysis	Oklahoma Industrial Energy Consumers
Public Utility Commission of Texas	Oncor Electric Delivery Company	PUC 46957	Depreciation rates, simulated analysis	Alliance of Oncor Cities

Utility Regulatory Proceedings

Regulatory Agency	Utility Applicant	Docket Number	Issues Addressed	Parties Represented
Nevada Public Utilities Commission	Nevada Power Company	17-06004	Depreciation rates, service lives, net salvage	Nevada Bureau of Consumer Protection
Public Utility Commission of Texas	El Paso Electric Company	PUC 46831	Depreciation rates, interim retirements	City of El Paso
Idaho Public Utilities Commission	Idaho Power Company	IPC-E-16-24	Accelerated depreciation of North Valmy plant	Micron Technology, Inc.
Idaho Public Utilities Commission	Idaho Power Company	IPC-E-16-23	Depreciation rates, service lives, net salvage	Micron Technology, Inc.
Public Utility Commission of Texas	Southwestern Electric Power Company	PUC 46449	Depreciation rates, decommissioning costs	Cities Advocating Reasonable Deregulation
Massachusetts Department of Public Utilities	Eversource Energy	D.P.U. 17-05	Cost of capital, capital structure, and rate of return	Sunrun Inc.; Energy Freedom Coalition of America
Railroad Commission of Texas	Atmos Pipeline - Texas	GUD 10580	Depreciation rates, grouping procedure	City of Dallas
Public Utility Commission of Texas	Sharyland Utility Company	PUC 45414	Depreciation rates, simulated analysis	City of Mission
Oklahoma Corporation Commission	Empire District Electric Company	PUD 201600468	Cost of capital, depreciation rates	Oklahoma Industrial Energy Consumers
Railroad Commission of Texas	CenterPoint Energy Texas Gas	GUD 10567	Depreciation rates, simulated plant analysis	Texas Coast Utilities Coalition
Arkansas Public Service Commission	Oklahoma Gas & Electric Company	160-159-GU	Cost of capital, depreciation rates, terminal salvage	Arkansas River Valley Energy Consumers; Wal-Mart
Florida Public Service Commission	Peoples Gas	160-159-GU	Depreciation rates, service lives, net salvage	Florida Office of Public Counsel
Arizona Corporation Commission	Arizona Public Service Company	E-01345A-16-0036	Cost of capital, depreciation rates, terminal salvage	Energy Freedom Coalition of America
Nevada Public Utilities Commission	Sierra Pacific Power Company	16-06008	Depreciation rates, net salvage, theoretical reserve	Northern Nevada Utility Customers
Oklahoma Corporation Commission	Oklahoma Gas & Electric Co.	PUD 201500273	Cost of capital, depreciation rates, terminal salvage	Public Utility Division
Oklahoma Corporation Commission	Public Service Co. of Oklahoma	PUD 201500208	Cost of capital, depreciation rates, terminal salvage	Public Utility Division
Oklahoma Corporation Commission	Oklahoma Natural Gas Company	PUD 201500213	Cost of capital, depreciation rates, net salvage	Public Utility Division

Summary Depreciation Accrual Adjustment

Plant Function	Plant Balance 1/1/2020	FPUC Proposed Accrual	OPC Proposed Accrual	**OPC Accrual Adjustment**
Transmission	19,106,966	518,046	425,184	(92,862)
Distribution	125,915,937	4,163,199	3,443,120	(720,079)
General	9,909,111	432,892	431,590	(1,302)
Total Plant Studied	$ 154,932,014	$ 4,985,663	$ 4,171,420	**$ (814,243)**

Based on depreciation rates developed in Exhibit DJG-6

Weighted Average
Peer Group Service Lives

Acct	Description	FPUC Proposed	Midwest Avg	Coastal Avg	Florida Avg	Weighted Avg	Avg. Life Difference
	Peer Group Weighting		20%	35%	45%		
	TRANSMISSION PLANT						
353	Station Equipment	45	65	59	44	53	8
355	Poles & Fixtures	43	54	56	43	50	7
	DISTRIBUTION PLANT						
362	Station Equipment	50	66	56	49	55	5
364	Poles, Towers, & Fixtures	38	54	45	38	44	6
366	UG Conduit	60	71	58	65	64	4
367	Underground Conductors	35	60	48	39	47	12
368	Line Transformers	30	43	41	30	36	6
369	Services	40	56	49	44	48	8

See Exhibit DJG-4 for detailed calculations of peer group averages

Peer Group Detailed Parameter Comparison

			Midwest Peer Group					Coastal Peer Group						Florida Peer Group					
		[1]	[2]	[3]	[4]	[5]	[6]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]
Acct	Description	FPUC Proposed	SWEPCO	OG&E	PSO	Peer Avg	Avg Less FPUC	Duke	SCG&E	ETI	Peer Avg	Avg Less FPUC	FPUC Current	Duke	TECO	Gulf	FPL	Peer Avg	Avg Less FPUC
	TRANSMISSION PLANT																		
353	Station Equipment	45	73	63	60	65	20	52	60	64	59	14	40	47	45	40	42	44	-2
355	Poles & Fixtures	43	50	65	46	54	11	50	53	65	56	13	43	38	38	41	55	43	0
	DISTRIBUTION PLANT																		
362	Station Equipment	50	55	68	75	66	16	42	60	65	56	6	45	60	45	38	51	49	-2
364	Poles, Towers, & Fixtures	38	55	55	53	54	16	49	43	43	45	7	38	32	34	38	49	38	0
366	UG Conduit	60	70	65	78	71	11	55	60	60	58	-2	60	67	60	67	66	65	5
367	Underground Conductors	35	50	64	65	60	25	54	49	42	48	13	35	35	35	41	46	39	4
368	Line Transformers	30	50	44	36	43	13	43	45	34	41	11	30	31	20	33	34	30	-1
369	Services	40	55	53	60	56	16	50	65	31	49	9	37	41	38	46	49	44	4
	Average	**43**	**57**	**60**	**59**	**59**	**16**	**49**	**54**	**51**	**51**	**9**	**41**	**44**	**39**	**43**	**49**	**44**	**1**

[1] FPUC's proposal in current case, DN 420190144-EI (average service lives for Accounts 355 and 355 1 are composited - service life for Account 355 alone is 40 years)
[2] Application of Southwestern Electric Power Company, Docket No 46449, Order on Rehearing, pp 33-34 (March 19, 2018)
[3] Final Order No 662059, p 8, Application of Oklahoma Gas and Electric Company, Docket No PUD 201500273, before the Corporation Commission of Oklahoma (March 20, 2017)
[4] Final Order No 672864, pp 5-6, Application of Public Service Company of Oklahoma, Docket No PUD 201700151, before the Corporation Commission of Oklahoma (January 31, 2018)
[5] = Average of [2], [3], and [4]
[6] = [5] - [1]
[7] OPC proposed service lives
[8] Docket No 2018-319-E, Duke Energy Carolinas, Order 2019-323, 5-1-19
[9] Docket No 2015-313-E, South Carolina Gas and Electric
[10] Docket No PUC 48371, Entergy Texas
[11] = Average of [8], [9], and [10]
[12] = [11] - [1]
[13] Docket No 20150162-EI, Order No PSC-2015-0575-PAA-EI (average service lives for Accounts 355 and 355 1 are composited - service life for Account 355 alone is 40 years)
[14] Docket No 090079-EI, Order No PSC-10-0131-FOF-EI
[15] Docket No 20110131-EI, Order No PSC-12-0175-PAA-EI
[16] Docket Nos 160186-EI and 160170-EI, Order No PSC-17-0178-S-EI
[17] Docket No 20160021-EI, Order No PSC-16-0560-AS-EI
[18] = Average of [9], [10], [11], and [12]
[19] = [18] - [1]
*All figures are rounded to the nearest whole number

Detailed Rate Comparison - Weighted Average

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	TRANSMISSION PLANT							
350.10	Land Rights	0	1.30%	0	1.30%	0	0.00%	0
352.00	Structures & Improvements	1,919,496	1 70%	32,631	1.70%	32,631	0.00%	0
353.00	Station Equipment	7,581,692	2.20%	166,797	1.83%	138,642	-0.37%	-28,155
354.00	Towers & Fixtures	249,798	1.90%	4,746	1.90%	4,746	0.00%	0
355.00	Poles & Fixtures	1,659,809	6.80%	112,867	4.52%	75,044	-2.28%	-37,823
355.10	Poles & Fixtures - Concrete	4,014,730	2.90%	116,427	2.25%	90,451	-0.65%	-25,976
356 00	Overhead Conductors & Devices	3,674,653	2.30%	84,517	2.28%	83,607	-0.02%	-910
359 00	Roads and Trails	6,788	0.90%	61	0.92%	62	0.02%	1
	Total Transmission Plant	**19,106,966**	**2.71%**	**518,046**	**2.23%**	**425,184**	**-0.49%**	**-92,862**
	DISTRIBUTION PLANT							
360.10	Land Rights	56,995	1.50%	855	1.55%	881	0.05%	26
361.00	Structures & Improvements	1,198,983	1.80%	21,582	1.78%	21,309	-0.02%	-273
362.00	Station Equipment	13,235,887	2.10%	277,954	1.90%	250,879	-0.20%	-27,075
364.00	Poles, Towers, & Fixtures	25,869,789	4.10%	1,060,661	3.40%	878,366	-0.70%	-182,295
365 00	Overhead Conductors & Devices	20,427,593	2.80%	571,973	2.80%	571,112	0 00%	-861
366.00	Underground Conduit	7,034,164	1.80%	126,615	1.67%	117,544	-0.13%	-9,071
367 00	Underground Conductors & Devices	10,218,344	3.20%	326,987	2.03%	207,704	-1 17%	-119,283
368.00	Line Transformers	22,458,863	3.90%	875,896	2.68%	602,558	-1.22%	-273,338
369.00	Services	14,341,344	3 30%	473,264	2.56%	366,565	-0.74%	-106,699
370 00	Meters	5,085,099	3 80%	193,234	3.79%	192,927	-0.01%	-307
371 00	Installation on Customers' Premises	3,263,292	3.00%	97,899	2.97%	96,771	-0.03%	-1,128
373.00	Street Lighting & Signal Systems	2,725,584	5.00%	136,279	5.01%	136,504	0.01%	225
	Total Distribution Plant	**125,915,937**	**3.31%**	**4,163,199**	**2.73%**	**3,443,120**	**-0.57%**	**-720,079**
	GENERAL PLANT							
390 00	Structures & Improvements	4,044,796	2.00%	80,896	1.98%	79,944	-0.02%	-952
392.10	Transportation - Cars	23,951	7.70%	1,844	7.70%	1,844	0 00%	0
392.20	Transportation - Light Trucks & Vans	1,041,834	8.00%	83,347	8.00%	83,347	0.00%	0
392.30	Transportation - Heavy Trucks	3,755,922	6.00%	225,355	6.00%	225,355	0 00%	0
392 40	Transportation - Trailers	144,084	3.20%	4,611	3.16%	4,556	-0.04%	-55

Detailed Rate Comparison - Weighted Average

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
396.00	Power Operated Equipment	898,523	4.10%	36,839	4.07%	36,544	-0 03%	-295
	Total General Plant	**9,909,111**	**4.37%**	**432,892**	**4.36%**	**431,590**	**-0.01%**	**-1,302**
	Four-Year Amortization			-128,474				128,474
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**	**3.22%**	**$ 4,985,663**	**2.69%**	**$ 4,171,420**	**-0.53%**	**$ (814,243)**

[1], [2] From depreciation study
[3] From Exhibit DJG-6
[4] = [3] - [2]

Depreciation Rate Development - Weighted Average

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Account No.	Description	Plant 1/1/2020	Iowa Curve Type	AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Age (Years)	Remaining Life	Service Life Accrual	Service Life Rate	Net Salvage Accrual	Net Salvage Rate	Total Accrual	Total Rate
	TRANSMISSION PLANT															
350 10	Land Rights	0	SQ	75	0 0%	0	0	0	0 0	75 0					0	1 30%
352 00	Structures & Improvements	1,919,496	S5	60	0 0%	1,919,496	59,504	1,859,992	3 2	57 0	32,631	1 70%	0	0 00%	32,631	1 70%
353 00	Station Equipment	7,581,692	S3	53	0 0%	7,581,692	1,623,570	5,958,122	10 2	43 0	138,642	1 83%	0	0 00%	138,642	1.83%
354 00	Towers & Fixtures	249,798	S6	60	-15 0%	287,268	197,091	90,177	41 0	19 0	2,774	1 11%	1,972	0 79%	4,746	1.90%
355 00	Poles & Fixtures	1,659,809	R4	50	-50 0%	2,489,713	487,283	2,002,430	23 0	26 7	43,942	2 65%	31,102	1 87%	75,044	4 52%
355.10	Poles & Fixtures - Concrete	4,014,730	R4	56	-30 0%	5,219,150	678,489	4,540,661	5 8	50 2	66,459	1 66%	23,992	0 60%	90 451	2.25%
356 00	Overhead Conductors & Devices	3,674,653	S2	55	-20 0%	4,409,583	563,667	3,845,916	9 2	46 0	67,630	1 84%	15,977	0 43%	83,607	2 28%
359 00	Roads and Trails	6,788	SQ	70	0 0%	6,788	6,009	779	57 5	12 5	62	0 92%	0	0 00%	62	0 92%
	Total Transmission Plant	**19,106,966**			**-14 7%**	**21,913,690**	**3,615,614**	**18,298,076**		**43 0**	**352,141**	**1 84%**	**73,043**	**0.38%**	**425,184**	**2.23%**
	DISTRIBUTION PLANT															
360 10	Land Rights	56,995	SQ	60	0 0%	56,995	34,100	22,895	34 5	26 0	881	1 55%	0	0 00%	881	1 55%
361 00	Structures & Improvements	1,198,983	SQ	60	-5 0%	1,258,932	108,223	1,150,710	5 6	54 0	20,199	1 68%	1,110	0 09%	21,309	1.78%
362 00	Station Equipment	13,235,887	S3	55	-10 0%	14,559,476	3,869,925	10,689,551	11 9	42 6	219,815	1 66%	31,064	0 23%	250,879	1.90%
364.00	Poles, Towers, & Fixtures	25,869,789	R4	44	-50 0%	38,804,684	9,265,961	29,538,723	10 2	33 6	493,733	1 91%	384,633	1 49%	878,366	3 40%
365 00	Overhead Conductors & Devices	20,427,593	R5	45	-35 0%	27,577,250	10,443,893	17,133,357	15 1	30 0	332,790	1 63%	238,322	1 17%	571,112	2 80%
366 00	Underground Conduit	7,034,164	R5	64	-5 0%	7,385,872	1,359,793	6,026,080	12 6	51.3	110,683	1 57%	6,860	0 10%	117,544	1 67%
367 00	Underground Conductors & Devices	10,218,344	R4	47	-5 0%	10,729,262	3,955,509	6,773,752	13 9	32.6	192,038	1 88%	15,666	0 15%	207,704	2 03%
368 00	Line Transformers	22,458,863	S4	36	-20 0%	26,950,635	15,095,313	11,855,323	16 5	19.7	374,259	1 67%	228,298	1 02%	602,558	2 68%
369 00	Services	14,341,344	R5	48	-40 0%	20,077,882	8,198,131	11,879,751	15 4	32 4	189,557	1 32%	177,008	1 23%	366,565	2 56%
370 00	Meters	5,085,099	R5	30	-10 0%	5,593,609	3,085,554	2,508,054	17 0	13 0	153,811	3 02%	39,116	0 77%	192,927	3 79%
371 00	Installation on Customers' Premises	3,263,292	S3	25	5 0%	3,100,127	1,784,044	1,316,083	11 6	13 6	108,768	3 33%	-11,997	-0 37%	96,771	2 97%
373 00	Street Lighting & Signal Systems	2,725,584	R3	22	-10 0%	2,998,142	1,441,996	1,556,146	11 5	11 4	112,595	4 13%	23,909	0 88%	136,504	5 01%
	Total Distribution Plant	**125,915,937**			**-26 3%**	**159,092,866**	**58,642,442**	**100,450,424**		**29.2**	**2,309,130**	**1 83%**	**1,133,990**	**0.90%**	**3,443,120**	**2.73%**
	GENERAL PLANT															
390 00	Structures & Improvements	4,044,796	R4	50	0 0%	4,044,796	1,006,938	3,037,858	12 7	38 0	79,944	1 98%	0	0 00%	79,944	1 98%
392 10	Transportation - Cars	23,951	S2	11	15 0%	20,358	10,768	9,590	6 5	5 2	2,535	10 58%	-691	-2 88%	1,844	7 70%
392 20	Transportation - Light Trucks & Vans	1,041,834	S4	11	12 0%	916,814	575,092	341,722	7 0	4 1	113,840	10 93%	-30,493	-2 93%	83,347	8 00%
392 30	Transportation - Heavy Trucks	3,755,922	S3	15	10 0%	3,380,330	2,005,662	1,374,668	9 4	6 1	286,928	7 64%	-61,572	-1 64%	225,355	6 00%
392 40	Transportation - Trailers	144,084	R4	25	5 0%	136,880	94,053	42,827	16 4	9 4	5,322	3 69%	-766	-0 53%	4,556	3 16%
396 00	Power Operated Equipment	898,523	S6	25	0 0%	898,523	335,752	562,771	9 6	15 4	36,544	4 07%	0	0 00%	36,544	4 07%
	Total General Plant	**9,909,111**			**5 2%**	**9,397,701**	**4,028,265**	**5,369,437**		**12 4**	**525,112**	**5.30%**	**-93,522**	**-0 94%**	**431,590**	**4 36%**
	Four-Year Amortization														-128,474	
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**			**-22 9%**	**$ 190,404,258**	**$ 66,286,321**	**$ 124,117,937**		**29 8**	**$ 3,186,383**	**2 06%**	**$ 1,113,511**	**0 64%**	**$ 4,171,420**	**2 69%**

[1] From depreciation study
[2] Average life for adjusted accounts based on statistical weighting in Exhibit DJG-3
[3] Mass net salvage rates developed through statistical analysis and professional judgment
[4] = [1]*(1-[3])
[5] From depreciation study
[6] = [4] - [5]
[7] Company calculated ages from Sch L
[8] Composite remaining life based on Iowa cuve in [2]
[9] = ([1] - [5]) / [8]
[10] = [9] / [1]
[11] = [13] - [9]
[12] = [14] - [10]
[13] = [6] / [8]
[14] = [13] / [1]

Detailed Rate Comparison - Midwest Peer Group

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	TRANSMISSION PLANT							
350.10	Land Rights	0	1.30%	0	1.30%	0	0.00%	0
352.00	Structures & Improvements	1,919,496	1.70%	32,631	1.70%	32,631	0.00%	0
353.00	Station Equipment	7,581,692	2.20%	166,797	1.43%	108,725	-0.77%	-58,072
354 00	Towers & Fixtures	249,798	1.90%	4,746	1.90%	4,746	0.00%	0
355.00	Poles & Fixtures	1,659,809	6.80%	112,867	3.89%	64,595	-2 91%	-48,272
355.10	Poles & Fixtures - Concrete	4,014,730	2.90%	116,427	2.13%	85,351	-0.77%	-31,076
356 00	Overhead Conductors & Devices	3,674,653	2.30%	84,517	2.28%	83,607	-0 02%	-910
359.00	Roads and Trails	6,788	0.90%	61	0.92%	62	0.02%	1
	Total Transmission Plant	**19,106,966**	**2.71%**	**518,046**	**1.99%**	**379,717**	**-0.72%**	**-138,329**
	DISTRIBUTION PLANT							
360 10	Land Rights	56,995	1.50%	855	1.55%	881	0.05%	26
361 00	Structures & Improvements	1,198,983	1 80%	21,582	1.78%	21,309	-0.02%	-273
362 00	Station Equipment	13,235,887	2.10%	277,954	1.49%	197,589	-0.61%	-80,365
364.00	Poles, Towers, & Fixtures	25,869,789	4 10%	1,060,661	2.61%	674,400	-1.49%	-386,261
365 00	Overhead Conductors & Devices	20,427,593	2 80%	571,973	2.80%	571,112	0.00%	-861
366.00	Underground Conduit	7,034,164	1.80%	126,615	1.47%	103,186	-0 33%	-23,429
367.00	Underground Conductors & Devices	10,218,344	3 20%	326,987	1.44%	146,936	-1 76%	-180,051
368.00	Line Transformers	22,458,863	3.90%	875,896	1.99%	447,371	-1 91%	-428,525
369.00	Services	14,341,344	3 30%	473,264	2.04%	292,605	-1 26%	-180,659
370.00	Meters	5,085,099	3 80%	193,234	3.79%	192,927	-0.01%	-307
371 00	Installation on Customers' Premises	3,263,292	3 00%	97,899	2.97%	96,771	-0.03%	-1,128
373 00	Street Lighting & Signal Systems	2,725,584	5.00%	136,279	5.01%	136,504	0.01%	225
	Total Distribution Plant	**125,915,937**	**3.31%**	**4,163,199**	**2.29%**	**2,881,591**	**-1.02%**	**-1,281,608**
	GENERAL PLANT							
390.00	Structures & Improvements	4,044,796	2 00%	80,896	1.98%	79,944	-0.02%	-952
392.10	Transportation - Cars	23,951	7.70%	1,844	7.70%	1,844	0 00%	0
392.20	Transportation - Light Trucks & Vans	1,041,834	8.00%	83,347	8.00%	83,347	0 00%	0
392.30	Transportation - Heavy Trucks	3,755,922	6.00%	225,355	6.00%	225,355	0.00%	0
392.40	Transportation - Trailers	144,084	3.20%	4,611	3.16%	4,556	-0 04%	-55

Detailed Rate Comparison - Midwest Peer Group

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
396 00	Power Operated Equipment	898,523	4.10%	36,839	4.07%	36,544	-0.03%	-295
	Total General Plant	**9,909,111**	**4.37%**	**432,892**	**4.36%**	**431,590**	**-0.01%**	**-1,302**
	Four-Year Amortization			-128,474		-128,474		0
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**	**3.22%**	**$ 4,985,663**	**2.30%**	**$ 3,564,423**	**-0.92%**	**$ (1,421,240)**

[1], [2] From depreciation study
[3] From Exhibit DJG-8
[4] = [3] - [2]

Depreciation Rate Development - Midwest Peer Group

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Account		Plant	Iowa Curve		Net	Depreciable	Book	Future	Age	Remaining	Service Life		Net Salvage		Total	
No.	Description	1/1/2020	Type	AL	Salvage	Base	Reserve	Accruals	(Years)	Life	Accrual	Rate	Accrual	Rate	Accrual	Rate
	TRANSMISSION PLANT															
350.10	Land Rights	0	SQ	75	0.0%	0	0	0	0.0	75.0					0	1.30%
352.00	Structures & Improvements	1,919,496	S5	60	0.0%	1,919,496	59,504	1,859,992	3.2	57.0	32,631	1.70%	0	0.00%	32,631	1.70%
353.00	Station Equipment	7,581,692	S3	65	0.0%	7,581,692	1,623,570	5,958,122	10.2	54.8	108,725	1.43%	0	0.00%	108,725	1.43%
354.00	Towers & Fixtures	249,798	S6	60	-15.0%	287,268	197,091	90,177	41.0	19.0	2,774	1.11%	1,972	0.79%	4,746	1.90%
355.00	Poles & Fixtures	1,659,809	R4	54	-50.0%	2,489,713	487,283	2,002,430	23.0	31.0	37,823	2.28%	26,771	1.61%	64,595	3.89%
355.10	Poles & Fixtures - Concrete	4,014,730	R4	59	-30.0%	5,219,150	678,489	4,540,661	5.8	53.2	62,711	1.56%	22,639	0.56%	85,351	2.13%
356.00	Overhead Conductors & Devices	3,674,653	S2	55	-20.0%	4,409,583	563,667	3,845,916	9.2	46.0	67,630	1.84%	15,977	0.43%	83,607	2.28%
359.00	Roads and Trails	6,788	SQ	70	0.0%	6,788	6,009	779	57.5	12.5	62	0.92%	0	0.00%	62	0.92%
	Total Transmission Plant	**19,106,966**			**-14.7%**	**21,913,690**	**3,615,614**	**18,298,076**		**48.2**	**312,357**	**1.63%**	**67,359**	**0.35%**	**379,717**	**1.99%**
	DISTRIBUTION PLANT															
360.10	Land Rights	56,995	SQ	60	0.0%	56,995	34,100	22,895	34.5	26.0	881	1.55%	0	0.00%	881	1.55%
361.00	Structures & Improvements	1,198,983	SQ	60	-5.0%	1,258,932	108,223	1,150,710	5.6	54.0	20,199	1.68%	1,110	0.09%	21,309	1.78%
362.00	Station Equipment	13,235,887	S3	66	-10.0%	14,559,476	3,869,925	10,689,551	11.9	54.1	173,123	1.31%	24,466	0.18%	197,589	1.49%
364.00	Poles, Towers, & Fixtures	25,869,789	R4	54	-50.0%	38,804,684	9,265,961	29,538,723	10.2	43.8	379,083	1.47%	295,317	1.14%	674,400	2.61%
365.00	Overhead Conductors & Devices	20,427,593	R5	45	-35.0%	27,577,250	10,443,893	17,133,357	15.1	30.0	332,790	1.63%	238,322	1.17%	571,112	2.80%
366.00	Underground Conduit	7,034,164	R5	71	-5.0%	7,385,872	1,359,793	6,026,080	12.6	58.4	97,164	1.38%	6,022	0.09%	103,186	1.47%
367.00	Underground Conductors & Devices	10,218,344	R4	60	-5.0%	10,729,262	3,955,509	6,773,752	13.9	46.1	135,853	1.33%	11,083	0.11%	146,936	1.44%
368.00	Line Transformers	22,458,863	S4	43	-20.0%	26,950,635	15,095,313	11,855,323	16.5	26.5	277,870	1.24%	169,501	0.75%	447,371	1.99%
369.00	Services	14,341,344	R5	56	-40.0%	20,077,882	8,198,131	11,879,751	15.4	40.6	151,311	1.06%	141,294	0.99%	292,605	2.04%
370.00	Meters	5,085,099	R5	30	-10.0%	5,593,609	3,085,554	2,508,054	17.0	13.0	153,811	3.02%	39,116	0.77%	192,927	3.79%
371.00	Installation on Customers' Premises	3,263,292	S3	25	5.0%	3,100,127	1,784,044	1,316,083	11.6	13.6	108,768	3.33%	-11,997	-0.37%	96,771	2.97%
373.00	Street Lighting & Signal Systems	2,725,584	R3	22	-10.0%	2,998,142	1,441,996	1,556,146	11.5	11.4	112,595	4.13%	23,909	0.88%	136,504	5.01%
	Total Distribution Plant	**125,915,937**			**-26.3%**	**159,092,866**	**58,642,442**	**100,450,424**		**34.9**	**1,943,448**	**1.54%**	**938,142**	**0.75%**	**2,881,591**	**2.29%**
	GENERAL PLANT															
390.00	Structures & Improvements	4,044,796	R4	50	0.0%	4,044,796	1,006,938	3,037,858	12.7	38.0	79,944	1.98%	0	0.00%	79,944	1.98%
392.10	Transportation - Cars	23,951	S2	11	15.0%	20,358	10,768	9,590	6.5	5.2	2,535	10.58%	-691	-2.88%	1,844	7.70%
392.20	Transportation - Light Trucks & Vans	1,041,834	S4	11	12.0%	916,814	575,092	341,722	7.0	4.1	113,840	10.93%	-30,493	-2.93%	83,347	8.00%
392.30	Transportation - Heavy Trucks	3,755,922	S3	15	10.0%	3,380,330	2,005,662	1,374,668	9.4	6.1	286,928	7.64%	-61,572	-1.64%	225,355	6.00%
392.40	Transportation - Trailers	144,084	R4	25	5.0%	136,880	94,053	42,827	16.4	9.4	5,322	3.69%	-766	-0.53%	4,556	3.16%
396.00	Power Operated Equipment	898,523	S6	25	0.0%	898,523	335,752	562,771	9.6	15.4	36,544	4.07%	0	0.00%	36,544	4.07%
	Total General Plant	**9,909,111**			**5.2%**	**9,397,701**	**4,028,265**	**5,369,437**		**12.4**	**525,112**	**5.30%**	**-93,522**	**-0.94%**	**431,590**	**4.36%**
	Four-Year Amortization														-128,474	
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**			**-22.9%**	**$ 190,404,258**	**$ 66,286,321**	**$ 124,117,937**		**34.8**	**$ 2,780,918**	**1.79%**	**$ 911,979**	**0.51%**	**$ 3,564,423**	**2.30%**

[1] From depreciation study
[2] Average life for adjusted accounts based on per group average in Exhibit DJG-4
[3] Mass net salvage rates developed through statistical analysis and professional judgment
[4] = [1]*(1-[3])
[5] From depreciation study
[6] = [4] - [5]
[7] Company calculated ages from Sch L
[8] Composite remaining life based on Iowa cuve in [2]
[9] = ([1] - [5]) / [8]
[10] = [9] / [1]
[11] = [13] - [9]
[12] = [14] - [10]
[13] = [6] / [8]
[14] = [13] / [1]

Detailed Rate Comparison - Coastal Peer Group

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	TRANSMISSION PLANT							
350.10	Land Rights	0	1.30%	0	1.30%	0	0.00%	0
352.00	Structures & Improvements	1,919,496	1.70%	32,631	1.70%	32,631	0.00%	0
353.00	Station Equipment	7,581,692	2.20%	166,797	1.61%	122,093	-0.59%	-44,704
354.00	Towers & Fixtures	249,798	1.90%	4,746	1.90%	4,746	0.00%	0
355.00	Poles & Fixtures	1,659,809	6.80%	112,867	3.66%	60,680	-3.14%	-52,187
355.10	Poles & Fixtures - Concrete	4,014,730	2 90%	116,427	2.05%	82,258	-0.85%	-34,169
356 00	Overhead Conductors & Devices	3,674,653	2 30%	84,517	2.28%	83,607	-0 02%	-910
359 00	Roads and Trails	6,788	0.90%	61	0.92%	62	0.02%	1
	Total Transmission Plant	**19,106,966**	**2.71%**	**518,046**	**2.02%**	**386,077**	**-0.69%**	**-131,969**
	DISTRIBUTION PLANT							
360 10	Land Rights	56,995	1.50%	855	1.55%	881	0.05%	26
361 00	Structures & Improvements	1,198,983	1 80%	21,582	1.78%	21,309	-0.02%	-273
362.00	Station Equipment	13,235,887	2.10%	277,954	1.83%	242,393	-0.27%	-35,561
364.00	Poles, Towers, & Fixtures	25,869,789	4.10%	1,060,661	3.28%	848,814	-0.82%	-211,847
365.00	Overhead Conductors & Devices	20,427,593	2.80%	571,973	2.80%	571,112	0.00%	-861
366.00	Underground Conduit	7,034,164	1.80%	126,615	1.89%	132,733	0.09%	6,118
367 00	Underground Conductors & Devices	10,218,344	3.20%	326,987	1.94%	198,644	-1.26%	-128,343
368.00	Line Transformers	22,458,863	3.90%	875,896	2.15%	483,891	-1.75%	-392,005
369.00	Services	14,341,344	3.30%	473,264	2.47%	353,564	-0.83%	-119,700
370.00	Meters	5,085,099	3.80%	193,234	3.79%	192,927	-0.01%	-307
371.00	Installation on Customers' Premises	3,263,292	3.00%	97,899	2.97%	96,771	-0 03%	-1,128
373.00	Street Lighting & Signal Systems	2,725,584	5.00%	136,279	5.01%	136,504	0 01%	225
	Total Distribution Plant	**125,915,937**	**3.31%**	**4,163,199**	**2.60%**	**3,279,543**	**-0.70%**	**-883,656**
	GENERAL PLANT							
390.00	Structures & Improvements	4,044,796	2.00%	80,896	1.98%	79,944	-0.02%	-952
392 10	Transportation - Cars	23,951	7.70%	1,844	7.70%	1,844	0.00%	0
392.20	Transportation - Light Trucks & Vans	1,041,834	8.00%	83,347	8.00%	83,347	0.00%	0
392 30	Transportation - Heavy Trucks	3,755,922	6.00%	225,355	6.00%	225,355	0.00%	0
392 40	Transportation - Trailers	144,084	3.20%	4,611	3.16%	4,556	-0.04%	-55

Detailed Rate Comparison - Coastal Peer Group

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
396.00	Power Operated Equipment	898,523	4.10%	36,839	4.07%	36,544	-0.03%	-295
	Total General Plant	**9,909,111**	**4.37%**	**432,892**	**4.36%**	**431,590**	**-0.01%**	**-1,302**
	Four-Year Amortization			-128,474		-128,474		0
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**	**3.22%**	**$ 4,985,663**	**2.56%**	**$ 3,968,736**	**-0.66%**	**$ (1,016,927)**

[1], [2] From depreciation study
[3] From Exhibit DJG-10
[4] = [3] - [2]

Depreciation Rate Development - Coastal Peer Group

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Account No	Description	Plant 1/1/2020	Iowa Curve Type	AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Age (Years)	Remaining Life	Service Life Accrual	Service Life Rate	Net Salvage Accrual	Net Salvage Rate	Total Accrual	Total Rate
	TRANSMISSION PLANT															
350 10	Land Rights	0	SQ	75	0 0%	0	0	0	0 0	75 0					0	1.30%
352 00	Structures & Improvements	1,919,496	S5	60	0 0%	1,919,496	59,504	1,859,992	3 2	57 0	32,631	1 70%	0	0 00%	32,631	1.70%
353 00	Station Equipment	7,581,692	S3	59	0 0%	7,581,692	1,623,570	5,958,122	10 2	48 8	122,093	1 61%	0	0 00%	122,093	1.61%
354 00	Towers & Fixtures	249,798	S6	60	-15 0%	287,268	197,091	90,177	41 0	19 0	2,774	1 11%	1,972	0 79%	4,746	1.90%
355 00	Poles & Fixtures	1,659,809	R4	56	-50 0%	2,489,713	487,283	2,002,430	23 0	33 0	35,531	2 14%	25,149	1 52%	60,680	3 66%
355.10	Poles & Fixtures - Concrete	4,014,730	R4	61	-30 0%	5,219,150	678,489	4,540,661	5 8	55 2	60,439	1 51%	21,819	0 54%	82,258	2.05%
356 00	Overhead Conductors & Devices	3,674,653	S2	55	-20 0%	4,409,583	563,667	3,845,916	9 2	46 0	67,630	1 84%	15,977	0 43%	83,607	2 28%
359 00	Roads and Trails	6,788	SQ	70	0 0%	6,788	6,009	779	57 5	12 5	62	0 92%	0	0 00%	62	0 92%
	Total Transmission Plant	**19,106,966**			**-14 7%**	**21,913,690**	**3,615,614**	**18,298,076**		**47 4**	**321,161**	**1.68%**	**64,917**	**0 34%**	**386,077**	**2 02%**
	DISTRIBUTION PLANT															
360 10	Land Rights	56,995	SQ	60	0 0%	56,995	34,100	22,895	34 5	26 0	881	1 55%	0	0 00%	881	1.55%
361 00	Structures & Improvements	1,198,983	SQ	60	-5 0%	1,258,932	108,223	1,150,710	5 6	54 0	20,199	1 68%	1,110	0 09%	21,309	1.78%
362.00	Station Equipment	13,235,887	S3	56	-10 0%	14,559,476	3,869,925	10,689,551	11 9	44.1	212,380	1 60%	30,013	0 23%	242,393	1.83%
364 00	Poles, Towers, & Fixtures	25,869,789	R4	45	-50 0%	38,804,684	9,265,961	29,538,723	10 2	34 8	477,121	1 84%	371,692	1 44%	848,814	3 28%
365 00	Overhead Conductors & Devices	20,427,593	R5	45	-35 0%	27,577,250	10,443,893	17,133,357	15 1	30 0	332,790	1 63%	238,322	1 17%	571,112	2 80%
366 00	Underground Conduit	7,034,164	R5	58	-5 0%	7,385,872	1,359,793	6,026,080	12 6	45 4	124,986	1 78%	7,747	0 11%	132,733	1 89%
367 00	Underground Conductors & Devices	10,218,344	R4	48	-5 0%	10,729,262	3,955,509	6,773,752	13 9	34 1	183,661	1 80%	14,983	0 15%	198,644	1 94%
368 00	Line Transformers	22,458,863	S4	41	-20 0%	26,950,635	15,095,313	11,855,323	16 5	24 5	300,553	1.34%	183,338	0 82%	483,891	2 15%
369 00	Services	14,341,344	R5	49	-40 0%	20,077,882	8,198,131	11,879,751	15 4	33 6	182,834	1 27%	170,730	1 19%	353,564	2 47%
370 00	Meters	5,085,099	R5	30	-10 0%	5,593,609	3,085,554	2,508,054	17 0	13 0	153,811	3 02%	39,116	0 77%	192,927	3 79%
371 00	Installation on Customers' Premises	3,263,292	S3	25	5 0%	3,100,127	1,784,044	1,316,083	11 6	13 6	108,768	3 33%	-11,997	-0 37%	96,771	2 97%
373 00	Street Lighting & Signal Systems	2,725,584	R3	22	-10 0%	2,998,142	1,441,996	1,556,146	11 5	11 4	112,595	4 13%	23,909	0 88%	136,504	5 01%
	Total Distribution Plant	**125,915,937**			**-26 3%**	**159,092,866**	**58,642,442**	**100,450,424**		**30 6**	**2,210,580**	**1.76%**	**1,068,963**	**0 85%**	**3,279,543**	**2.60%**
	GENERAL PLANT															
390 00	Structures & Improvements	4,044,796	R4	50	0 0%	4,044,796	1,006,938	3,037,858	12 7	38 0	79,944	1 98%	0	0 00%	79,944	1 98%
392 10	Transportation - Cars	23,951	S2	11	15 0%	20,358	10,768	9,590	6 5	5 2	2,535	10 58%	-691	-2 88%	1,844	7.70%
392 20	Transportation - Light Trucks & Vans	1,041,834	S4	11	12 0%	916,814	575,092	341,722	7 0	4 1	113,840	10 93%	-30,493	-2 93%	83,347	8 00%
392 30	Transportation - Heavy Trucks	3,755,922	S3	15	10 0%	3,380,330	2,005,662	1,374,668	9 4	6 1	286,928	7 64%	-61,572	-1 64%	225,355	6 00%
392 40	Transportation - Trailers	144,084	R4	25	5 0%	136,880	94,053	42,827	16 4	9 4	5,322	3 69%	-766	-0 53%	4,556	3 16%
396 00	Power Operated Equipment	898,523	S6	25	0 0%	898,523	335,752	562,771	9 6	15 4	36,544	4 07%	0	0 00%	36,544	4.07%
	Total General Plant	**9,909,111**			**5 2%**	**9,397,701**	**4,028,265**	**5,369,437**		**12.4**	**525,112**	**5 30%**	**-93,522**	**-0 94%**	**431,590**	**4 36%**
	Four-Year Amortization														-128,474	
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**			**-22.9%**	**$ 190,404,258**	**$ 66,286,321**	**$ 124,117,937**		**31 3**	**$ 3,056,853**	**1 97%**	**$ 1,040,357**	**0 59%**	**$ 3,968,736**	**2.56%**

[1] From depreciation study
[2] Average life for adjusted accounts based on per group average in Exhibit DJG-4
[3] Mass net salvage rates developed through statistical analysis and professional judgment
[4] = [1]*(1 [3])
[5] From depreciation study
[6] = [4] - [5]
[7] Company calculated ages from Sch L
[8] Composite remaining life based on Iowa cuve in [2]
[9] = ([1] - [5]) / [8]
[10] = [9] / [1]
[11] = [13] - [9]
[12] = [14] - [10]
[13] = [6] / [8]
[14] = [13] / [1]

Detailed Rate Comparison - Florida Peer Group

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	TRANSMISSION PLANT							
350.10	Land Rights	0	1.30%	0	1.30%	0	0.00%	0
352.00	Structures & Improvements	1,919,496	1.70%	32,631	1.70%	32,631	0.00%	0
353.00	Station Equipment	7,581,692	2.20%	166,797	2.33%	176,276	0.13%	9,479
354.00	Towers & Fixtures	249,798	1.90%	4,746	1.90%	4,746	0.00%	0
355.00	Poles & Fixtures	1,659,809	6.80%	112,867	6.03%	100,122	-0 77%	-12,745
355.10	Poles & Fixtures - Concrete	4,014,730	2.90%	116,427	2.68%	107,599	-0.22%	-8,828
356 00	Overhead Conductors & Devices	3,674,653	2.30%	84,517	2.28%	83,607	-0.02%	-910
359 00	Roads and Trails	6,788	0.90%	61	0.92%	62	0.02%	1
	Total Transmission Plant	**19,106,966**	**2.71%**	**518,046**	**2.64%**	**505,043**	**-0.07%**	**-13,003**
	DISTRIBUTION PLANT							
360 10	Land Rights	56,995	1.50%	855	1.55%	881	0 05%	26
361.00	Structures & Improvements	1,198,983	1.80%	21,582	1.78%	21,309	-0.02%	-273
362.00	Station Equipment	13,235,887	2.10%	277,954	2.18%	288,128	0.08%	10,174
364.00	Poles, Towers, & Fixtures	25,869,789	4.10%	1,060,661	4.11%	1,062,544	0.01%	1,883
365 00	Overhead Conductors & Devices	20,427,593	2.80%	571,973	2.80%	571,112	0.00%	-861
366.00	Underground Conduit	7,034,164	1.80%	126,615	1.63%	115,002	-0.17%	-11,613
367.00	Underground Conductors & Devices	10,218,344	3.20%	326,987	2.64%	269,871	-0.56%	-57,116
368.00	Line Transformers	22,458,863	3.90%	875,896	3.91%	878,172	0.01%	2,276
369.00	Services	14,341,344	3.30%	473,264	2.90%	415,376	-0.40%	-57,888
370 00	Meters	5,085,099	3 80%	193,234	3.79%	192,927	-0 01%	-307
371.00	Installation on Customers' Premises	3,263,292	3.00%	97,899	2.97%	96,771	-0 03%	-1,128
373.00	Street Lighting & Signal Systems	2,725,584	5.00%	136,279	5.01%	136,504	0.01%	225
	Total Distribution Plant	**125,915,937**	**3.31%**	**4,163,199**	**3.22%**	**4,048,596**	**-0.09%**	**-114,603**
	GENERAL PLANT							
390 00	Structures & Improvements	4,044,796	2.00%	80,896	1.98%	79,944	-0.02%	-952
392.10	Transportation - Cars	23,951	7.70%	1,844	7.70%	1,844	0 00%	0
392.20	Transportation - Light Trucks & Vans	1,041,834	8.00%	83,347	8.00%	83,347	0.00%	0
392.30	Transportation - Heavy Trucks	3,755,922	6.00%	225,355	6.00%	225,355	0 00%	0
392.40	Transportation - Trailers	144,084	3.20%	4,611	3.16%	4,556	-0 04%	-55

Detailed Rate Comparison - Florida Peer Group

		[1]	[2]		[3]		[4]	
			FPUC Proposal		OPC Proposal		Difference	
Account No.	Description	Plant 1/1/2020	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
396 00	Power Operated Equipment	898,523	4.10%	36,839	4.07%	36,544	-0 03%	-295
	Total General Plant	**9,909,111**	**4.37%**	**432,892**	**4.36%**	**431,590**	**-0.01%**	**-1,302**
	Four-Year Amortization			-128,474		-128,474		0
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**	**3.22%**	**$ 4,985,663**	**3.13%**	**$ 4,856,755**	**-0.08%**	**$ (128,908)**

[1], [2] From depreciation study
[3] From Exhibit DJG-12
[4] = [3] - [2]

Depreciation Rate Development - Florida Peer Group

		[1]	[2]		[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Account No.	Description	Plant 1/1/2020	Iowa Curve Type	AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Age (Years)	Remaining Life	Service Life Accrual	Service Life Rate	Net Salvage Accrual	Net Salvage Rate	Total Accrual	Total Rate
	TRANSMISSION PLANT															
350 10	Land Rights	0	SQ	75	0 0%	0	0	0	0 0	75 0					0	1.30%
352 00	Structures & Improvements	1,919,496	S5	60	0 0%	1,919,496	59,504	1,859,992	3 2	57 0	32,631	1 70%	0	0 00%	32,631	1.70%
353.00	Station Equipment	7,581,692	S3	44	0 0%	7,581,692	1,623,570	5,958,122	10 2	33 8	176,276	2 33%	0	0 00%	176,276	2.33%
354 00	Towers & Fixtures	249,798	S6	60	-15 0%	287,268	197,091	90,177	41 0	19 0	2,774	1 11%	1,972	0 79%	4,746	1 90%
355 00	Poles & Fixtures	1,659,809	R4	43	-50 0%	2,489,713	487,283	2,002,430	23 0	20 0	58,626	3 53%	41,495	2 50%	100,122	6 03%
355 10	Poles & Fixtures - Concrete	4,014,730	R4	48	-30 0%	5,219,150	678,489	4,540,661	5 8	42.2	79,058	1 97%	28,541	0 71%	107,599	2.68%
356 00	Overhead Conductors & Devices	3,674,653	S2	55	-20 0%	4,409,583	563,667	3,845,916	9 2	46 0	67,630	1 84%	15,977	0 43%	83,607	2 28%
359 00	Roads and Trails	6,788	SQ	70	0 0%	6,788	6,009	779	57 5	12 5	62	0 92%	0	0 00%	62	0 92%
	Total Transmission Plant	**19,106,966**			**-14 7%**	**21,913,690**	**3,615,614**	**18,298,076**		**36 2**	**417,058**	**2.18%**	**87,985**	**0 46%**	**505,043**	**2 64%**
	DISTRIBUTION PLANT															
360 10	Land Rights	56,995	SQ	60	0 0%	56,995	34,100	22,895	34 5	26 0	881	1 55%	0	0 00%	881	1 55%
361 00	Structures & Improvements	1,198,983	SQ	60	-5 0%	1,258,932	108,223	1,150,710	5 6	54 0	20,199	1 68%	1,110	0 09%	21,309	1 78%
362.00	Station Equipment	13,235,887	S3	49	-10 0%	14,559,476	3,869,925	10,689,551	11.9	37 1	252,452	1 91%	35,676	0 27%	288,128	2 18%
364.00	Poles, Towers, & Fixtures	25,869,789	R4	38	-50 0%	38,804,684	9,265,961	29,538,723	10 2	27 8	597,260	2 31%	465,284	1 80%	1,062,544	4 11%
365 00	Overhead Conductors & Devices	20,427,593	R5	45	-35 0%	27,577,250	10,443,893	17,133,357	15 1	30 0	332,790	1 63%	238,322	1 17%	571,112	2 80%
366 00	Underground Conduit	7,034,164	R5	65	-5 0%	7,385,872	1,359,793	6,026,080	12 6	52 4	108,290	1 54%	6,712	0 10%	115,002	1 63%
367.00	Underground Conductors & Devices	10,218,344	R4	39	-5 0%	10,729,262	3,955,509	6,773,752	13 9	25 1	249,515	2 44%	20,355	0 20%	269,871	2 64%
368 00	Line Transformers	22,458,863	S4	30	-20 0%	26,950,635	15,095,313	11,855,323	16 5	13 5	545,448	2 43%	332,724	1 48%	878,172	3 91%
369 00	Services	14,341,344	R5	44	-40 0%	20,077,882	8,198,131	11,879,751	15 4	28 6	214,798	1 50%	200,578	1 40%	415,376	2 90%
370 00	Meters	5,085,099	R5	30	-10 0%	5,593,609	3,085,554	2,508,054	17 0	13 0	153,811	3 02%	39,116	0 77%	192,927	3 79%
371 00	Installation on Customers' Premises	3,263,292	S3	25	5 0%	3,100,127	1,784,044	1,316,083	11 6	13 6	108,768	3 33%	-11,997	-0 37%	96,771	2 97%
373 00	Street Lighting & Signal Systems	2,725,584	R3	22	-10 0%	2,998,142	1,441,996	1,556,146	11 5	11 4	112,595	4 13%	23,909	0 88%	136,504	5 01%
	Total Distribution Plant	**125,915,937**			**-26.3%**	**159,092,866**	**58,642,442**	**100,450,424**		**24 8**	**2,696,807**	**2 14%**	**1,351,789**	**1 07%**	**4,048,596**	**3 22%**
	GENERAL PLANT															
390 00	Structures & Improvements	4,044,796	R4	50	0 0%	4,044,796	1,006,938	3,037,858	12 7	38 0	79,944	1 98%	0	0 00%	79,944	1 98%
392 10	Transportation - Cars	23,951	S2	11	15 0%	20,358	10,768	9,590	6 5	5 2	2,535	10 58%	-691	-2 88%	1,844	7 70%
392 20	Transportation - Light Trucks & Vans	1,041,834	S4	11	12 0%	916,814	575,092	341,722	7 0	4 1	113,840	10 93%	-30,493	-2 93%	83,347	8 00%
392 30	Transportation - Heavy Trucks	3,755,922	S3	15	10 0%	3,380,330	2,005,662	1,374,668	9 4	6 1	286,928	7 64%	-61,572	-1 64%	225,355	6 00%
392 40	Transportation - Trailers	144,084	R4	25	5 0%	136,880	94,053	42,827	16 4	9 4	5,322	3 69%	-766	-0 53%	4,556	3 16%
396 00	Power Operated Equipment	898,523	S6	25	0 0%	898,523	335,752	562,771	9 6	15 4	36,544	4 07%	0	0 00%	36,544	4 07%
	Total General Plant	**9,909,111**			**5.2%**	**9,397,701**	**4,028,265**	**5,369,437**		**12 4**	**525,112**	**5 30%**	**-93,522**	**-0 94%**	**431,590**	**4 36%**
	Four-Year Amortization														-128,474	
	TOTAL DEPRECIABLE PLANT	**$ 154,932,014**			**-22 9%**	**$ 190,404,258**	**$ 66,286,321**	**$ 124,117,937**		**25 6**	**$ 3,638,977**	**2.35%**	**$ 1,346,251**	**0 79%**	**$ 4,856,755**	**3.13%**

[1] From depreciation study
[2] Average life for adjusted accounts based on per group average in Exhibit DJG-4
[3] Mass net salvage rates developed through statistical analysis and professional judgment
[4] = [1]*(1-[3])
[5] From depreciation study
[6] = [4] - [5]
[7] Company calculated ages from Sch L
[8] Composite remaining life based on Iowa cuve in [2]
[9] = ([1] - [5]) / [8]
[10] = [9] / [1]
[11] = [13] - [9]
[12] = [14] - [10]
[13] = [6] / [8]
[14] = [13] / [1]

Account 353 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	Exposures (Dollars)	Observed Life Table (OLT)	FPUC S3-45	SWEPCO R1.5-73	FPUC SSD	SWEPCO SSD
0.0	526,000,000	100.00%	100.00%	100.00%	0.0000	0.0000
0 5	494,000,000	99.92%	100.00%	99.88%	0 0000	0.0000
1.5	456,000,000	99.79%	100.00%	99.63%	0.0000	0.0000
2.5	430,000,000	98.85%	100.00%	99.38%	0.0001	0.0000
3 5	390,000,000	98.50%	100 00%	99.12%	0 0002	0.0000
4.5	366,000,000	98.30%	100.00%	98.86%	0.0003	0.0000
5.5	340,000,000	98.14%	100.00%	98.58%	0.0003	0.0000
6.5	312,000,000	98.05%	100.00%	98.30%	0.0004	0.0000
7.5	296,000,000	98.02%	100.00%	98.02%	0.0004	0.0000
8.5	272,000,000	97.90%	100.00%	97.72%	0.0004	0.0000
9.5	264,000,000	97.56%	99.99%	97.42%	0.0006	0.0000
10.5	257,000,000	97.41%	99.99%	97.11%	0.0007	0.0000
11.5	253,000,000	97 30%	99.98%	96.79%	0 0007	0.0000
12.5	237,000,000	97.19%	99.96%	96.47%	0.0008	0.0001
13.5	220,000,000	97.02%	99.94%	96.14%	0.0008	0.0001
14 5	211,000,000	96.77%	99 89%	95.80%	0 0010	0.0001
15.5	207,000,000	96.63%	99.83%	95.45%	0.0010	0.0001
16.5	194,000,000	96.21%	99.75%	95.09%	0.0013	0.0001
17.5	190,000,000	96.01%	99 63%	94.72%	0.0013	0.0002
18.5	181,000,000	95.69%	99.47%	94.35%	0.0014	0.0002
19.5	172,000,000	95.27%	99.26%	93.97%	0.0016	0.0002
20.5	144,000,000	94.79%	98 98%	93.57%	0.0018	0.0001
21.5	136,000,000	94.50%	98.64%	93.17%	0.0017	0.0002
22.5	132,000,000	93.63%	98.21%	92.76%	0.0021	0.0001
23.5	129,000,000	93.32%	97 68%	92.34%	0.0019	0.0001
24.5	126,000,000	93.08%	97.04%	91.91%	0.0016	0.0001
25.5	122,000,000	92.68%	96.28%	91.47%	0.0013	0.0001
26 5	120,000,000	92.16%	95 39%	91.02%	0.0010	0.0001
27.5	119,000,000	91.99%	94.35%	90.56%	0.0006	0.0002
28.5	118,000,000	91.35%	93.15%	90.09%	0.0003	0.0002
29.5	111,000,000	90.99%	91 78%	89.61%	0.0001	0.0002
30.5	104,000,000	90.50%	90.24%	89.12%	0.0000	0.0002
31.5	92,683,376	89.93%	88.53%	88.61%	0.0002	0.0002
32.5	88,841,439	88.99%	86.62%	88.09%	0.0006	0.0001
33.5	74,794,277	87.64%	84.54%	87.56%	0.0010	0.0000
34 5	66,468,915	86.89%	82.27%	87 02%	0.0021	0.0000
35.5	62,074,858	86.09%	79.83%	86.46%	0.0039	0.0000
36.5	58,053,551	85.11%	77.21%	85.90%	0.0062	0.0001
37 5	40,302,652	84.30%	74.43%	85 31%	0 0097	0.0001
38.5	38,851,495	83.69%	71.50%	84.71%	0.0149	0.0001
39.5	36,185,055	82.59%	68.44%	84.10%	0.0200	0.0002
40.5	33,029,722	81.68%	65.26%	83.47%	0.0270	0.0003
41.5	31,709,658	81.24%	61.97%	82.83%	0.0371	0.0003
42.5	29,425,583	80.81%	58.61%	82.17%	0.0493	0.0002
43.5	24,572,747	80.57%	55 19%	81.50%	0 0644	0.0001
44.5	23,475,188	79.65%	51.73%	80.81%	0.0779	0.0001
45.5	19,700,875	79.16%	48.27%	80.10%	0.0954	0.0001
46.5	18,761,885	78.64%	44 81%	79.37%	0.1144	0.0001
47.5	17,149,042	77.80%	41.39%	78.63%	0.1325	0.0001
48.5	16,021,269	76.20%	38.03%	77.87%	0.1457	0.0003
49.5	14,803,379	74.27%	34.74%	77 09%	0.1562	0.0008
50.5	13,604,740	73.09%	31.56%	76.30%	0.1724	0.0010
51.5	11,844,938	72.15%	28.50%	75.48%	0.1905	0.0011
52 5	11,455,102	71.41%	25.57%	74.65%	0.2101	0.0011
53.5	10,862,201	70.82%	22.79%	73.80%	0.2307	0.0009
54.5	10,011,743	70.59%	20.17%	72.93%	0.2542	0.0005
55.5	9,046,418	68.73%	17.73%	72.04%	0.2601	0.0011
56.5	8,113,514	67.93%	15.46%	71.13%	0.2753	0.0010
57.5	6,691,216	67.12%	13.38%	70.21%	0.2888	0.0010
58.5	6,312,129	66.65%	11.47%	69.26%	0.3045	0.0007
59.5	5,269,504	66.01%	9.76%	68.29%	0.3164	0.0005

Account 353 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**FPUC S3-45**	**SWEPCO R1.5-73**	**FPUC SSD**	**SWEPCO SSD**
60.5	4,653,764	64.97%	8.22%	67.31%	0.3221	0.0005
61.5	4,122,798	64 12%	6 85%	66.30%	0.3280	0.0005
62.5	3,305,626	63.35%	5.65%	65.28%	0.3329	0.0004
63.5	2,865,514	62.90%	4.61%	64.24%	0.3397	0.0002
64.5	2,488,119	62 21%	3 72%	63.17%	0.3421	0 0001
65.5	2,073,817	61.31%	2.96%	62.09%	0.3405	0.0001
66.5	1,782,745	60.80%	2.32%	61.00%	0.3421	0.0000
67.5	1,074,258	59.82%	1.79%	59.88%	0.3368	0.0000
68.5	762,836	58.81%	1.36%	58.75%	0.3300	0.0000
69.5	451,643	58.75%	1.02%	57.60%	0.3333	0.0001
70.5	426,532	58.75%	0.74%	56.44%	0.3365	0.0005
71.5	416,224	58.08%	0.53%	55.26%	0.3312	0.0008
72.5	400,116	57 83%	0 37%	54 06%	0 3301	0.0014
73.5	320,984	57.66%	0.25%	52.85%	0.3296	0.0023
74.5	214,026	52.83%	0.17%	51.63%	0.2774	0.0001
75.5	209,511	52 65%	0.11%	50.40%	0 2761	0 0005
76.5	192,792	49.08%	0.06%	49.16%	0.2403	0.0000
77.5	191,676	49.08%	0.04%	47.90%	0.2405	0.0001
78.5	179,171	49.08%	0.02%	46.64%	0.2407	0.0006
79.5	168,848	47.75%	0.01%	45.37%	0.2279	0.0006
80.5	165,348	46.94%	0.01%	44.10%	0.2202	0.0008
81.5	146,436	46.92%	0.00%	42.82%	0.2201	0.0017
82.5	123,262	46.09%	0.00%	41.53%	0.2124	0.0021
83.5	122,444	45.83%	0.00%	40.25%	0.2100	0.0031
84.5	64,423	45.66%	0.00%	38.97%	0.2085	0 0045
85.5	62,400	44.43%	0.00%	37.69%	0.1974	0.0046
86.5	35,850	44.43%		36.41%	0.1974	0.0064
87.5	4,525	44.08%		35.13%	0 1943	0 0080
88.5	1,968	44.08%		33.87%	0.1943	0.0104
89.5	0	44.08%		32.61%	0.1943	0.0132
90 5				31.36%		
91.5				30.12%		
92.5				28.90%		
93.5				27.69%		
94.5				26.50%		
95.5				25.32%		
96.5				24.17%		
97.5				23.04%		
98.5				21 92%		
99.5				20.84%		
Sum of Squared Differences				[8]	11.7144	0.0784

[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 for comparison purposes.
[5] Approved 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 355 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**FPUC R4-43**	**ETI R1.5-65**	**FPUC SSD**	**ETI SSD**
0.0	323,087,745	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	321,234,320	99.91%	100.00%	99.86%	0.0000	0.0000
1.5	279,045,542	99.90%	100.00%	99.59%	0.0000	0.0000
2.5	250,790,578	99.70%	99.99%	99.30%	0.0000	0.0000
3.5	236,119,885	99.58%	99.99%	99.01%	0.0000	0.0000
4.5	225,222,494	99 32%	99.98%	98.71%	0.0000	0.0000
5.5	220,052,584	99.07%	99.97%	98.39%	0.0001	0.0000
6.5	203,614,245	98.39%	99.96%	98.07%	0.0002	0.0000
7.5	183,136,980	97.90%	99.94%	97.74%	0.0004	0.0000
8.5	174,955,153	97.07%	99.92%	97.41%	0.0008	0.0000
9.5	163,856,686	96.96%	99.90%	97.06%	0.0009	0.0000
10.5	160,781,479	96.69%	99.86%	96.70%	0.0010	0.0000
11.5	160,457,727	96.49%	99.81%	96.33%	0.0011	0.0000
12.5	107,102,391	96.06%	99.76%	95.95%	0.0014	0.0000
13.5	93,807,670	94.81%	99.68%	95.57%	0.0024	0.0001
14.5	86,287,774	93.03%	99.59%	95.17%	0.0043	0.0005
15.5	81,477,564	92.57%	99.48%	94.76%	0.0048	0.0005
16.5	76,723,505	91.91%	99.34%	94.34%	0.0055	0.0006
17.5	73,384,098	91.17%	99.17%	93.91%	0.0064	0.0007
18.5	71,873,097	90.58%	98.96%	93.46%	0.0070	0.0008
19.5	66,190,626	90.07%	98.70%	93.01%	0.0075	0.0009
20.5	62,892,398	88.51%	98.40%	92.54%	0.0098	0.0016
21 5	59,141,679	88 31%	98 04%	92.07%	0 0095	0 0014
22.5	57,969,040	88.07%	97.61%	91.58%	0.0091	0.0012
23.5	56,772,207	87.91%	97.10%	91.07%	0.0085	0.0010
24.5	54,146,015	87.81%	96.51%	90.56%	0.0076	0.0008
25.5	53,265,537	87.70%	95.82%	90 03%	0.0066	0 0005
26.5	52,251,159	87.50%	95.02%	89.48%	0.0057	0.0004
27.5	51,021,485	87.34%	94.11%	88.92%	0.0046	0.0003
28.5	50,537,214	87.20%	93.05%	88.35%	0.0034	0.0001
29 5	49,493,202	86 84%	91 86%	87.76%	0.0025	0.0001
30.5	49,088,595	86.61%	90.52%	87.16%	0.0015	0.0000
31.5	45,412,511	85.95%	89.00%	86.53%	0.0009	0.0000
32.5	44,811,076	85.74%	87.31%	85.90%	0.0002	0.0000
33.5	43,073,087	85.19%	85.45%	85.24%	0.0000	0.0000
34.5	41,235,775	84.87%	83.39%	84.56%	0.0002	0.0000
35.5	29,395,163	84.38%	81.13%	83.87%	0.0011	0.0000
36.5	25,606,514	84.03%	78.68%	83.16%	0.0029	0.0001
37.5	22,653,923	83.70%	76.00%	82.43%	0.0059	0.0002
38.5	21,809,838	83.34%	73.04%	81.67%	0.0106	0.0003
39.5	21,115,741	81.90%	69.76%	80.90%	0.0147	0.0001
40.5	20,492,639	81.31%	66.11%	80.11%	0.0231	0.0001
41.5	17,980,632	80.84%	62.08%	79.29%	0.0352	0.0002
42.5	17,705,812	80.31%	57.69%	78.46%	0.0512	0.0003
43.5	17,234,547	79.81%	52.99%	77.60%	0.0719	0.0005
44.5	16,707,232	79.12%	48.06%	76.72%	0.0965	0.0006
45.5	15,501,586	78.77%	43.01%	75.81%	0.1279	0.0009
46.5	14,154,739	78.54%	37.96%	74.88%	0.1647	0.0013
47.5	11,621,138	77.56%	33.00%	73.93%	0.1985	0.0013
48.5	9,470,496	76.18%	28.25%	72.96%	0.2297	0.0010
49.5	8,243,491	74.36%	23.80%	71.96%	0.2557	0.0006
50.5	7,722,133	73.81%	19.71%	70.93%	0.2927	0.0008
51.5	7,249,596	73.21%	16.01%	69.89%	0.3271	0.0011
52.5	6,278,776	69.41%	12.75%	68.81%	0.3211	0.0000
53.5	5,745,614	68.65%	9.92%	67.72%	0.3449	0.0001
54.5	5,274,119	68.36%	7.51%	66.60%	0.3702	0.0003
55.5	5,012,245	67.58%	5.50%	65.45%	0.3854	0.0005
56.5	4,642,192	66.85%	3.88%	64.28%	0.3965	0.0007
57.5	4,331,304	64.50%	2.60%	63.09%	0.3832	0.0002

Account 355 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**FPUC R4-43**	**ETI R1.5-65**	**FPUC SSD**	**ETI SSD**
58.5	4,143,465	63.95%	1.63%	61.88%	0.3884	0.0004
59.5	4,057,801	63.60%	0.94%	60.64%	0.3926	0.0009
60.5	3,595,418	61.01%	0.49%	59.38%	0.3663	0.0003
61.5	3,428,027	58.93%	0.21%	58.10%	0.3448	0.0001
62.5	3,351,168	58.71%	0.07%	56.80%	0.3438	0.0004
63.5	1,146,662	57.75%	0.02%	55.47%	0.3333	0.0005
64.5	895,795	57.47%		54.14%	0.3303	0.0011
65.5	744,038	56.53%		52.78%	0.3196	0.0014
66.5	738,932	56.48%		51.41%	0.3190	0.0026
67.5	733,150	56.14%		50.02%	0.3152	0.0037
68.5	715,907	56.13%		48.62%	0.3151	0.0056
69.5	600,964	55.40%		47.20%	0.3069	0.0067
70.5	590,243	54.45%		45.78%	0.2965	0.0075
71.5	197,569	52.65%		44.35%	0.2772	0.0069
72.5	187,744	50.22%		42.92%	0.2522	0.0053
73.5	180,714	48.34%		41.48%	0.2337	0.0047
74.5	150,866	40.61%		40.03%	0.1649	0.0000
75.5	139,069	37.43%		38.59%	0.1401	0.0001
76.5	135,609	36.67%		37.15%	0.1345	0.0000
77.5	133,020	36.25%		35.72%	0.1314	0.0000
78.5	122,343	33.34%		34.29%	0.1112	0.0001
79.5	108,406	33.28%		32.88%	0.1108	0.0000
80.5	100,469	32.17%		31.47%	0.1035	0.0000
81.5	91,154	29.19%		30.08%	0.0852	0.0001
82.5	89,393	28.89%		28.71%	0.0835	0.0000
83.5	88,291	28.89%		27.36%	0.0835	0.0002
84.5	79,866	26.13%		26 03%	0 0683	0.0000
85.5	79,358	25.97%		24.72%	0.0674	0.0002
86.5	79,080	25.88%		23.43%	0.0670	0.0006
87.5	78,855	25.80%		22.18%	0.0666	0.0013
88 5	22,020	25.40%		20.95%	0.0645	0 0020
89.5	10,185	23.19%		19.76%	0.0538	0.0012
90.5	10,185	23.19%		18.60%		
91.5	9,638	23.17%		17.47%		
92.5	4,469	22.63%		16.37%		
93.5	4,469	22.63%		15.31%		
94.5	0	17.72%		14.29%		
Sum of Squared Differences				[8]	10.8953	0.0770

[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 for comparison purposes.
[5] Approved 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] FPUC S3-50	[5] PSO R0.5-75	[6] FPUC SSD	[7] PSO SSD
0.0	358,824,750	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	337,195,038	99.95%	100.00%	99.75%	0.0000	0.0000
1.5	312,364,056	99.84%	100.00%	99.24%	0.0000	0.0000
2.5	280,627,966	99.44%	100.00%	98.73%	0.0000	0.0001
3.5	243,924,737	99.10%	100.00%	98.22%	0.0001	0.0001
4.5	236,972,381	98.78%	100.00%	97.70%	0.0001	0.0001
5.5	224,498,054	98.47%	100.00%	97.18%	0.0002	0.0002
6.5	214,353,165	98.26%	100 00%	96.65%	0.0003	0.0003
7.5	198,816,545	97.74%	100.00%	96.13%	0.0005	0.0003
8.5	187,598,965	97.54%	100.00%	95.60%	0.0006	0.0004
9.5	172,661,539	97.19%	100.00%	95.06%	0.0008	0.0005
10.5	164,071,855	96.77%	100.00%	94.53%	0.0010	0.0005
11.5	159,002,832	96.44%	99.99%	93.99%	0.0013	0.0006
12.5	154,702,519	96.10%	99.98%	93.45%	0.0015	0.0007
13.5	146,227,690	95.17%	99.97%	92.90%	0.0023	0.0005
14.5	140,998,711	94.77%	99.95%	92.35%	0.0027	0.0006
15.5	135,342,168	94.07%	99.92%	91.80%	0.0034	0.0005
16.5	132,165,316	93.36%	99.88%	91.24%	0.0042	0.0004
17.5	124,913,803	93.02%	99.81%	90.68%	0.0046	0.0005
18.5	117,737,337	92.32%	99.73%	90.12%	0.0055	0.0005
19.5	112,000,595	91.79%	99.62%	89.56%	0.0061	0.0005
20.5	107,144,307	91.12%	99.48%	88.99%	0.0070	0.0005
21.5	106,479,556	90.55%	99.29%	88.42%	0.0076	0.0005
22.5	102,089,325	90.15%	99.06%	87.85%	0.0079	0.0005
23.5	97,300,586	89.23%	98.77%	87.27%	0.0091	0.0004
24.5	93,254,093	88.69%	98.42%	86.69%	0.0095	0.0004
25.5	85,421,699	87.87%	97.99%	86.11%	0.0102	0.0003
26.5	78,958,015	87.13%	97.48%	85.52%	0.0107	0.0003
27.5	74,076,251	86.42%	96.87%	84.93%	0.0109	0.0002
28.5	71,654,573	86.05%	96.16%	84.34%	0.0102	0.0003
29.5	70,104,393	85.29%	95.34%	83.74%	0.0101	0.0002
30.5	67,515,594	83.93%	94.41%	83.14%	0.0110	0.0001
31.5	65,013,230	83.25%	93.34%	82.54%	0.0102	0.0001
32.5	61,433,398	81.65%	92.14%	81.93%	0.0110	0.0000
33.5	57,711,437	80.37%	90.81%	81.32%	0.0109	0.0001
34.5	54,265,070	79.42%	89.32%	80.70%	0.0098	0.0002
35.5	53,176,866	78.38%	87.70%	80.08%	0.0087	0.0003
36.5	50,526,092	77.77%	85.92%	79.46%	0.0066	0.0003
37.5	47,996,290	76.72%	83.99%	78.83%	0.0053	0.0004
38.5	43,902,291	76.33%	81.92%	78.20%	0.0031	0.0003
39.5	42,355,913	75.71%	79.70%	77.56%	0.0016	0.0003
40.5	39,421,497	74.70%	77.35%	76.92%	0.0007	0.0005
41.5	35,479,270	73.76%	74.86%	76.27%	0.0001	0.0006
42.5	33,525,441	73.05%	72.25%	75.62%	0.0001	0.0007
43.5	31,477,863	72.54%	69.53%	74.96%	0.0009	0.0006
44.5	29,073,905	71.92%	66.70%	74.30%	0.0027	0.0006
45.5	27,663,799	70.82%	63.79%	73.63%	0.0049	0.0008
46.5	26,410,479	70.57%	60.80%	72.96%	0.0095	0.0006
47.5	24,941,894	70.37%	57.76%	72.28%	0.0159	0.0004
48.5	22,607,831	69.47%	54.67%	71.60%	0.0219	0.0005
49.5	21,398,862	69.14%	51.56%	70.91%	0.0309	0.0003
50.5	19,668,055	68.28%	48.44%	70.21%	0.0394	0.0004
51.5	17,661,372	67.60%	45.33%	69.51%	0.0496	0.0004

Account 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] FPUC S3-50	[5] PSO R0.5-75	[6] FPUC SSD	[7] PSO SSD
52.5	16,417,212	67.16%	42.24%	68.81%	0.0621	0.0003
53.5	15,583,212	66.85%	39.19%	68.10%	0.0765	0.0002
54.5	14,472,821	66.08%	36.21%	67.38%	0.0892	0.0002
55.5	13,339,819	65.59%	33.30%	66.65%	0.1043	0.0001
56.5	12,259,778	65.22%	30.47%	65.92%	0.1207	0.0000
57.5	11,011,293	64.62%	27.75%	65.19%	0.1359	0.0000
58.5	9,571,183	63.99%	25.14%	64.45%	0.1509	0.0000
59.5	7,756,845	62.97%	22.65%	63.70%	0.1626	0.0001
60.5	6,700,066	62.85%	20.30%	62.95%	0.1811	0.0000
61.5	5,445,926	62.43%	18.08%	62.19%	0.1967	0.0000
62.5	4,109,891	61.89%	16.01%	61.43%	0.2105	0.0000
63.5	3,227,447	60.98%	14.08%	60.66%	0.2200	0.0000
64.5	2,422,275	59.92%	12.30%	59.88%	0.2267	0.0000
65.5	2,131,463	59.65%	10.68%	59.10%	0.2398	0.0000
66.5	1,732,772	59.43%	9.19%	58.32%	0.2524	0.0001
67.5	1,312,587	59.26%	7.86%	57.53%	0.2642	0.0003
68.5	1,011,670	57.19%	6.66%	56.73%	0.2553	0.0000
69.5	885,634	55.89%	5.59%	55.93%	0.2530	0.0000
70.5	871,221	55.78%	4.66%	55.13%	0.2614	0.0000
71.5	799,021	53.80%	3.84%	54.32%	0.2496	0.0000
72.5	725,284	52.73%	3.13%	53.50%	0.2460	0.0001
73.5	711,436	52.73%	2.52%	52.68%	0.2521	0.0000
74.5	604,424	51.75%	2.01%	51.86%	0.2474	0.0000
75.5	577,303	51.33%	1.58%	51.03%	0.2475	0.0000
76.5	543,351	49.29%	1.23%	50.20%	0.2310	0.0001
77.5	480,020	48.19%	0.94%	49.37%	0.2233	0.0001
78.5	422,807	47.60%	0.71%	48.53%	0.2199	0.0001
79.5	286,915	46.27%	0.52%	47.69%	0.2093	0.0002
80.5	268,535	46.16%	0.38%	46.85%	0.2096	0.0000
81.5	150,037	45.28%	0.27%	46.00%	0.2026	0.0001
82.5	0	44.66%	0.19%	45.16%		
Sum of Squared Differences				[8]	6.3851	0.0211

[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 for comparison purposes.
[5] Approved 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]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	Exposures (Dollars)	Observed Life Table (OLT)	FPUC R4-38	SWEPCO R0.5-55	FPUC SSD	SWEPCO SSD
0.0	463,886,723	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	452,684,667	99.89%	100.00%	99.66%	0.0000	0.0000
1.5	438,118,216	99.44%	100.00%	98.96%	0.0000	0.0000
2.5	424,479,066	98.91%	99.99%	98.26%	0.0001	0.0000
3.5	406,926,861	98.32%	99.99%	97.56%	0.0003	0.0001
4.5	393,994,608	97.63%	99.98%	96.85%	0.0005	0.0001
5.5	352,007,462	97.05%	99.96%	96.13%	0.0009	0.0001
6.5	339,452,960	96.48%	99.95%	95.40%	0.0012	0.0001
7.5	320,869,193	95.90%	99.92%	94.67%	0.0016	0.0001
8.5	298,841,748	95.23%	99.89%	93.94%	0.0022	0.0002
9.5	280,877,226	94.58%	99.85%	93.20%	0.0028	0.0002
10.5	267,063,210	93.92%	99.79%	92.45%	0.0035	0.0002
11.5	254,613,051	93.22%	99.72%	91.70%	0.0042	0.0002
12.5	239,933,953	92.57%	99.63%	90.94%	0.0050	0.0003
13.5	230,831,257	91 84%	99.51%	90.17%	0.0059	0.0003
14.5	217,665,056	90.96%	99.35%	89.40%	0.0070	0.0002
15.5	204,041,394	90.12%	99.16%	88.63%	0.0082	0.0002
16.5	192,416,355	89.19%	98.92%	87.85%	0.0095	0.0002
17.5	179,797,327	88.22%	98.62%	87.06%	0.0108	0.0001
18.5	166,779,188	87.19%	98.25%	86.27%	0.0122	0.0001
19.5	152,561,054	86.11%	97.81%	85.47%	0.0137	0.0000
20.5	138,305,944	85.16%	97.27%	84.66%	0.0147	0.0000
21 5	129,444,794	84 05%	96.62%	83.85%	0 0158	0.0000
22.5	112,412,971	83.19%	95.85%	83.03%	0.0160	0.0000
23.5	105,790,511	82.39%	94.94%	82.21%	0.0158	0.0000
24.5	99,027,360	81.56%	93.88%	81.38%	0.0152	0.0000
25.5	91,465,857	80.76%	92.65%	80.54%	0.0141	0 0000
26.5	85,392,225	79.97%	91.23%	79.69%	0.0127	0.0000
27.5	79,489,184	79.19%	89.60%	78.83%	0.0108	0.0000
28.5	74,011,341	78.33%	87.76%	77.97%	0.0089	0.0000
29 5	68,518,359	77 58%	85.68%	77.10%	0 0066	0.0000
30.5	63,833,002	76.89%	83.36%	76.21%	0.0042	0.0000
31.5	58,255,035	75.76%	80.79%	75.32%	0.0025	0.0000
32.5	51,439,082	73.37%	77.96%	74.42%	0.0021	0.0001
33.5	45,670,025	71.19%	74.83%	73.51%	0.0013	0.0005
34.5	41,191,396	69.90%	71.31%	72.59%	0.0002	0.0007
35.5	37,322,657	68.27%	67.35%	71.66%	0.0001	0.0012
36.5	32,945,080	65.86%	62.91%	70.72%	0.0009	0.0024
37.5	30,155,884	64.67%	57.99%	69.77%	0.0045	0.0026
38.5	28,143,025	63.84%	52.67%	68.81%	0.0125	0.0025
39.5	26,254,804	62.99%	47.07%	67.84%	0.0253	0.0023
40.5	23,593,361	62.17%	41.35%	66.85%	0.0434	0.0022
41.5	22,178,242	61.28%	35.65%	65.86%	0.0657	0.0021
42.5	21,074,884	60.48%	30.16%	64.85%	0.0919	0.0019
43.5	19,590,910	59.71%	25.00%	63.84%	0.1205	0.0017
44.5	18,370,295	58.87%	20.27%	62.81%	0.1490	0.0016
45.5	16,928,352	57.92%	16.06%	61.78%	0.1752	0.0015
46.5	15,351,234	56.92%	12.40%	60.73%	0.1982	0.0015
47.5	14,137,254	56.18%	9.27%	59.67%	0.2201	0.0012
48.5	12,785,746	55.50%	6.70%	58.60%	0.2381	0.0010
49.5	11,626,848	54.87%	4.63%	57.53%	0.2524	0.0007
50.5	10,556,265	54.07%	3.01%	56.44%	0.2607	0.0006
51.5	9,477,414	53.31%	1.83%	55.35%	0.2650	0.0004
52.5	8,624,407	52.63%	1.00%	54.24%	0.2667	0.0003
53.5	7,620,519	52.11%	0.47%	53.13%	0.2667	0.0001
54.5	6,810,236	51.53%	0.18%	52.01%	0.2637	0.0000
55.5	6,248,487	51.04%	0.05%	50.88%	0.2600	0.0000
56.5	5,565,977	50.45%	0.01%	49.75%	0.2544	0.0000
57.5	5,082,736	49.93%		48.61%	0.2493	0.0002

Account 364 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	Exposures (Dollars)	Observed Life Table (OLT)	FPUC R4-38	SWEPCO R0.5-55	FPUC SSD	SWEPCO SSD
58.5	4,587,334	49.41%		47.46%	0.2442	0.0004
59.5	4,073,365	48.90%		46.31%	0.2392	0.0007
60.5	3,373,972	48.38%		45.16%	0.2340	0.0010
61.5	2,901,986	47.69%		44.00%	0.2275	0.0014
62.5	2,187,376	46.89%		42.83%	0.2198	0.0016
63.5	1,877,730	46.36%		41.67%	0.2149	0.0022
64.5	1,419,107	45.73%		40.50%	0.2091	0.0027
65.5	1,292,659	45.48%		39.33%	0.2068	0.0038
66.5	1,056,925	44.25%		38.17%	0.1958	0.0037
67.5	910,333	44.12%		37.00%	0.1947	0.0051
68.5	797,263	41.88%		35.84%	0.1754	0.0037
69.5	718,861	40.67%		34.68%	0.1654	0.0036
70.5	697,273	40.30%		33.52%	0.1624	0.0046
71.5	644,676	38.80%		32.37%	0.1505	0.0041
72.5	573,327	35.59%		31.22%	0.1267	0.0019
73.5	550,453	35.30%		30.08%	0.1246	0.0027
74.5	504,105	33.97%		28.95%	0.1154	0.0025
75.5	486,283	33.78%		27.82%	0.1141	0.0036
76.5	404,053	33.33%		26.71%	0.1111	0.0044
77.5	400,914	33.07%		25.60%	0.1094	0.0056
78.5	395,391	32.62%		24.51%	0.1064	0.0066
79.5	394,422	32.54%		23.43%	0.1059	0.0083
80.5	323,361	26.68%		22.37%	0.0712	0.0019
81.5	253,239	21.80%		21.31%	0.0475	0.0000
82.5	219,539	18.90%		20.28%	0.0357	0.0002
83 5	193,188	16.63%		19.26%	0.0277	0.0007
84.5	0	15.95%		18.26%	0.0254	0 0005
85.5				17.27%	0.0000	0.0298
86.5				16.31%	0.0000	0.0266
87.5				15.36%	0.0000	0.0236
88.5				14.44%	0 0000	0.0209
89.5				13.54%	0.0000	0.0183
90.5				12.66%	0.0000	0.0160
91.5				11.80%	0.0000	0.0139
92 5				10.97%	0 0000	0.0120
93.5				10.16%	0.0000	0.0103
94.5				9.37%		
Sum of Squared Differences				[8]	7.8753	0.2811

[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 for comparison purposes
[5] Approved 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] FPUC R5-60	[5] PSO R2-78	[6] FPUC SSD	[7] PSO SSD
0.0	77,664,275	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	72,240,771	99.99%	100.00%	99.94%	0.0000	0.0000
1.5	67,333,215	99.95%	100.00%	99.81%	0.0000	0.0000
2.5	57,343,433	99.91%	100.00%	99.68%	0.0000	0.0000
3.5	54,861,235	99.87%	100.00%	99.55%	0.0000	0.0000
4.5	50,810,791	99.81%	100.00%	99.41%	0.0000	0.0000
5.5	48,295,972	99.77%	100.00%	99.26%	0.0000	0.0000
6.5	44,352,439	99.74%	100.00%	99.10%	0.0000	0.0000
7.5	34,078,260	99.69%	100.00%	98.94%	0.0000	0.0001
8 5	27,509,665	99.62%	100.00%	98.78%	0.0000	0.0001
9.5	23,899,086	99.54%	100.00%	98.60%	0.0000	0.0001
10.5	21,601,430	99.42%	100.00%	98.42%	0.0000	0.0001
11.5	20,003,156	99.35%	100.00%	98.23%	0.0000	0.0001
12.5	18,559,639	99.20%	100.00%	98.03%	0.0001	0.0001
13.5	14,394,257	99.04%	100.00%	97.83%	0.0001	0.0001
14.5	9,408,492	98.58%	100.00%	97.62%	0.0002	0.0001
15.5	8,847,970	98.41%	100.00%	97.40%	0.0003	0.0001
16.5	8,292,057	98.02%	100.00%	97.17%	0.0004	0.0001
17.5	7,684,607	97.77%	100.00%	96.93%	0.0005	0.0001
18.5	6,577,269	97.30%	100.00%	96.68%	0.0007	0.0000
19.5	5,750,329	97.12%	100.00%	96.42%	0.0008	0.0000
20.5	4,604,083	95.74%	100.00%	96.16%	0.0018	0.0000
21.5	4,491,069	95.29%	100.00%	95.88%	0.0022	0.0000
22.5	4,446,812	95.00%	100.00%	95.60%	0.0025	0.0000
23.5	4,365,949	93.27%	100.00%	95.30%	0.0045	0.0004
24.5	4,356,580	93.19%	100.00%	94.99%	0.0046	0.0003
25.5	4,304,344	93.03%	100.00%	94.67%	0.0049	0.0003
26.5	3,859,432	91.71%	99.99%	94.34%	0.0069	0.0007
27.5	3,848,472	91.53%	99.99%	94.00%	0.0072	0.0006
28.5	3,843,853	91.43%	99.98%	93.65%	0.0073	0.0005
29.5	3,424,236	89.97%	99.96%	93.28%	0.0100	0.0011
30.5	3,325,078	89.84%	99.94%	92.90%	0.0102	0.0009
31.5	3,312,221	89.63%	99.90%	92.51%	0.0106	0.0008
32.5	3,141,044	89.47%	99.85%	92.11%	0.0108	0.0007
33.5	2,964,144	89.05%	99.78%	91.69%	0.0115	0.0007
34.5	2,928,578	88.49%	99.69%	91.26%	0.0125	0.0008
35.5	2,897,678	87.67%	99.57%	90.81%	0.0142	0.0010
36.5	2,822,998	87.46%	99.41%	90.35%	0.0143	0.0008
37.5	2,517,514	87.35%	99.20%	89.87%	0.0140	0.0006
38.5	2,401,094	87.20%	98.95%	89.38%	0.0138	0.0005
39.5	2,244,174	86.88%	98.64%	88.87%	0.0138	0.0004
40.5	2,204,327	86.73%	98.25%	88.35%	0.0133	0.0003
41.5	2,038,290	86.16%	97.79%	87.80%	0.0135	0.0003
42.5	2,014,038	85.97%	97.25%	87.25%	0.0127	0.0002
43.5	1,732,279	85.43%	96.59%	86.67%	0.0125	0.0002
44.5	1,605,161	84.87%	95.82%	86.08%	0.0120	0.0001
45.5	1,584,149	84.65%	94.92%	85.47%	0.0106	0.0001
46.5	1,568,695	83.83%	93.86%	84.84%	0.0101	0.0001
47.5	1,550,467	83.49%	92.63%	84.19%	0.0084	0.0000
48.5	1,514,810	83.14%	91.19%	83.52%	0.0065	0.0000
49.5	1,466,963	82.52%	89.52%	82.83%	0.0049	0.0000

Account 366 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**FPUC R5-60**	**PSO R2-78**	**FPUC SSD**	**PSO SSD**
50.5	1,441,961	82.20%	87.61%	82.13%	0.0029	0.0000
51.5	1,413,239	81.61%	85.41%	81.40%	0.0014	0.0000
52.5	1,347,449	81.24%	82.90%	80.65%	0.0003	0.0000
53.5	1,320,877	80.95%	80.07%	79.88%	0.0001	0.0001
54.5	1,297,672	80.22%	76.90%	79.09%	0.0011	0.0001
55.5	1,229,521	79.64%	73.37%	78.28%	0.0039	0.0002
56.5	1,132,656	79.03%	69.51%	77.44%	0.0091	0.0003
57.5	1,058,782	78.66%	65.32%	76.58%	0.0178	0.0004
58.5	1,009,492	78.27%	60.82%	75.71%	0.0304	0.0007
59.5	874,155	77.78%	56.07%	74.80%	0.0471	0.0009
60.5	744,561	77.49%	51.11%	73.88%	0.0696	0.0013
61.5	741,343	77.16%	46.01%	72.93%	0.0970	0.0018
62.5	464,304	76.80%	40.86%	71.96%	0.1292	0.0023
63.5	458,194	76.55%	35.73%	70.96%	0.1666	0.0031
64.5	455,949	76.18%	30.73%	69.94%	0.2066	0.0039
65.5	450,992	75.59%	25.94%	68.90%	0.2465	0.0045
66.5	301,588	72.91%	21.46%	67.84%	0.2647	0.0026
67.5	176,666	70.55%	17.38%	66.75%	0.2827	0.0014
68.5	170,985	68.28%	13.74%	65.64%	0.2975	0.0007
69.5	167,841	67.03%	10.60%	64.51%	0.3185	0.0006
70.5	158,293	64.34%	7.98%	63.35%	0.3176	0.0001
71.5	148,931	60.53%	5.85%	62.17%	0.2989	0.0003
72.5	147,462	59.94%	4.20%	60.97%	0.3107	0.0001
73.5	145,301	59.06%	2.95%	59.75%	0.3149	0.0000
74.5	142,817	58.05%	2.00%	58.51%	0.3142	0.0000
75 5	141,410	57.49%	1.30%	57.25%	0.3157	0.0000
76.5	139,176	56.94%	0.79%	55.97%	0.3153	0.0001
77.5	134,971	56.14%	0.43%	54.68%	0.3104	0.0002
78.5	121,978	54.80%	0.20%	53.37%	0.2981	0.0002
79.5		53.79%	0.07%	52.04%		
Sum of Squared Differences				[8]	5.2740	0.0397

[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 for comparison purposes.
[5] Approved 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] FPUC R4-35	[5] PSO R1.5-65	[6] FPUC SSD	[7] PSO SSD
0.0	316,005,119	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	299,802,733	99.69%	100.00%	99.86%	0.0000	0.0000
1.5	285,216,685	98.84%	100.00%	99.59%	0.0001	0.0001
2.5	268,287,105	97.89%	99.99%	99.30%	0.0004	0.0002
3.5	252,986,249	97.07%	99.98%	99.01%	0.0008	0.0004
4.5	235,367,174	96.24%	99.97%	98.71%	0.0014	0.0006
5.5	214,054,363	95.51%	99.96%	98.39%	0.0020	0.0008
6.5	175,028,284	94.84%	99.93%	98.07%	0.0026	0.0010
7.5	154,927,603	94.28%	99.90%	97.74%	0.0032	0.0012
8.5	141,527,663	93.52%	99.86%	97.41%	0.0040	0.0015
9.5	131,733,250	92.88%	99.81%	97.06%	0.0048	0.0017
10.5	122,557,604	92.41%	99.73%	96.70%	0.0054	0.0018
11.5	118,784,144	92.09%	99.63%	96.33%	0.0057	0.0018
12.5	114,170,495	91.87%	99.50%	95.95%	0.0058	0.0017
13.5	108,262,750	91.73%	99.32%	95.57%	0.0058	0.0015
14.5	98,153,599	91.48%	99.10%	95.17%	0.0058	0.0014
15.5	89,423,843	91.30%	98.83%	94.76%	0.0057	0.0012
16.5	80,746,629	91.08%	98.48%	94.34%	0.0055	0.0011
17.5	71,789,667	90.92%	98.04%	93.91%	0.0051	0.0009
18.5	59,281,872	90.71%	97.50%	93.46%	0.0046	0.0008
19.5	58,653,049	90.36%	96.84%	93.01%	0.0042	0.0007
20.5	51,321,835	90.06%	96.05%	92.54%	0.0036	0.0006
21.5	47,312,974	89.82%	95.09%	92.07%	0.0028	0.0005
22.5	44,452,456	89.57%	93.96%	91.58%	0.0019	0.0004
23.5	40,272,025	89.41%	92.63%	91.07%	0.0010	0.0003
24.5	36,988,264	89.18%	91.07%	90.56%	0.0004	0.0002
25.5	34,499,551	88.97%	89.27%	90.03%	0.0000	0.0001
26.5	32,613,326	88.80%	87.21%	89.48%	0.0003	0.0000
27.5	30,794,868	88.61%	84.88%	88.92%	0.0014	0.0000
28.5	29,182,800	88.49%	82.25%	88.35%	0.0039	0.0000
29.5	26,149,708	88.27%	79.33%	87.76%	0.0080	0.0000
30.5	23,294,919	88.12%	76.08%	87.16%	0.0145	0.0001
31.5	21,046,387	87.94%	72.42%	86.53%	0.0241	0.0002
32.5	19,145,833	87.80%	68.24%	85.90%	0.0382	0.0004
33.5	17,167,584	87.63%	63.50%	85.24%	0.0582	0.0006
34.5	15,123,300	87.50%	58.21%	84.56%	0.0858	0.0009
35.5	12,984,105	87.44%	52.43%	83.87%	0.1225	0.0013
36.5	11,050,092	87.32%	46.34%	83.16%	0.1679	0.0017
37.5	9,568,108	87.19%	40.12%	82.43%	0.2216	0.0023
38.5	8,537,095	87.12%	33.97%	81.67%	0.2824	0.0030
39.5	7,178,844	87.08%	28.12%	80.90%	0.3476	0.0038
40.5	6,187,118	87.00%	22.71%	80.11%	0.4133	0.0047
41.5	4,520,808	86.76%	17.86%	79.29%	0.4747	0.0056
42.5	3,797,685	86.61%	13.64%	78.46%	0.5324	0.0066
43.5	3,208,273	86.48%	10.07%	77.60%	0.5838	0.0079
44.5	2,860,472	86.39%	7.14%	76.72%	0.6281	0.0094
45.5	2,532,486	86.21%	4.81%	75.81%	0.6627	0.0108
46.5	2,257,784	85.84%	3.04%	74.88%	0.6857	0.0120
47.5	1,847,386	85.62%	1.75%	73.93%	0.7033	0.0137
48.5	1,666,345	85.40%	0.90%	72.96%	0.7141	0.0155

Account 367 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] FPUC R4-35	[5] PSO R1.5-65	[6] FPUC SSD	[7] PSO SSD
49.5	1,517,177	85.14%	0.38%	71.96%	0.7184	0.0174
50.5	1,389,683	84.88%	0.12%	70.93%	0.7184	0.0194
51.5	1,328,432	84.53%	0.02%	69.89%	0.7141	0.0214
52.5	1,270,765	84.49%		68.81%	0.7139	0.0246
53.5	1,226,806	84.38%		67.72%	0.7120	0.0278
54.5	1,140,554	84.22%		66.60%	0.7093	0.0311
55.5	1,017,473	83.99%		65.45%	0.7054	0.0344
56.5	920,794	83.89%		64.28%	0.7038	0.0384
57.5	769,760	83.82%		63.09%	0.7026	0.0430
58.5	569,260	83.80%		61.88%	0.7022	0.0481
59.5	565,035	83.78%		60.64%	0.7019	0.0536
60.5	218,822	83.77%		59.38%	0.7017	0.0595
61.5	206,785	82.24%		58.10%	0.6763	0.0583
62.5	204,826	81.46%		56.80%	0.6636	0.0608
63.5	200,184	81.03%		55.47%	0.6566	0.0653
64.5	102,221	80.15%		54.14%	0.6424	0.0677
65.5	54,661	79.23%		52.78%	0.6277	0.0700
66.5	52,434	76.00%		51.41%	0.5776	0.0605
67.5	49,764	73.69%		50.02%	0.5430	0.0560
68.5	47,850	72.43%		48.62%	0.5246	0.0567
69.5	47,809	72.37%		47.20%	0.5237	0.0633
70.5	47,809	72.37%		45.78%	0.5237	0.0707
71.5	47,809	72.37%		44.35%	0.5237	0.0785
72.5	47,809	72.37%		42.92%	0.5237	0.0868
73.5	46,545	72.37%		41.48%	0.5237	0.0954
74.5	41,930	72.37%		40.03%	0.5237	0.1046
75.5	33,306	72.37%		38.59%	0.5237	0.1141
76.5	18,598	72.37%		37.15%	0.5237	0.1240
77.5		72.37%		35.72%		
Sum of Squared Differences				[8]	24.4627	1.7741

[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 for comparison purposes.
[5] Approved 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 368 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] FPUC S4-30	[5] SWEPCO L0-50	[6] FPUC SSD	[7] SWEPCO SSD
0 0	466,624,847	100.00%	100.00%	100 00%	0.0000	0.0000
0.5	450,005,635	99.61%	100 00%	99.87%	0 0000	0.0000
1.5	429,793,983	98.63%	100.00%	99.45%	0 0002	0.0001
2.5	410,860,016	97.67%	100 00%	98.89%	0.0005	0.0002
3.5	391,587,371	96 75%	100 00%	98.24%	0.0011	0.0002
4.5	372,315,143	95.67%	100.00%	97.50%	0 0019	0.0003
5.5	326,367,137	94.68%	100.00%	96.70%	0.0028	0.0004
6 5	311,175,577	93.50%	100 00%	95.83%	0.0042	0.0005
7.5	291,331,133	92 51%	100.00%	94.92%	0.0056	0.0006
8.5	275,874,708	91.76%	100.00%	93 97%	0.0068	0 0005
9.5	260,131,755	90 91%	100.00%	92.97%	0.0083	0.0004
10.5	249,591,853	90.22%	100.00%	91.94%	0.0096	0 0003
11 5	240,224,485	89.50%	100.00%	90.87%	0 0110	0.0002
12.5	228,258,973	88.54%	99.99%	89 78%	0.0131	0 0002
13 5	219,341,114	87.64%	99.97%	88.67%	0 0152	0.0001
14.5	208,170,035	86 74%	99 93%	87.53%	0.0174	0.0001
15 5	205,421,588	85.70%	99.83%	86.37%	0 0200	0.0000
16 5	189,752,371	84.58%	99.66%	85.19%	0.0227	0.0000
17.5	182,932,347	83 55%	99 33%	83 99%	0.0249	0.0000
18 5	170,118,845	82.44%	98.79%	82.79%	0.0267	0.0000
19 5	162,724,712	81 37%	97 93%	81.57%	0.0274	0.0000
20.5	152,216,704	80 15%	96 64%	80 34%	0.0272	0.0000
21.5	146,252,806	79.07%	94.81%	79.10%	0.0248	0.0000
22.5	134,660,361	77.99%	92.33%	77 86%	0.0206	0.0000
23.5	128,422,982	76.81%	89 07%	76.62%	0.0150	0.0000
24.5	120,262,326	75.66%	85.01%	75.37%	0.0087	0 0000
25.5	113,677,918	74.46%	80.11%	74.12%	0.0032	0.0000
26.5	106,605,942	73.18%	74.39%	72.87%	0.0001	0 0000
27 5	100,972,665	71.98%	67.99%	71.62%	0.0016	0.0000
28.5	95,317,851	70.75%	61.03%	70.38%	0.0094	0.0000
29 5	89,384,427	69.42%	53.72%	69.13%	0.0247	0.0000
30 5	82,780,190	68 00%	46 28%	67 89%	0.0472	0.0000
31.5	75,970,659	66.62%	38 97%	66.65%	0.0765	0 0000
32.5	69,741,142	65.20%	32 02%	65 42%	0.1101	0.0000
33.5	63,827,215	63.88%	25 61%	64 19%	0 1465	0.0000
34.5	58,709,802	62.58%	19.89%	62.96%	0.1822	0.0000
35.5	54,007,153	61.27%	14.99%	61.74%	0.2142	0.0000
36.5	49,623,027	59.95%	10.93%	60.52%	0.2403	0.0000
37 5	45,027,569	58.58%	7.67%	59.31%	0.2591	0.0001
38.5	41,567,572	57.30%	5.19%	58.10%	0.2716	0.0001
39 5	38,847,215	56.04%	3.36%	56 90%	0.2775	0.0001
40 5	35,811,638	54.32%	2.07%	55.71%	0.2730	0.0002
41 5	32,151,237	52 96%	1.21%	54 53%	0.2678	0.0002
42.5	29,207,069	51.61%	0.67%	53.35%	0.2595	0.0003
43 5	26,424,451	50.34%	0.34%	52 18%	0.2500	0.0003
44.5	23,748,555	49.11%	0 17%	51.02%	0.2395	0 0004
45.5	20,908,014	47.85%	0.07%	49.87%	0.2283	0.0004
46 5	18,026,373	46.43%	0.03%	48 73%	0.2153	0.0005
47.5	15,852,308	44.91%	0 01%	47.60%	0.2016	0.0007
48.5	14,156,743	43.62%	0.00%	46.48%	0.1902	0.0008
49.5	12,454,926	42.18%	0.00%	45.37%	0.1779	0.0010
50.5	11,183,493	40.98%	0.00%	44.27%	0.1679	0.0011
51 5	9,942,720	39 81%	0.00%	43 18%	0 1585	0.0011
52.5	8,832,942	38.61%		42.11%	0.1491	0.0012
53 5	7,717,294	37.42%		41 04%	0.1400	0.0013
54.5	6,774,022	36.34%		39.99%	0.1321	0.0013
55.5	5,816,004	35.29%		38.95%	0.1246	0 0013
56.5	4,956,425	34.37%		37.93%	0.1181	0.0013
57.5	4,075,835	33.39%		36.91%	0.1115	0.0012
58.5	3,284,297	32.44%		35 91%	0.1052	0.0012
59 5	2,575,746	31.63%		34.93%	0.1000	0.0011
60.5	1,677,573	30.74%		33 96%	0 0945	0.0010
61 5	1,242,200	30.13%		33.00%	0.0908	0 0008
62.5	893,601	29.62%		32.06%	0.0877	0.0006
63 5	670,726	29.17%		31.13%	0.0851	0.0004
64.5	468,522	28 76%		30.21%	0.0827	0.0002
65.5	228,761	28.35%		29 31%	0.0804	0 0001
66.5	224,156	28.26%		28 43%	0 0799	0.0000
67 5	173,264	27.47%		27.56%	0.0754	0.0000

Account 368 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] FPUC S4-30	[5] SWEPCO L0-50	[6] FPUC SSD	[7] SWEPCO SSD
68.5	147,838	26.94%		26.71%	0.0726	0.0000
69.5	94,162	26 32%		25.87%	0 0693	0 0000
70.5	91,621	25.98%		25.04%	0 0675	0.0001
71.5	89,175	25.29%		24.24%	0 0640	0 0001
72 5	89,175	25 29%		23.45%	0.0640	0.0003
73.5	87,952	24.94%		22.67%	0 0622	0 0005
74 5	87,952	24 94%		21.91%	0.0622	0 0009
75.5	76,301	24.46%		21.16%	0.0598	0.0011
76 5	76,301	24 46%		20 44%	0.0598	0.0016
77 5	56,758	24.46%		19 72%	0.0598	0.0022
78 5	14,588	24 46%		19.03%	0.0598	0.0030
79 5	14,588	24.46%		18 35%	0.0598	0.0037
80 5	14,588	24.46%		17.68%	0.0598	0.0046
81 5	14,588	24.46%		17 03%	0 0598	0.0055
82.5	14,588	24.46%		16.40%	0 0598	0 0065
83.5	14,588	24 46%		15.78%	0.0598	0 0075
84 5	14,588	24.46%		15.18%	0.0598	0 0086
85.5	14,588	24.46%		14.59%	0.0598	0 0097
86 5	14,588	24 46%		14 02%	0.0598	0.0109
87.5	14,588	24 46%		13.46%	0.0598	0.0121
88.5	14,588	24 46%		12.92%	0.0598	0.0133
89 5	14,588	24.46%		12 39%	0 0598	0.0146
90.5	14,588	24.46%		11.88%	0.0598	0.0158
91.5	14,588	24.46%		11.39%	0 0598	0.0171
92.5	14,588	24.46%		10.90%	0.0598	0.0184
93.5	14,588	24.46%		10 44%	0.0598	0.0197
94 5	14,588	24.46%		9.98%	0.0598	0 0210
95 5	14,588	24.46%		9.54%	0 0598	0 0223
96 5	14,588	24 46%		9.12%	0.0598	0.0235
97.5	14,588	24 46%		8 71%	0.0598	0.0248
98.5	14,588	24 46%		8.31%	0.0598	0 0261
99.5	14,588	24.46%		7 92%	0.0598	0.0273
100.5	11,671	19.57%		7.55%	0 0383	0 0144
101.5	11,671	19.57%		7 19%	0 0383	0.0153
102.5	11,671	19.57%		6.85%	0 0383	0 0162
103 5	11,671	19 57%		6.51%	0.0383	0 0170
104.5	11,671	19.57%		6.19%	0.0383	0 0179
105.5	11,671	19 57%		5.88%	0.0383	0 0187
106.5	11,671	19.57%		5.58%	0.0383	0.0196
107.5	11,671	19.57%		5.30%	0.0383	0.0204
108 5	11,671	19.57%		5 02%	0.0383	0.0212
109.5	8,753	14.68%		4.76%	0.0215	0 0098
110 5	8,753	14.68%		4.50%	0 0215	0.0104
111.5	0	14.68%		4.26%	0 0215	0.0109
112 5				4 02%	0 0000	0.0016
113.5				3.80%	0.0000	0.0014
114.5				3.58%	0.0000	0.0013
115 5				3 38%		
Sum of Squared Differences				[8]	8.8337	0.5440

[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 for comparison purposes
[5] Approved 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 369 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] FPUC R5-40	[5] PSO R1.5-60	[6] FPUC SSD	[7] PSO SSD
0.0	274,842,735	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	263,939,709	99.95%	100.00%	99.85%	0.0000	0.0000
1.5	253,933,894	99.85%	100.00%	99.55%	0.0000	0.0000
2.5	243,656,013	99.66%	100.00%	99.24%	0.0000	0.0000
3.5	225,251,318	99.16%	100.00%	98.92%	0.0001	0.0000
4.5	210,258,705	98.68%	100.00%	98.59%	0.0002	0.0000
5.5	199,423,104	98.42%	100.00%	98.25%	0.0002	0.0000
6.5	188,032,017	98.12%	100.00%	97.90%	0.0004	0.0000
7.5	175,728,017	97.80%	100.00%	97.53%	0.0005	0.0000
8.5	157,749,263	97.50%	100.00%	97.16%	0.0006	0.0000
9.5	142,106,376	97.18%	100.00%	96.78%	0.0008	0.0000
10.5	128,452,099	96.79%	100.00%	96.38%	0.0010	0.0000
11.5	121,643,308	96.42%	100.00%	95.97%	0.0013	0.0000
12.5	111,348,782	95.94%	100.00%	95.55%	0.0016	0.0000
13.5	106,956,270	95.45%	100.00%	95.12%	0.0021	0.0000
14.5	105,968,250	95.02%	100.00%	94.67%	0.0025	0.0000
15.5	102,570,670	94.54%	100.00%	94.21%	0.0030	0.0000
16.5	95,680,090	94.18%	100.00%	93.74%	0.0034	0.0000
17.5	89,409,145	93.68%	99.99%	93.26%	0.0040	0.0000
18.5	83,947,238	93.14%	99.99%	92.76%	0.0047	0.0000
19.5	78,513,441	92.58%	99.97%	92.25%	0.0055	0.0000
20.5	72,079,165	92.01%	99.93%	91.72%	0.0063	0.0000
21.5	71,448,116	91.34%	99.87%	91.18%	0.0073	0.0000
22.5	66,199,251	90.70%	99.76%	90.62%	0.0082	0.0000
23.5	62,338,486	90.06%	99.60%	90.05%	0.0091	0.0000
24.5	58,346,024	89.36%	99.36%	89.46%	0.0100	0.0000
25.5	54,053,438	88.62%	99.02%	88.85%	0.0108	0.0000
26.5	51,657,383	87.81%	98.55%	88.23%	0.0115	0.0000
27.5	48,772,059	86.83%	97.92%	87.59%	0.0123	0.0001
28.5	46,351,160	85.96%	97.09%	86.92%	0.0124	0.0001
29.5	43,769,983	84.97%	96.03%	86.24%	0.0122	0.0002
30.5	41,062,736	83.93%	94.67%	85.54%	0.0115	0.0003
31.5	38,175,250	82.98%	92.95%	84.82%	0.0099	0.0003
32.5	34,414,387	81.97%	90.80%	84.08%	0.0078	0.0004
33.5	30,963,244	80.97%	88.11%	83.31%	0.0051	0.0005
34.5	27,545,102	80.01%	84.81%	82.52%	0.0023	0.0006
35.5	24,562,752	79.07%	80.81%	81.71%	0.0003	0.0007
36.5	22,107,729	78.17%	76.05%	80.87%	0.0005	0.0007
37.5	19,881,438	77.26%	70.51%	80.01%	0.0046	0.0008
38.5	17,749,156	76.47%	64.22%	79.12%	0.0150	0.0007
39.5	15,689,212	75.72%	57.28%	78.21%	0.0340	0.0006
40.5	13,971,215	74.99%	49.85%	77.27%	0.0632	0.0005
41.5	12,923,634	74.26%	42.15%	76.31%	0.1031	0.0004
42.5	11,532,265	73.50%	34.46%	75.31%	0.1524	0.0003
43.5	10,459,906	72.81%	27.11%	74.29%	0.2088	0.0002
44.5	9,263,919	72.04%	20.40%	73.24%	0.2667	0.0001
45.5	8,203,433	71.04%	14.60%	72.17%	0.3185	0.0001
46.5	7,519,771	69.75%	9.90%	71.06%	0.3582	0.0002
47.5	6,818,006	68.86%	6.34%	69.93%	0.3908	0.0001
48.5	6,164,881	67.81%	3.85%	68.77%	0.4091	0.0001
49.5	5,557,031	66.97%	2.21%	67.58%	0.4194	0.0000
50.5	5,019,257	66.04%	1.16%	66.36%	0.4210	0.0000
51.5	4,663,112	65.22%	0.50%	65.11%	0.4188	0.0000

Account 369 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] FPUC R5-40	[5] PSO R1.5-60	[6] FPUC SSD	[7] PSO SSD
52.5	4,313,040	64.24%	0.16%	63.84%	0.4106	0.0000
53.5	3,957,547	63.32%	0.03%	62.54%	0.4006	0.0001
54.5	3,622,432	62.11%		61.21%	0.3858	0.0001
55.5	3,271,740	60.93%		59.85%	0.3712	0.0001
56.5	3,075,344	59.44%		58.47%	0.3533	0.0001
57.5	2,743,710	58.09%		57.07%	0.3374	0.0001
58.5	2,426,964	56.68%		55.64%	0.3213	0.0001
59.5	2,070,624	55.14%		54.19%	0.3040	0.0001
60.5	1,694,820	53.53%		52.72%	0.2865	0.0001
61.5	1,296,556	51.90%		51.23%	0.2694	0.0000
62.5	1,060,891	50.23%		49.73%	0.2523	0.0000
63.5	778,374	48.35%		48.21%	0.2338	0.0000
64.5	627,616	46.65%		46.67%	0.2176	0.0000
65.5	436,423	44.75%		45.13%	0.2003	0.0000
66.5	367,388	42.89%		43.57%	0.1840	0.0000
67.5	246,494	41.03%		42.02%	0.1683	0.0001
68.5	170,728	39.31%		40.45%	0.1545	0.0001
69 5	92,949	36.16%		38.89%	0.1308	0.0007
70.5	53,681	34.48%		37.33%	0.1189	0.0008
71.5	37,780	33.16%		35.78%	0.1100	0.0007
72.5	32,530	31.70%		34.23%	0.1005	0.0006
73.5	29,926	30.66%		32.70%	0.0940	0.0004
74.5	23,892	29.35%		31.18%	0.0861	0.0003
75.5	14,987	27.84%		29.68%	0.0775	0.0003
76.5	11,665	26.44%		28.20%	0.0699	0.0003
77.5	7,316	25.03%		26.75%	0.0627	0.0003
78.5	5,183	23.67%		25.31%	0.0560	0.0003
79.5	3,837	22.90%		23.91%	0.0524	0.0001
80.5	2,906	21.97%		22.54%	0.0483	0.0000
81.5	2,421	21.03%		21.21%	0.0442	0.0000
82.5		18.88%		19.91%		
Sum of Squared Differences				[8]	9.6551	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 for comparison purposes.
[5] Approved 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.
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[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

CERTIFICATE OF SERVICE
Docket No.: 20190155-EI
Docket No. 20190156-EI
Docket No. 20190174-EI

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by electronic mail on this 15th day of May 2020, to the following:

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/s/Patricia A. Christensen
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Associate Public Counsel