CPUC Docket: A.19-08-013
Witness: David J.Garrett
Exhibit: TURN-08

PREPARED TESTIMONY OF DAVID J. GARRETT

ADDRESSING THE PROPOSALS OF SOUTHERN CALIFORNIA EDISON COMPANY IN ITS TEST YEAR 2021 GENERAL RATE CASE RELATED TO DEPRECIATION RATES

Submitted on Behalf of

THE UTILITY REFORM NETWORK

785 Market Street, Suite 1400
San Francisco, CA 94103

Telephone: (415) 929-8876
Facsimile: (415) 929-1132

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I. INTRODUCTION

Q. State your name and occupation.

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

Q. Summarize your educational background and professional experience.

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

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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 Utility Reform Network ("TURN") regarding the depreciation rates proposed by Southern California Edison Company ("SCE" or the "Company") in this proceeding before the California Public Utilities Commission ("CPUC" or the "Commission"). My testimony addresses the depreciation study performed by Foster Associates and the testimony of Company witness Dr. Ronald E. White, who sponsors the depreciation study, as well as the net salvage recommendations sponsored by SCE witness David Gunn.

II. EXECUTIVE SUMMARY

Q. Summarize the key points of your testimony.

A. In this case, SCE is requesting a substantial increase in depreciation expense of $226 million from its 2018 GRC authorized depreciation expense (a 14% increase).[2] My review of the Company's depreciation study revealed some unreasonable assumptions and positions regarding service life and net salvage estimates. As discussed in my testimony, the Company has the burden to make a convincing showing that its proposed depreciation rates are reasonable, and while some aspects of the depreciation study may be reasonable, the evidence presented in this testimony demonstrates that the Company has failed to meet its burden regarding several key issues. As a result, the Company's proposed depreciation rates should not be accepted as filed, as they would result in an unreasonably high depreciation expense charged to customers. My analysis of the depreciation study in this

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[2] SCE-07, Vol. 3, p. 1, lines 27-30.

case consisted of employing a well-established depreciation system and using actuarial analysis to statistically analyze the Company's depreciable assets to develop reasonable depreciation rates. I applied my estimates of average service life and salvage to the Company's plant and reserve balances as of December 31, 2018. The table below compares the proposed depreciation accruals as of the study date.[3]

Figure 1:
Depreciation Parameter Comparison by Plant Function

Division / Function	Plant 12/31/2018	SCE Proposal Rate	SCE Proposal Accrual	TURN Proposal Rate	TURN Proposal Accrual	TURN Adjustment Rate	TURN Adjustment Adjustment
Transmission	13,430,553,242	2.74%	368,029,209	2.55%	342,137,448	-0.19%	(25,891,762)
Distribution	24,887,406,063	4.43%	1,103,458,116	3.68%	916,257,165	-0.75%	(187,200,951)
General	1,079,844,132	1.82%	19,616,455	1.82%	19,616,455	0.00%	-
Total Plant Studied	$ 39,397,803,437	3.78%	$ 1,491,103,781	3.24%	$ 1,278,011,068	-0.54%	**$ (213,092,713)**

Applying reasonable and conservative adjustments to SCE's proposed depreciation rates would result in an adjustment reducing the Company's proposed depreciation accrual by $213 million – calculated based on plant balances at December 31, 2018.

Q. Did you perform a similar calculation based on plant balances as of January 1, 2019 for the CPUC jurisdiction?

A. Yes. I also applied my proposed depreciation rates to the CPUC-jurisdictional plant balances as of January 1, 2019 and compared the corresponding depreciation accruals to current depreciation parameters, as well as SCE's proposed depreciation rates and accruals. The following table summarizes these results.

[3] *See also* Exhibit DJG-2; detailed calculations provided in Exhibit DJG-4. Note that the dollar figures presented in this table and throughout my testimony relate to plant balances as of December 31, 2018. Presenting these dollar amounts provides a direct comparison to the depreciation accruals presented in the depreciation study as of December 31, 2018. The actual depreciation expense for the 2021 test year will reflect the adopted depreciation rates applied to the authorized plant balance for 2021.

Figure 2:
Depreciation Accrual Comparison by Plant Function (Jan. 1, 2019)

Division / Function	Plant **1/1/2019**	Current Accrual	SCE Proposed Accrual	TURN Proposed Accrual	Change from Current Accrual	Adjustment to SCE Proposal
Transmission	4,896,103,082	124,294,566	133,113,894	126,959,826	2,665,261	(6,154,067)
Distribution	24,887,406,063	925,610,750	1,103,030,433	916,257,165	(9,353,585)	(186,773,268)
General	1,079,844,132	22,460,758	19,653,163	19,616,455	(2,844,303)	(36,708)
Total	$ 30,863,353,278	$ 1,072,366,074	$ 1,255,797,490	$ 1,062,833,447	**$ (9,532,627)**	**$ (192,964,043)**

Applying my proposed rates to plant balances as of January 1, 2019, would result in an adjustment reducing the Company's proposed depreciation accrual by $193 million.[4]

Q. Summarize the primary factors driving your adjustment.

A. My overall adjustment to SCE's proposed depreciation rates is driven by adjustments to service life and net salvage estimates proposed by the Company. Regarding service life, an objective analysis indicates that the Company's proposed service lives for several of its transmission and distribution are too short given the Company's own historical retirement data. Unreasonably short service life estimates result in unreasonably high depreciation rates. The evidence presented in my testimony shows that reasonable adjustments should be made to increase the proposed service lives for several of the Company's transmission and distribution accounts. Regarding net salvage, the Company is proposing substantial increases to several accounts. These increases do not comport with the Commission's prior applications of gradualism to net salvage increases. The Commission's policies related to net salvage gradualism continue to act as a reasonable check against ever-increasing net

[4] *See* Exhibit DJG-2; detailed calculations provided in Exhibit DJG-16.

salvage rates. The table below summarizes the difference in SCE's and TURN's depreciation parameters proposed in this case.[5]

Figure 3:
Depreciation Accrual Comparison by Plant Function

Account No.	Description	Current Parameters Net Salvage	Current Iowa Curve Type	Current AL	SCE Proposal Net Salvage	SCE Iowa Curve Type	SCE AL	TURN Proposal Net Salvage	TURN Iowa Curve Type	TURN AL
	TRANSMISSION									
352.00	Structures and Improvements	-35%	L1	55	-35%	L1	55	-35%	L0.5	58
353.00	Station Equipment	-15%	R0.5	45	-15%	L0.5	45	-15%	L0.5	45
354.00	Towers and Fixtures	-60%	R5	65	-80%	R5	65	-65%	R5	69
355.00	Poles and Fixtures	-72%	SC	65	-90%	SC	65	-77%	SC	65
356.00	Overhead Conductors & Devices	-80%	R3	61	-100%	R3	61	-85%	R3	65
357.00	Underground Conduit	0%	R3	55	0%	R3	55	0%	R3	55
358.00	Underground Conductors & Devices	-15%	S1	45	-30%	S1	45	-19%	S1	45
359.00	Roads and Trails	0%	R5	60	0%	R5	60	0%	R5	60
	DISTRIBUTION									
361.00	Structures and Improvements	-25%	L0.5	50	-40%	L0.5	55	-29%	L0	58
362.00	Station Equipment	-25%	L0.5	65	-40%	S0.5	65	-29%	L0	67
364.00	Poles, Towers and Fixtures	-210%	R1	55	-210%	R1	55	-210%	R1	55
365.00	Overhead Conductors & Devices	-115%	R0.5	55	-190%	R0.5	55	-134%	R0.5	55
366.00	Underground Conduit	-30%	R3	59	-80%	R3	59	-43%	R2.5	64
367.00	Underground Conductors & Devices	-60%	R1.5	43	-100%	L1	47	-70%	L1	47
368.00	Line Transformers	-20%	S1.5	33	-50%	S1.5	33	-28%	S1.5	33
369.00	Services	-100%	R1.5	55	-100%	R1.5	55	-100%	R1.5	60
370.00	Meters	-5%	R3	20	-5%	R3	20	-5%	R3	30
371.00	Installations on Customer Premises	-100%	R1.5	55	-100%	R1.5	55	-100%	R1.5	55
373.00	Street Lighting & Signal Systems	-30%	L1	48	-50%	L0.5	50	-35%	L0.5	50
	GENERAL									
390.00	Structures and Improvements	-10%	R0.5	45	-10%	SC	50	-10%	SC	50

Q. What is your recommendation in this case?

A. I recommend the Commission adopt the depreciation rates presented in Exhibit DJG-3, which are illustrated in Figure 3 above.

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

III. LEGAL STANDARDS

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

A. In *Lindheimer v. Illinois Bell Telephone Co.*, the U.S. Supreme Court stated that "depreciation is the loss, not restored by current maintenance, which is due to all the factors causing the ultimate retirement of the property. These factors embrace wear and tear, decay, inadequacy, and obsolescence."[6] The *Lindheimer* Court also recognized that the original cost of plant assets, rather than present value or some other measure, is the proper basis for calculating depreciation expense.[7] Moreover, the *Lindheimer* Court found:

> [T]he company has the burden of making a convincing showing that the amounts it has charged to operating expenses for depreciation have not been excessive. That burden is not sustained by proof that its general accounting system has been correct. The calculations are mathematical, but the predictions underlying them are essentially matters of opinion.[8]

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

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

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

[8] *Id*. at 169.

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

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

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

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

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

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

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

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

IV. ANALYTIC METHODS

Q. Discuss your approach to analyzing the Company's depreciable property in this case.

A. I obtained and reviewed all the data that was used to conduct the Company's depreciation study. The depreciation rates proposed by Dr. White were developed based on depreciable property recorded as of December 31, 2018. I used the same plant balances to develop my proposed depreciation rates.

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

A. The legal standards set forth above do not mandate a specific procedure for conducting depreciation analysis. These standards, however, direct that analysts use a system for estimating depreciation rates that will result in the "systematic and rational" allocation of capital recovery for the utility. Over the years, analysts have developed "depreciation systems" designed to analyze grouped property in accordance with this standard. A depreciation system may be defined by several primary parameters: 1) a method of allocation; 2) a procedure for applying the method of allocation; 3) a technique of applying the depreciation rate; and 4) a model for analyzing the characteristics of vintage property groups.[13] In this case, I used the straight line method, the average life procedure, the remaining life technique, and the broad group model to analyze the Company's actuarial data. This depreciation system conforms to the legal standards set forth above and is commonly used by depreciation analysts in regulatory proceedings. I provide a more detailed discussion of depreciation system parameters in Appendix A.

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

V. SERVICE LIFE ANALYSIS

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

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

I used the aged property data provided by the Company to create an OLT for each account. The data points on the OLT can be plotted to form a curve (the "OLT curve").

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

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

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 required. The Iowa curves are empirically derived curves based on extensive studies of the actual mortality patterns of many different types of industrial property. The curve-fitting process involves selecting the best Iowa curve to fit the OLT curve. This can be accomplished through a combination of visual and mathematical curve-fitting techniques, as well as professional judgment. The first step of my approach to curve-fitting involves visually inspecting the OLT curve for any irregularities. For example, if the "tail" end of the curve is erratic and shows a sharp decline over a short period of time, it may indicate that this portion of the data is less reliable, as further discussed below. After inspecting the OLT curve, I use a mathematical curve-fitting technique which essentially involves measuring the distance between the OLT curve and the selected Iowa curve to get an objective, mathematical assessment of how well the curve fits. After selecting an Iowa curve, I observe the OLT curve along with the Iowa curve on the same graph to determine how well the curve fits. I may repeat this process several times for any given account to ensure that the most reasonable Iowa curve is selected.

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

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

Q. Should every portion of the OLT curve be given equal weight?

A. Not necessarily. Many analysts have observed that the points comprising the "tail end" of the OLT curve may often have less analytical value than other portions of the curve. In fact, "[p]oints at the end of the curve are often based on fewer exposures and may be given less weight than points based on larger samples. The weight placed on those points will depend on the size of the exposures."[16] In accordance with this standard, an analyst may decide to truncate the tail end of the OLT curve at a certain percent of initial exposures, such as one percent. Using this approach puts a greater emphasis on the most valuable portions of the curve. For my analysis in this case, I not only considered the entirety of the OLT curve, but also conducted further analyses that involved fitting Iowa curves to the most significant part of the OLT curve for certain accounts. In other words, to verify the accuracy of my curve selection, I narrowed the focus of my additional calculation to consider the top 99% of the "exposures" (*i.e.*, dollars exposed to retirement) and to eliminate the tail end of the curve representing the bottom 1% of exposures for some accounts, if necessary. However, I should also note that for every account discussed below (i.e., the accounts to which I propose service life adjustments), the Iowa curves proposed

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

by the Company fit the observed data so poorly that the Iowa curves I propose provide a better fit to the observed data for every account, no matter which portion of the OLT curve is analyzed (i.e., the full OLT curve or the top 99% based on exposures).

Q. Generally, describe the differences between the Company's service life proposals and your service life proposals.

A. For each of these accounts discussed below, the Company's proposed service life, as estimated through Iowa curves, is too short to accurately describe the mortality characteristics of the account in my opinion. For most of the accounts in which I propose a longer service life, such proposal is based on the objective approach of choosing an Iowa curve that provides a better mathematical and/or visual fit to the observed historical retirement pattern derived from the Company's plant data.

Q. Briefly describe the mathematical curve fitting process.

A. When conducting a mathematical curve-fitting analysis, it is important to consider the most mathematically relevant portions of the OLT curve. While visual curve fitting techniques help identify the most statistically relevant portions of the OLT curve for this account, mathematical curve fitting techniques can help us determine which of the two Iowa curves provides the better fit. Mathematical curve fitting essentially involves measuring the distance between the OLT curve and the selected Iowa curve. The best fitting curve is the one that minimizes the distance between the OLT curve and the Iowa curve, thus providing the closest fit. The "distance" between the curves is calculated using the sum-of-squared differences ("SSD") technique.

Q. Please discuss your specific service life adjustments.

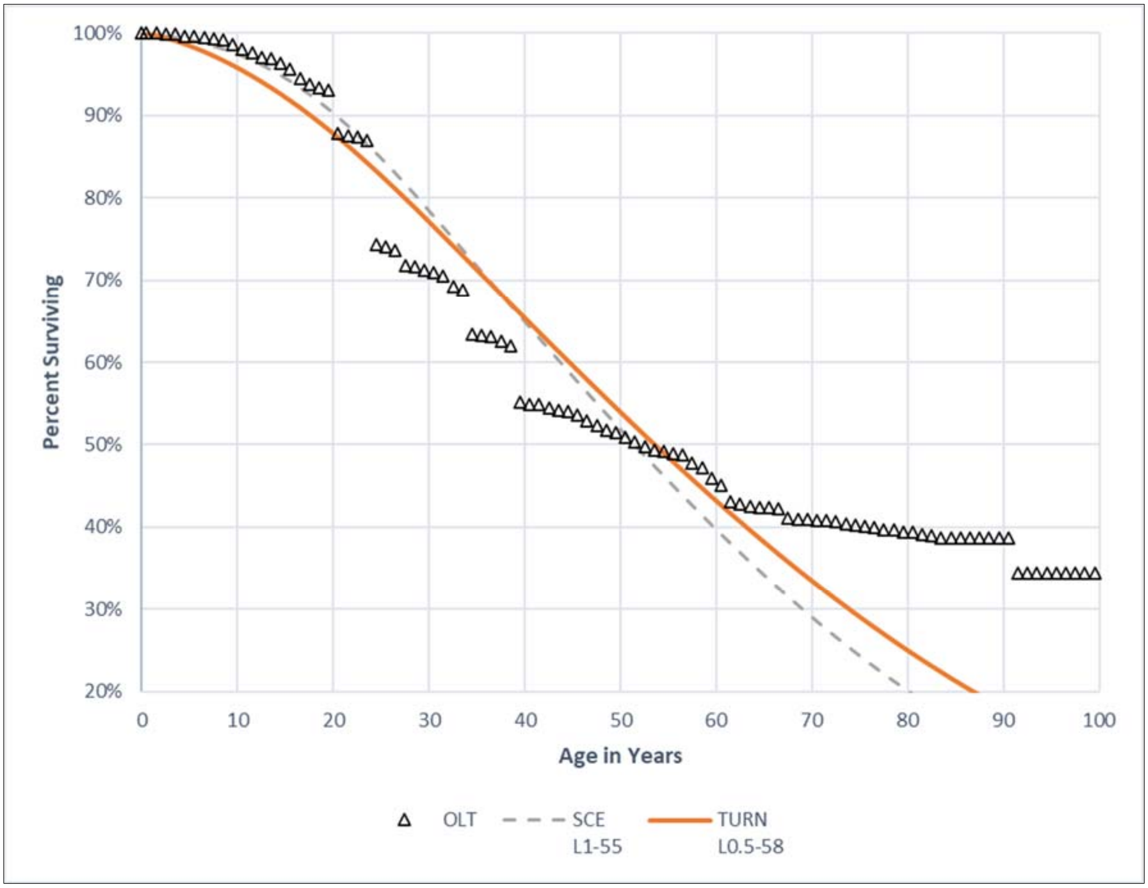
A. I am proposing service life adjustments to eight of SCE's transmission and distribution accounts. These adjustments are discussed in detail in the following sections.

A. <u>Account 352 – Structures and Improvements</u>

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

A. The OLT curve derived from the Company's data for this account has adequate retirement history for Iowa curve analysis. For this account, Dr. White selected the L1-55 Iowa curve, and I selected the L0.5-58 Iowa curve. Both of the selected Iowa curves are in the "L" family of Iowa curve shapes, which means that the greatest rate of retirement frequency in these curves occurs before (or to the left of) the average life. The average lives of these curves are indicated by the numbers after the dashes (55 and 58 in this case). Both Iowa curves are shown in the graph below, juxtaposed with the OLT curve.

Figure 4:
Account 352 – Structures and Improvements



As shown in the graph, both selected Iowa curves have similar shapes, but the L1-55 curve selected by Dr. White is shorter, and results in a shorter average life and higher depreciation rate. For this account, both Iowa curves provide relatively close fits to the OLT curve through the upper and middle portions of the OLT curve. The fact that SCE's selected Iowa curve provides a better fit through the first 20 age intervals does not mean it provides the better fit overall. Additionally, both Iowa curves appear to "ignore" the tail end of the OLT curve. The tail end of this particular OLT curve is less relevant from a statistical standpoint. With that in mind, it is difficult to ascertain from a mere visual inspection which Iowa curve results in the closer fit to the OLT curve. In these situations, mathematical curve fitting techniques are particularly useful.

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

A. Yes. For this account, the total SSD, or "distance" between the Company's curve and the OLT curve, is 1.8815 and the SSD between the L0.5-58 curve and the OLT curve is only 1.2079.[17] When the tail end of this OLT curve is excluded from the mathematical curve fitting calculation (based on 1% of beginning exposures in the observed life table), the L0.5-58 still provides a slightly closer fit to the observe data. Thus, the L0.5-58 curve is a better mathematical fit to the OLT curve, and it results in a more reasonable depreciation rate for this account.[18]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. According to Dr. White, some of the retirements in this account were derived from "unlikely recurring retirement activity,"[19] yet Dr. White does not show why this retirement activity is anomalous, nor does he make any quantitative connection between this retirement and his proposed service life. Dr. White also notes that he was informed by Company personnel that they "do not anticipate policy or procedural changes or technological advances that would introduce significantly different forces of retirement

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[17] Exhibit DJG-6.

[18] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

[19] SCE-07, Vol. 3, Appendix A, p. A-10.

from those observed in the past."[20] If this is indeed the case, such a fact provides further support for my service life adjustment. That is, if the past retirement pattern in this account is a good indication of future retirement (i.e., we do not expect different forces of retirement to change the retirement pattern going forward), then the Iowa curve that provides a closer mathematical fit to the observed data (i.e., the L0.5-58 curve) should be more accurate. This is because Iowa curves, by design, incorporate past information in order to predict future information (remaining life).

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 352.

A. Apply the L0.5-58 Iowa curve to Account 352 would result in an adjustment reducing SCE's proposed depreciation expense by $579,408.[21]

B. <u>Account 354 – Towers and Fixtures</u>

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

A. For this account, Dr. White selected the R5-65 Iowa curve, and I selected the R5-69 Iowa curve. Both of the selected Iowa curves are in the "R" family of Iowa curve shapes, which means that the greatest rate of retirement frequency in these curves occurs after (or to the right of) the average life. Both Iowa curves are shown in the graph below along with the OLT curve.

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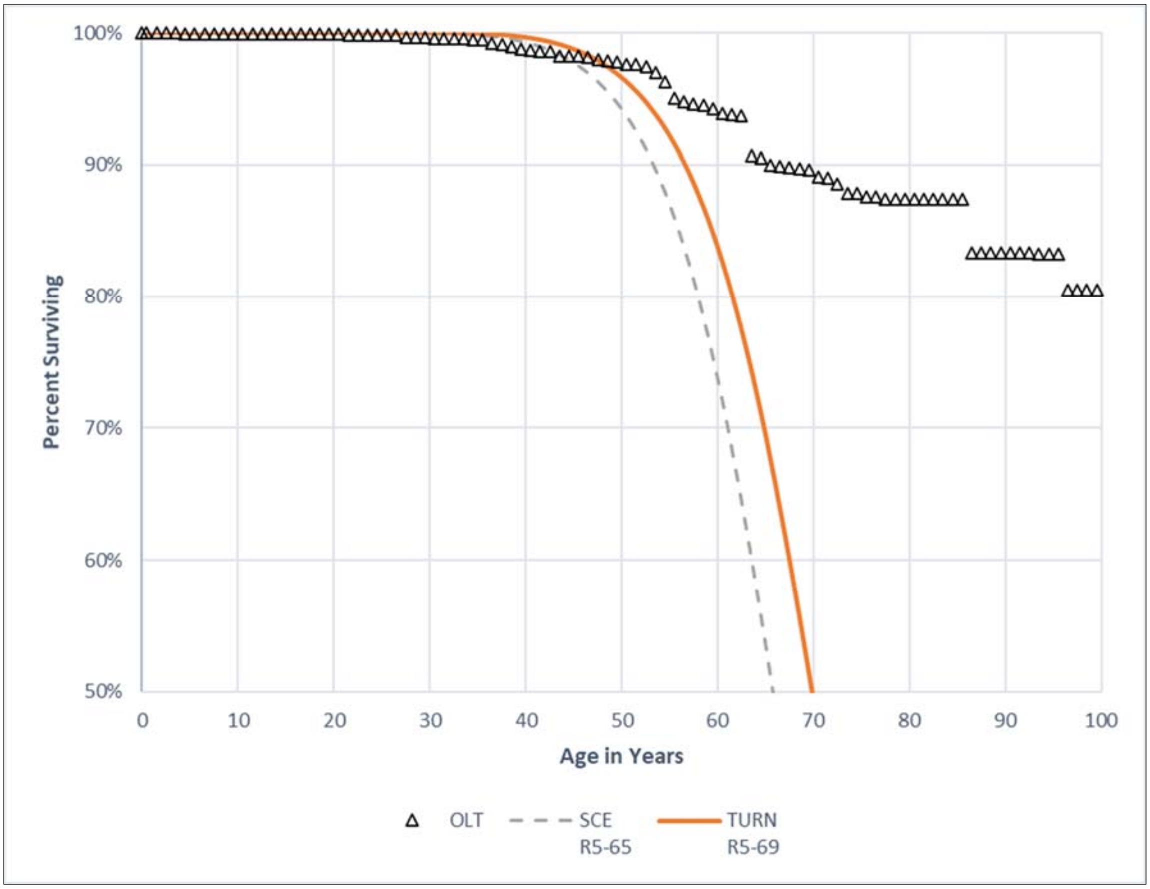
[20] *Id*. at p. A-11.

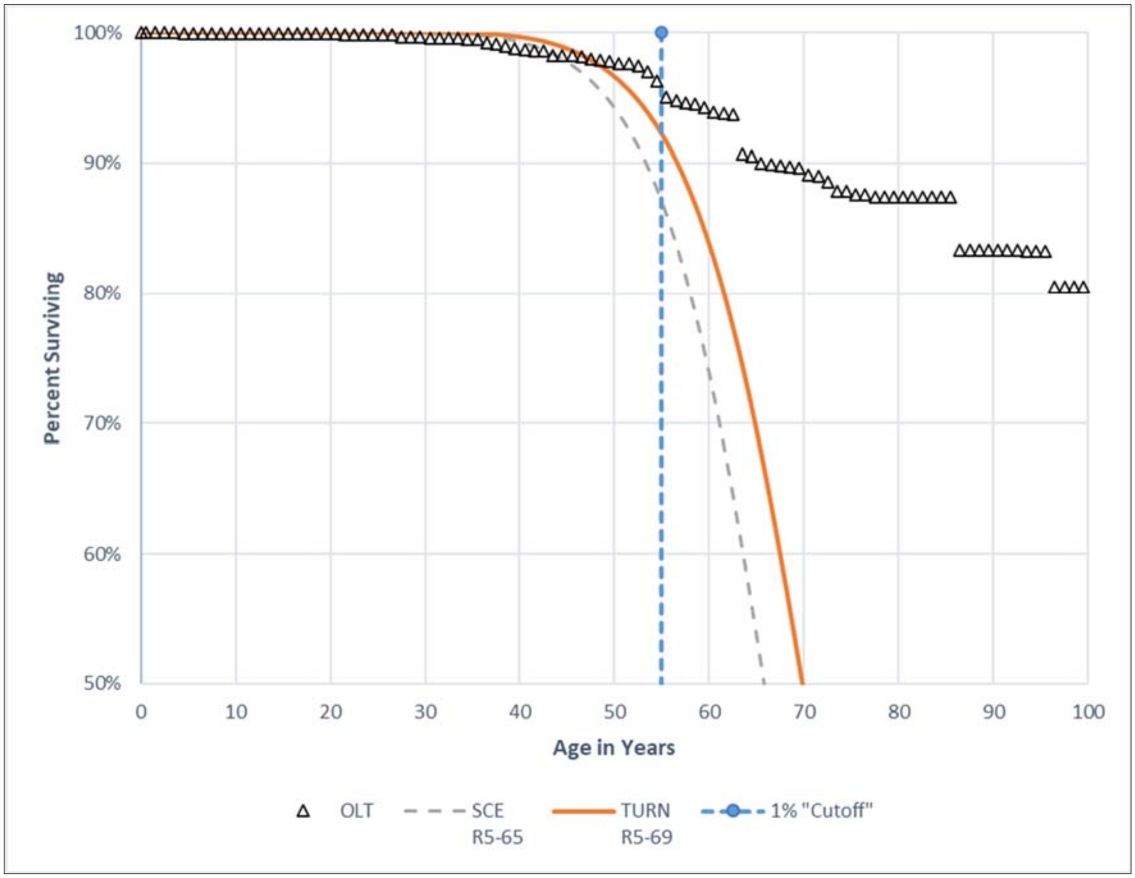
[21] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

Figure 5:
Account 354 – Towers and Fixtures



As shown in the graph, the OLT for this account has relatively less retirement experience (i.e., the OLT curve does not drop below 80% surviving). Thus, it is fair to assume that the entirety of this OLT curve may not be suitable for visual and mathematical curve fitting. In other words, if we were to strictly use the best fitting curve from a mathematical standpoint using the entire OLT curve for the calculation, it would likely result in an excessively long service life estimate (and unreasonably low depreciation rate). Thus, it is not surprising that both Iowa curves "ignore" the tail end of this OLT curve. If we consider the 1% cutoff point based on the level of beginning dollars exposed to retirement in this account, we can visually observe where this OLT curve should be "truncated" for statistical analysis. This truncation point is shown in the graph below.

Figure 6:
Account 354 – Towers and Fixtures – 1% Cutoff



This graph presents the same information as the previous graph, but with the addition of a truncation line at age interval 55. According to the observed life table for this account, the data points occurring after (that is, to the right of) this age interval are associated with retirements that represent less than 1% of the beginning dollars exposed to retirement in this account. As a general guideline, these data points can be eliminated prior to conducting the mathematical curve fitting calculation to arrive at a more accurate service life estimate.

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

A. Yes. For this account, the SSD, or "distance" between the Company's curve and the truncated OLT curve, is 0.0222 and the SSD between the R5-69 curve and the OLT curve is only 0.0044,[22] which means it provides a closer fit to the observed data. Thus, the R5-69 curve results in a more reasonable depreciation rate for this account in my opinion.[23]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. According to Dr. White, Foster Associates "deferred to SCE" in selecting their proposed service life due to the "unreliable service life indications" from the Company's data.[24] There are several problems with this approach. First, as noted in the legal standards discussed above, the Company has the burden to show that its proposed depreciation rates are not excessive, and in turn, that its service lives are not underestimated. The fact that SCE failed to produce "reliable" service life indications through its historical data for this account does not absolve the Company of its burden. Additionally, service life estimates have a direct impact on depreciation expense. To the extent SCE's independent expert simply "defers" to Company personnel regarding an issue that directly impacts the cash flow of their employer, the potential for biases in this arrangement should be noted. It would not be unlike a utility's rate of return witness deferring to the CFO regarding the cost of equity estimate. Finally, the Company has provided evidence related to service life

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[22] Exhibit DJG-7.

[23] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

[24] SCE-07, Vol. 3, Appendix A, p. A-15.

in the form of historical retirement data for this account. These data show that over 75% of the assets in this account are surviving at the age interval of 104 year. Both Dr. White and I agree that the average and remaining life going forward will be less than that (as indicated by our Iowa curve estimates not fully recognizing the tail end of the OLT curve), but the evidence provided by the Company indicates a longer average life than 65 years, even when the tail end of the OLT curve is properly truncated. The evidence provided by the Company indicates an average life of 69 years in this account, as described by the R5-69 Iowa curve I selected.

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 354.

A. Apply the R5-69 Iowa curve to Account 354 would result in an adjustment reducing SCE's proposed depreciation expense by $125,615.[25]

C. Account 356 – Overhead Conductors and Devices

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

A. For this account, Dr. White selected the R3-61 Iowa curve, and I selected the R3-65 Iowa curve. Both Iowa curves are shown in the graph below along with the OLT curve.

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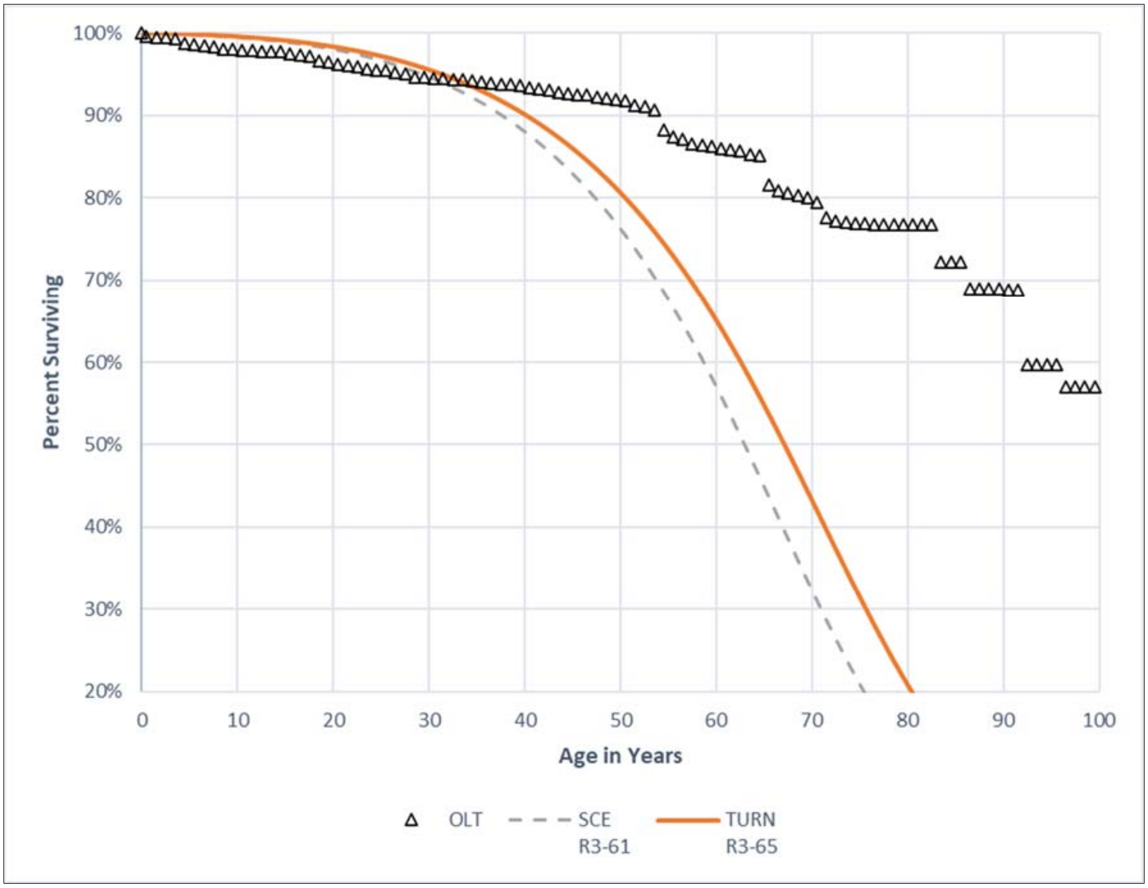
[25] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

Figure 7:
Account 356 – Overhead Conductors and Devices



As with Account 354 discussed above, both Iowa curves provide relatively close fits to the OLT curve to a certain point, then statistically ignore the tail end of the curve. Also as with Account 354, the observed life table in this account reveals that there are portions of data at the end of the OLT curve that are statistically irrelevant based on the 1% truncation benchmark.

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

A. Yes. Whether considering the entire or truncated OLT curve, the R3-65 Iowa curve I selected results in the better mathematical fit. Specifically, the SSD between the

Company's curve and the truncated OLT curve, is 4.8243, and the SSD between the R3-65 Iowa curve and the OLT curve is only 2.9499,[26] which means it provides a closer fit to the observed data. Thus, the R3-65 curve results in a more reasonable depreciation rate for this account.[27]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. As with Account 354 discussed above, Dr. White appears to have simply "deferred" to the opinions of SCE, who is recommending a $226 million increase to depreciation expense in this case.[28] We should not be surprised when the opinions of Company personnel result in service life proposals that are shorter than what is otherwise indicated by SCE's own retirement data, which leads to higher depreciation expense proposals, as is the case with this account. There is sufficient retirement history in Account 356 such that reasonable estimates can be made through the use of conventional Iowa curve fitting analysis. That analysis indicates that the average service life for Account 356 is longer than the 61-year life proposed by Dr. White, and perhaps even longer than the 65-year life I proposed, as shown in the graph above. In that regard, the R3-65 Iowa curve I proposed is quite reasonable, if not overly conservative.

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[26] Exhibit DJG-8.

[27] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

[28] SCE-07, Vol. 3, Appendix A, p. A-19.

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 356.

A. Apply the R3-65 Iowa curve to Account 356 would result in an adjustment reducing SCE's proposed depreciation expense by $754,114.[29]

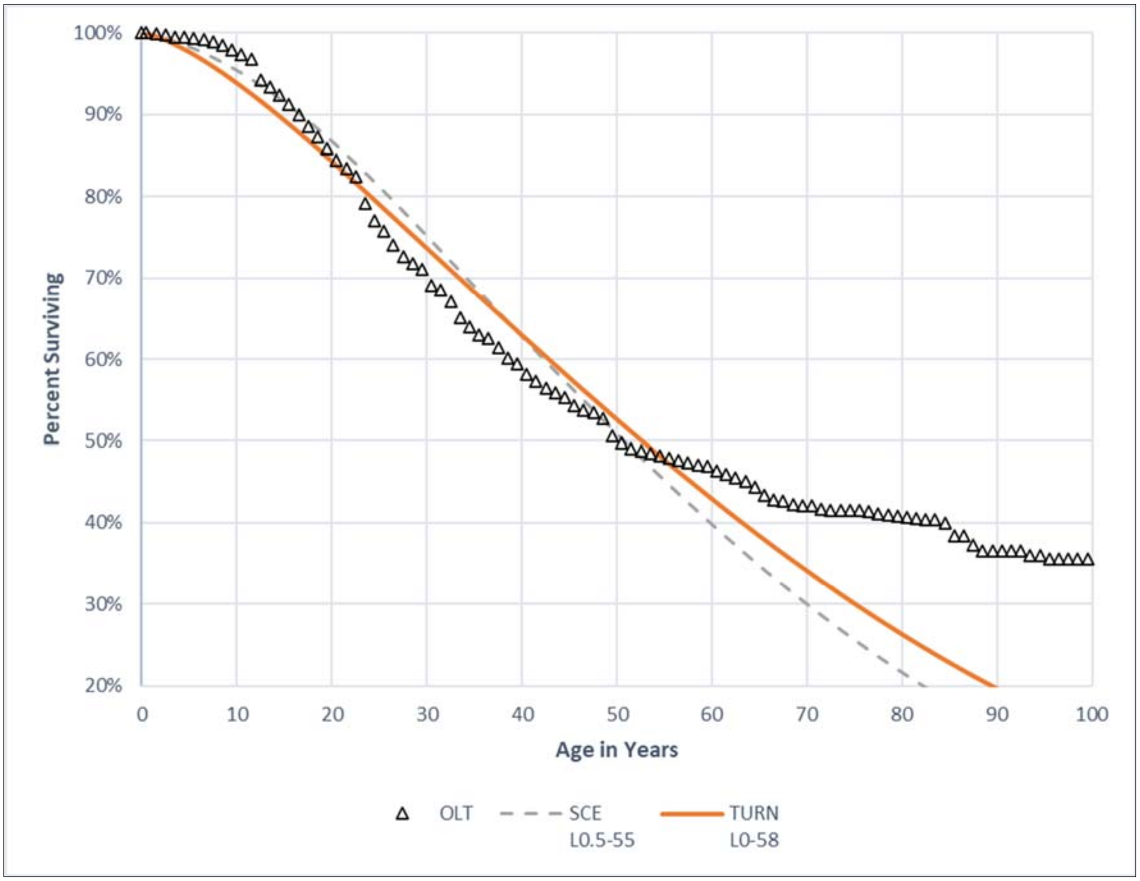
D. Account 361 – Distribution Structures and Improvements

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

A. The OLT curve for Account 361 is well-suited for conventional Iowa curve fitting techniques in that it is relatively smooth, contains adequate retirement history, and resembles a pattern typically observed in utility property retirement. For this account, Dr. White selected the L0.5-55 Iowa curve, and I selected the L0-58 Iowa curve. Both Iowa curves are shown in the graph below along with the OLT curve.

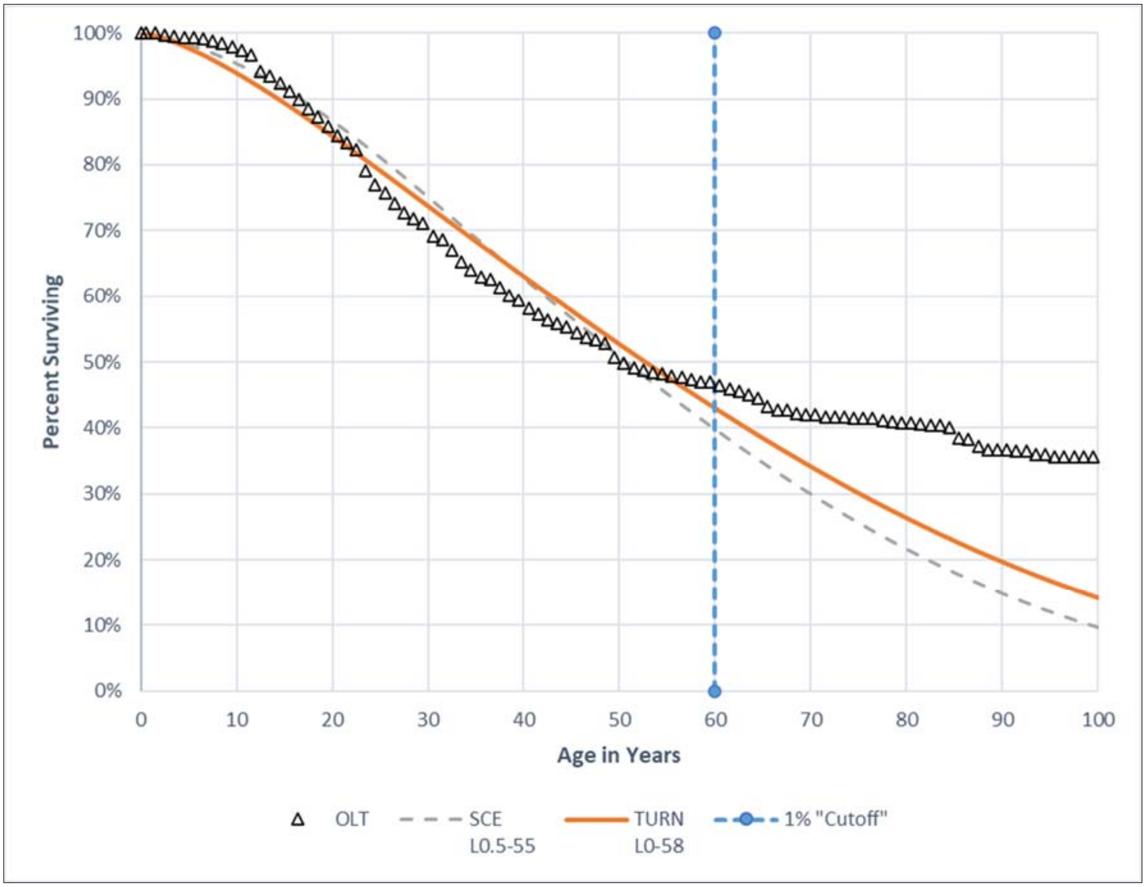
[29] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

Figure 8:
Account 361 – Distribution Structures and Improvements



As shown in the graph, both Iowa curves provide relatively close fits to the OLT curve through age interval 55. If we consider the 1% cutoff point based on the level of beginning dollars exposed to retirement in this account, we can visually observe where this OLT curve should be "truncated" for statistical analysis. This truncation point is shown in the graph below.

Figure 9:
Account 361 – Distribution Structures and Improvements – 1% Cutoff



This graph presents the same information as the previous graph, but with the addition of a truncation line at age interval 60. According to the observed life table for this account, the data points occurring after (to the right of) this age interval are associated with retirements that represent less than 1% of the beginning dollars exposed to retirement in this account. As a general guideline, these data points can be eliminated prior to conducting the mathematical curve fitting calculation to arrive at a more accurate service life estimate. Thus, both curves correctly disregard data points occurring after the truncation point. We can use mathematical curve fitting techniques to determine which of these two relatively similar Iowa curves provides the better fit to the OLT curve.

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

A. Yes. Whether considering the entire or truncated OLT curve, the L0-58 Iowa curve I selected results in the better mathematical fit. Specifically, the SSD between the Company's curve and the truncated OLT curve is 0.0651, and the SSD between the L0-58 Iowa curve and the OLT curve is only 0.0501,[30] which means it provides a closer fit to the observed data. Thus, the L0-58 curve results in a more reasonable depreciation rate for this account.[31]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. The depreciation study notes that "Company operations personnel do not expect policy or procedural changes or technological advances that would introduce significantly different forces of retirement from those observed in the past."[32] As discussed above, the purpose of Iowa curves are to use past indications of service life in order to predict the remaining life going forward. The OLT curve for Account 361 is well suited for Iowa curve fitting techniques due to its adequate retirement history (i.e., its length) and relatively smooth and conventional shape. Moreover, the depreciation study acknowledges that future forces of retirement are not expected to differ significantly from past forces. All of these facts point to relying on an Iowa curve that provides the better mathematical fit to the OLT curve, which is seen in the L0-58 Iowa curve I selected.

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[30] Exhibit DJG-9.

[31] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

[32] SCE-07, Vol. 3, Appendix A, p. A-26.

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 361.

A. Apply the L0-58 Iowa curve to Account 361 would result in an adjustment reducing SCE's proposed depreciation expense by $1.2 million.[33]

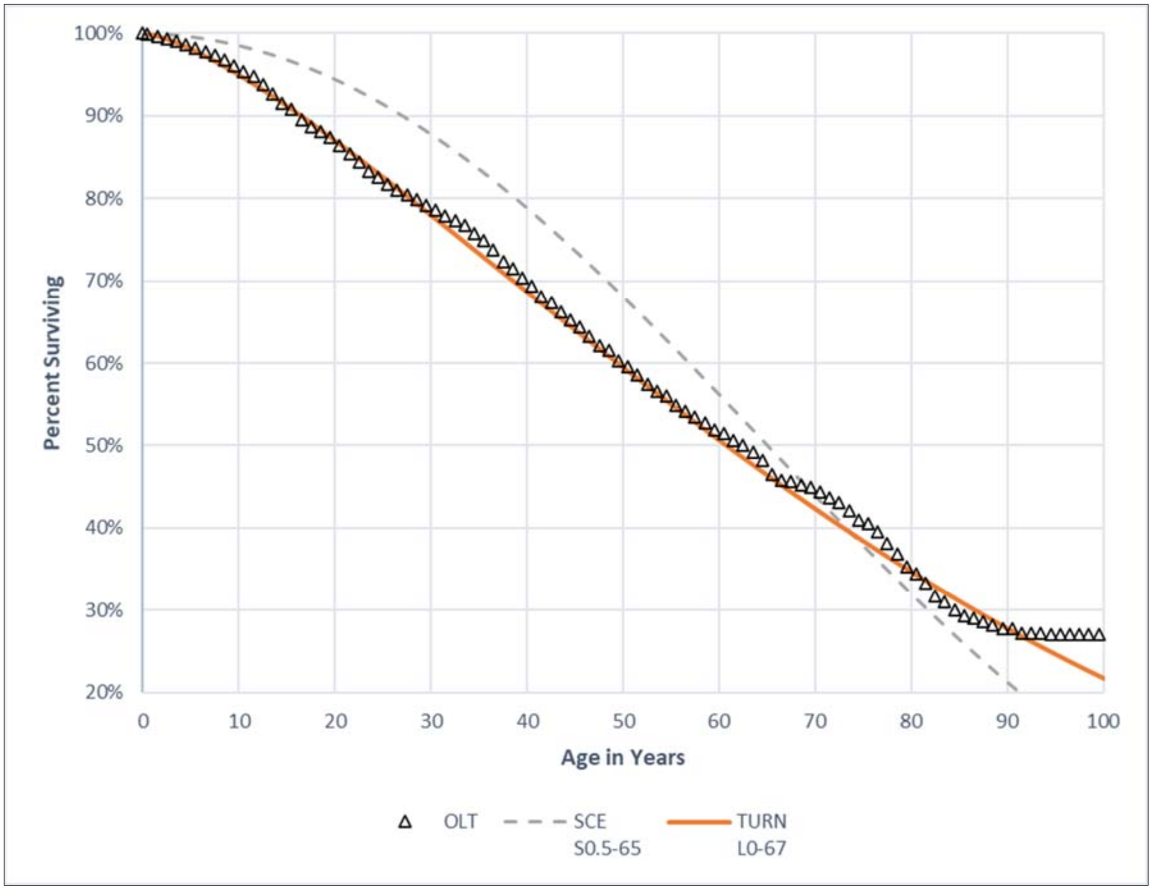
E. Account 362 – Station Equipment

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

A. For this account, Dr. White selected the S0.5-65 Iowa curve, and I selected the L0-67 Iowa curve. Both Iowa curves are shown in the graph below along with the OLT curve.

[33] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

Figure 10:
Account 362 – Station Equipment



The primary purpose of the Iowa curve fitting process is to use a smooth and complete curve (i.e., reaching zero percent surviving) in order to calculate average and remaining life. This is especially necessary because OLT curves are often unsmooth and incomplete. In Account 362, however, we have an OLT curve that is relatively smooth and complete. In this situation, selecting a close-fitting Iowa curve should be a straightforward process. But, as shown in the graph above, Dr. White's selected Iowa curve simply does not provide a good fit to the observed data in comparison to the L0-67 curve I selected, which results in a near-perfect fit. The OLT curve presented in this account clearly follows the pattern of an L-shaped Iowa curve, thus it is puzzling why Dr. White selected an S-shaped curve. Regardless, the Iowa curve Dr. White selected results in a poor fit to the observed data.

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

A. Yes. Whether considering the entire or truncated OLT curve, the L0-67 Iowa curve I selected results in the better mathematical fit. Specifically, the SSD between the Company's curve and the truncated OLT curve is 0.3120, and the SSD between the L0-67 Iowa curve and the OLT curve is only 0.0043,[34] which means it provides a closer fit to the observed data. Thus, the L0-67 curve results in a more reasonable depreciation rate for this account.[35]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. Regardless of what information Dr. White obtained from Company personnel for this account, there is no justification made as to why a nearly smooth and complete OLT curve should be essentially ignored in the process of estimating service life. To accept Dr. White's proposed S0.5-65 curve for this account would essentially equate to disregarding the Iowa curve fitting process altogether. The Company's own historical data for this account clearly indicate an average service life estimate of 67 years, as defined by the L0-67 Iowa curve. Dr. White has not presented any reasons as to why that clear evidence

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[34] Exhibit DJG-10.

[35] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

should be disregarded in favor of an S-shaped Iowa curve that provides a poor fit to the historical retirement pattern in this account.

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 362.

A. Apply the L0-67 Iowa curve to Account 362 would result in an adjustment reducing SCE's proposed depreciation expense by $2.4 million.[36]

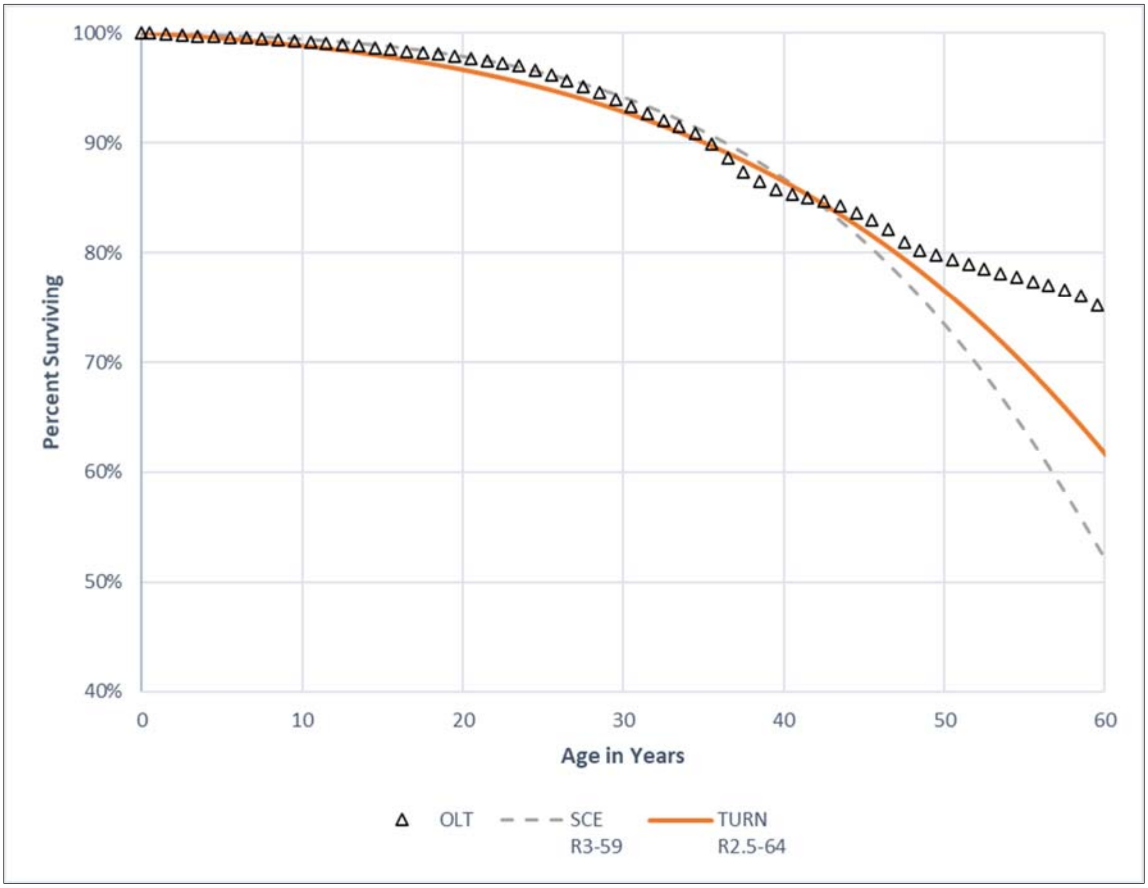
F. Account 366 – Underground Conduit

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

A. For this account, Dr. White selected the R1-59 Iowa curve, and I selected the R2.5-64 Iowa curve. Both Iowa curves are shown in the graph below along with the OLT curve.

[36] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

Figure 11:
Account 366 – Underground Conduit



Unlike several of the accounts discussed above, the entirety of the OLT curve shown for Account 366 falls within the 1% truncation benchmark. By that standard, the entire OLT curve for this account is statistically relevant. Due to the particular shape of this OLT curve, there is no Iowa curve that would provide a near-perfect fit (such as Account 362 discussed above). Nonetheless, it is still necessary to select the best fitting Iowa curve. Even from a visual perspective, it is clear that the R2.5-64 curve I selected provides the better fit, as it appears the R3-59 curve Dr. White selected does not give enough statistical weight to relevant portions of the OLT curve. We can confirm the results mathematically.

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

A. Yes. Specifically, the SSD between the Company's curve and the OLT curve is 0.2767, and the SSD between the R2.5-64 Iowa curve and the OLT curve is only 0.0922,[37] which means it provides a closer fit to the observed data. Thus, the R2.5-64 curve results in a more reasonable depreciation rate for this account.[38]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. Once again, Dr. White simply "deferred to the Company in recommending retention of the currently approved 59-R3"[39] Iowa curve. As discussed above regarding several other accounts, simply deferring to Company personal does not satisfy the burden to make a convincing showing that the Company's proposed depreciation rates are reasonable. Dr. White claims there "minimal retirements" in this account.[40] However, as illustrated in the graph above, the percent surviving of the assets in this account drop below 80%, and the observed life table shows that at age 60, there are over 70% of the assets surviving in this account, which strongly indicates that the average life going forward will be greater than 60 years. The Company has provided sufficient evidence indicating that the R2.5-64 Iowa curve is a reasonable and conservative curve selection. Simply "deferring" to SCE

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[37] Exhibit DJG-11.

[38] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

[39] SCE-07, Vol. 3, Appendix A, p. A-34.

[40] *Id*.

personnel to justify an inadequate life projection of 59 years is insufficient to satisfy the Company's burden for this account.

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 366.

A. Apply the R2.5-64 Iowa curve to Account 366 would result in an adjustment reducing SCE's proposed depreciation expense by $6.6 million.[41]

G. Account 369 – Services

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

A. For this account, Dr. White selected the R1.5-55 Iowa curve, and I selected the R1.5-60 Iowa curve. Both Iowa curves are shown in the graph below along with the OLT curve.[42]

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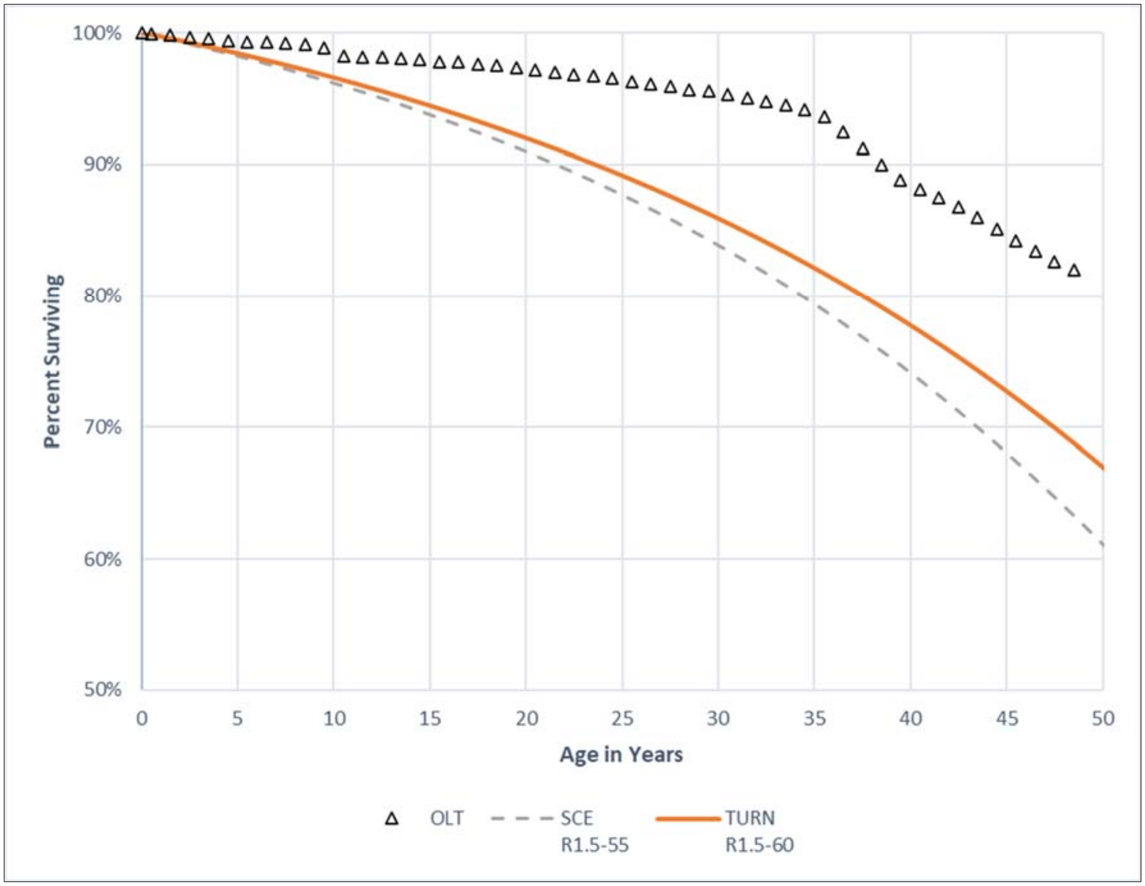
[41] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

[42] The OLT curve shown in the graph is truncated at the 1% cutoff based on beginning dollars exposed to retirement, thus all of the data points shown are statistically relevant.

Figure 12:
Account 369 – Services



As shown in this graph, both Iowa curves are shorter than the OLT curve. For this account, selecting an Iowa curve that provided a very close fit to the OLT curve would result in an average life that is notably longer than those observed in the industry for this account. In other words, going forward, the remaining life will likely be shorter than what is otherwise indicated by the OLT curve at this point, and this projection is reflected in both Iowa curves. However, the OLT curve at this time also indicates that the average life going forward in this account will be longer than the 55 year average life proposed by Dr. White. The fact that the retirement history in this account is less than ideal for conventional Iowa curve fitting techniques does not absolve the Company of its burden to make a convincing showing that its proposed service lives are reasonable. At this time, the data provided by the Company indicates the average life going forward will be longer than 55 years, though perhaps not as long as the precise average life indicated by the OLT curve at this time. Thus, the 60-year average life I propose represents a good balance between current indications of average life, while recognizing the possibility that average life will decline going forward.

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

A. Yes. Specifically, the SSD between the Company's curve and the truncated OLT curve is 0.5353, and the SSD between the R1.5-60 Iowa curve and the OLT curve is only 0.3199,[43] which means it provides a closer fit to the observed data. Thus, the R1.5-60 curve results in a more reasonable depreciation rate for this account.[44]

Q. Did you consider any information presented in SCE's depreciation study as compelling evidence in support of the Company's proposed service life?

A. No. According to the depreciation study, "[n]either the full account nor the subpopulation analysis provides sufficient evidence to warrant adjusting the currently approved 55–R1.5 projection life and curve." I disagree. The <u>only</u> conclusion drawn from the data provided by the Company (as illustrated in the OLT curve above) is that the average life for this account should be longer than 55 years, and perhaps even longer than the 60-year life I proposed. The fact is that both Dr. White and I are predicting an average life going forward

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[43] Exhibit DJG-12.

[44] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

that is less than what is otherwise indicated by the OLT curve, that is, than the curve supported by empirical evidence. Again, a strict reliance on mathematical curve fitting for this particular account would run the risk of selecting an average life that is notably longer than what is observed in the industry for this account. That does not mean, however, that there is no evidence to suggest that the average life should be longer than 55 years. Rather, the evidence provided by the Company indicates the life should be longer than 55 years. The R1.5-60 curve I selected provides a good balance between current indications of average life, while conservatively recognizing the possibility that average life will decline going forward.

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 369.

A. Apply the R1.5-60 Iowa curve to Account 369 would result in an adjustment reducing SCE's proposed depreciation expense by $5.2 million.[45]

H. Account 370 – Meters

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

A. For this account, Dr. White selected the R3-20 Iowa curve, and I selected the R3-30 Iowa curve. Both Iowa curves are shown in the graph below along with the OLT curve.[46]

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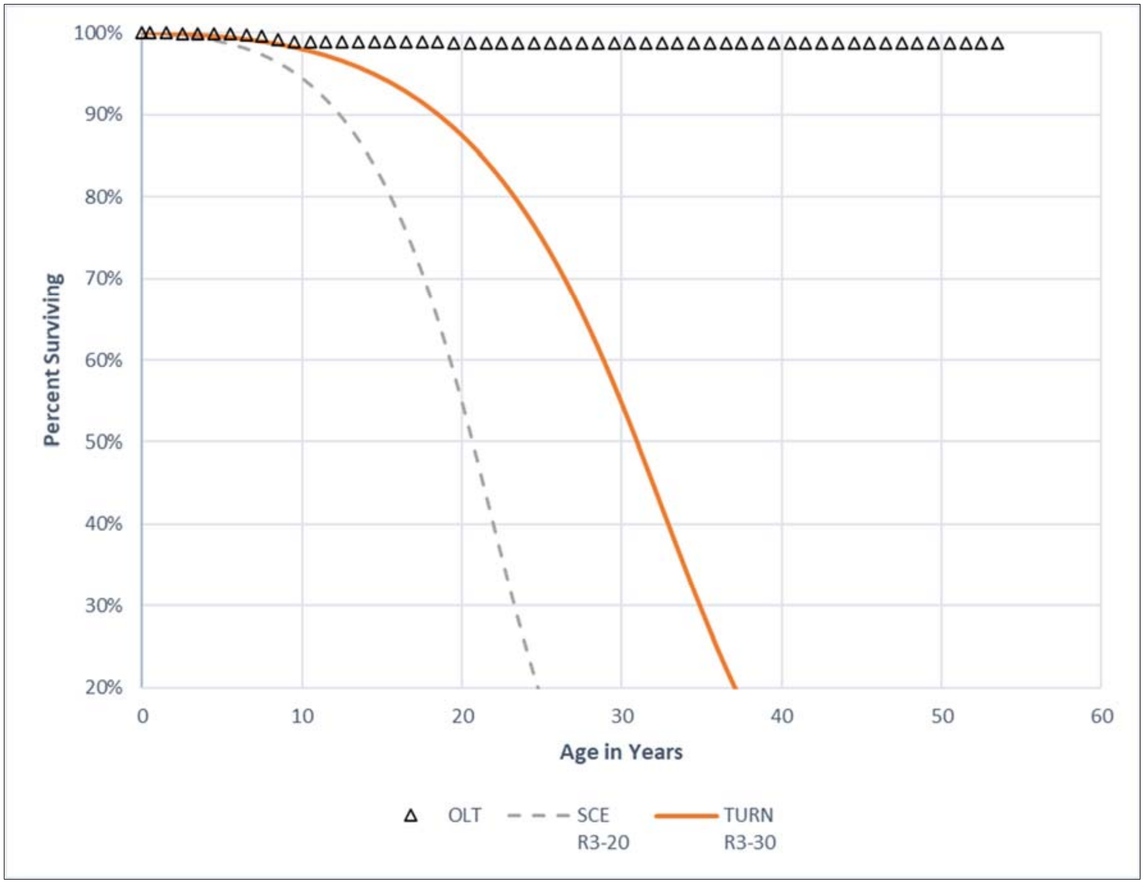
[45] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

[46] The OLT curve shown in the graph is truncated at the 1% cutoff based on beginning dollars exposed to retirement, thus all of the data points shown are statistically relevant.

Figure 13:
Account 370 – Meters



As shown in this graph, the OLT curve for this account does not have adequate retirement history for conventional Iowa curve fitting techniques. That is, if we attempted to visually and mathematically fit an Iowa curve to this OLT curve , it would result in an excessively long average life projection. However, this does not mean the historical data provided by the Company is valueless. In fact, the data show that 99% of the assets in this account that have reached beyond the 30-year age interval are still surviving. In order for Dr. White's 20-year average life projection to be accurate going forward, there would need to be a significant increase in the rate of retirements, which is not yet supported by empirical data provided by the Company. Looking at the graph above, it is clear that both Dr. White and

I are projecting that, going forward, the OLT will inevitably start to decline as retirement activity increases, and will likely begin to form a pattern that is more resembling of an Iowa type curve. However, the fact that this type of retirement activity has not yet occurred does not absolve SCE of its burden to make a convincing showing that its proposed service lives are reasonable. Typical average life projections for this account range for 20-30 years, though often those life projections are supported by more reliable data than what has been provided by the Company here. As with some of the other accounts discussed above, the data provided by the Company is less than ideal for conventional Iowa curve fitting techniques, however, the data nonetheless indicate that the average life going forward will be longer than the average life proposed by Dr. White. Again, of the assets in this account that have reached beyond 30 years, 99% are still surviving. While I would not be surprised if life indications obtained from future depreciation studies show a lower average life than what is indicated by the data in this study (as indicated by my 30-year life proposal), the 20-year life proposed by Dr. White goes too far at this time in light of the evidence provided by the Company.

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

A. Yes. Although as discussed above, mathematical curve fitting techniques are not as valuable for this account given the inadequate retirement history inherent in the OLT curve, the Iowa curve I proposed nonetheless results in a better mathematical fit. Specifically, the SSD between the Company's curve and the truncated OLT curve is 8.5993, and the SSD between the R3-30 Iowa curve and the OLT curve is only 1.2332,[47] which means it provides a closer fit to the observed data. Thus, the R3-30 curve results in a more reasonable depreciation rate for this account.[48]

Q. Please describe the adjustment to SCE's depreciation expense that would result from implementing your proposed service life for Account 370.

A. Apply the R3-30 Iowa curve to Account 370 would result in an adjustment reducing SCE's proposed depreciation expense by $27.2 million.[49]

VI. NET SALVAGE ANALYSIS

Q. Describe the concept of net salvage.

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

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[47] Exhibit DJG-13.

[48] *See* Exhibit DJG-14 for remaining life calculations based on selected Iowa curves; *see also* Exhibit DJG-5 for depreciation rate calculations based on calculated remaining lives.

[49] Please see Exhibit DJG-16 for TURN's proposed depreciation rates and accruals applied to CPUC-jurisdictional plant balances as of January 1, 2019. The dollar adjustment cited here is an estimate of the change for this account that is attributable to TURN's proposed service life on a stand-alone basis (excluding net salvage impacts), and it is calculated on a simplified basis by taking the difference between TURN's total proposed depreciation adjustments listed in Exhibit DJG-16 and TURN's stand-alone net salvage adjustments listed in Exhibit DJG-15.

particular period of time and increases the depreciation rate. Therefore, a greater negative net salvage rate equates to a higher depreciation rate and expense, all else held constant.

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

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

Q. Has the Commission expressed concern over increasing negative net salvage rates?

A. Yes. In PG&E's 2014 GRC, the Commission made it clear: "We remain concerned with the growing cost burden associated with increasing cost trends for negative net salvage."[50] The Commission also expressed an interest in the ratemaking concept of gradualism. According to the Commission:

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

> In evaluating whether a proposed increase reflects gradualism, however, we believe the more appropriate measure is how the change affects customers' retail rates. The fact that PG&E previously proposed higher removal costs than adopted has no bearing on how a proposed change would impact current ratepayers. Accordingly, we apply the principle of gradualism based on how a proposed change in estimate compares to adopted costs reflected in current rates, irrespective of what PG&E may have forecasted in an earlier depreciation study.[51]

In PG&E's 2014 GRC, the Office of Ratepayer Advocates proposed a 25% cap on increased net salvage rates to mitigate sudden increases in net salvage and instead provide for more gradual levels of increases.[52] The Commission ultimately found: "As a general approach, we adopt no more than 25% of PG&E's estimated increases in the accrual provision for removal costs. This limitation tempers the impacts on current ratepayers. . . ."[53]

Q. Despite the Commission's concern regarding increasing net salvage rates, did SCE propose significant net salvage rate increases in this case?

A. Yes. SCE is proposing net salvage rate increases to 11 transmission and distribution accounts, many of which are substantial.

Q. Did you consider the Commission's concern for the growing cost burden associated with increasing negative net salvage when conducting your analysis of SCE's proposed net salvage rates?

A. Yes, and I agree with the Commission's concern. My proposed net salvage adjustments are based on the Commission's 25% benchmark discussed above. That is, for each account to which SCE proposed a net salvage rate increase, my proposed adjustments limit that

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[51] *Id*. at 598.

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

[53] *Id*. at 602.

increase to 25%. The table below summarizes the current and proposed net salvage rates for the 11 accounts at issue.

Figure 14:
Net Salvage Adjustment Summary

Account No.	Description	Current NS %	SCE NS %	TURN NS %
	TRANSMISSION			
354.00	Towers and Fixtures	-60%	-80%	-65%
355.00	Poles and Fixtures	-72%	-90%	-77%
356.00	Overhead Conductors & Devices	-80%	-100%	-85%
358.00	Underground Conductors & Devices	-15%	-30%	-19%
	DISTRIBUTION			
361.00	Structures and Improvements	-25%	-40%	-29%
362.00	Station Equipment	-25%	-40%	-29%
365.00	Overhead Conductors & Devices	-115%	-190%	-134%
366.00	Underground Conduit	-30%	-80%	-43%
367.00	Underground Conductors & Devices	-60%	-100%	-70%
368.00	Line Transformers	-20%	-50%	-28%
373.00	Street Lighting & Signal Systems	-30%	-50%	-35%

TURN's proposed net salvage rates in the far-right column represent 25% of the increases from current net salvage rates proposed by SCE.

Q. Do you generally agree with Dr. White that the net salvage rates for the accounts at issue should increase?

A. Yes. The data provided by the Company indicate that the net salvage rates for the 11 accounts at issue should increase. However, the ultimate purpose of this process is to set fair and reasonable depreciation rates, which should be based on fair and reasonable depreciation parameters, such as service life and net salvage. I agree with the Commission's concern regarding ever-increasing net salvage rates. I also believe the

Commission's guideline to limit net salvage increases by 25% of the proposed increase (assuming the proposed increases themselves are reasonable) is sound ratemaking policy. This policy can help mitigate the economic impact to customers in light of a potential rate increase while not financially harming the Company.

Q. Have you calculated the stand-alone impact of your proposed net salvage rate adjustments as compared to the depreciation accrual that would occur using currently authorized net salvage rates?

A. Yes. If all of my net salvage rate adjustments were adopted by the Commission, it would result in a substantial increase in current depreciation expense of $33 million (excluding service life adjustments).[54] This highlights the benefits of the Commission's guidelines regarding gradualism when applied to net salvage rates. As discussed above, I agree with SCE that net salvage rates should increase, but the increase should be spread over a longer period of time, which is consistent with the relatively longer expected life for various accounts.

VII. CONCLUSION AND RECOMMENDATION

Q. Summarize the key points of your testimony.

A. SCE is requesting a substantial increase in depreciation expense in this case, which is largely driven by its excessively high depreciation rate proposals. My overall adjustment to SCE's proposed depreciation rates is driven by adjustments to service life and net salvage estimates proposed by the Company. Regarding service life, an objective analysis

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[54] *See* Exhibit DJG-15. This calculation is based on applying my proposed depreciation rates to CPUC-jurisdictional plant balances as of January 1, 2019, and it considers the stand-alone impact of my proposed net salvage adjustments.

indicates that the Company's proposed service lives for several of its transmission and distribution are too short given the Company's own historical retirement data. Dr. White simply deferred to Company personnel for his proposals on several of these accounts, which does not satisfy the Company's burden to make a convincing showing that its proposed depreciation rates are not excessive. Unreasonably short service life estimates result in unreasonably high depreciation rates. The evidence presented in my testimony shows that reasonable adjustments should be made to increase the proposed service lives for several of the Company's transmission and distribution accounts. Regarding net salvage, the Company is proposing substantial increases to several accounts. These increases do not comport with the Commission's prior applications of gradualism to net salvage increases. The Commission's policies related to net salvage gradualism are prudent and continue to act as a reasonable check against ever-increasing net salvage rates.

Q. What is your recommendation to the Commission?

A. I recommend the Commission adopt TURN's proposed deprecation rates, which are presented in Exhibit DJG-3.

Q. Does this conclude your testimony?

A. Yes.

APPENDIX A:

THE DEPRECIATION SYSTEM

A depreciation accounting system may be thought of as a dynamic system in which estimates of life and salvage are inputs to the system, and the accumulated depreciation account is a measure of the state of the system at any given time.[55] 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.[56] The figure below illustrates the basic concept of a depreciation system and includes some of the available parameters.[57]

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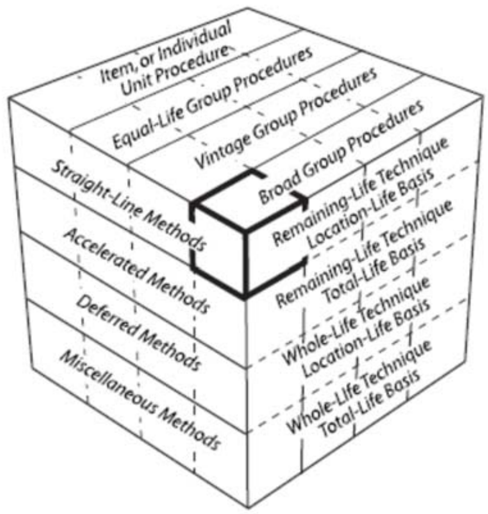
[55] Wolf *supra* n. 9, at 69-70.

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

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

Figure 15:
The Depreciation System Cube



1. <u>Allocation Methods</u>

The "method" refers to the pattern of depreciation in relation to the accounting periods. The method most commonly used in the regulatory context is the "straight-line method" – a type of age-life method in which the depreciable cost of plant is charged in equal amounts to each accounting period over the service life of plant.[58] 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.[59] The basic formula for the straight-line method is as follows:[60]

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

[59] *Id*.

[60] *Id*.

Equation 1:
Straight-Line Accrual

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

Gross plant is a known amount from the utility's records, while both net salvage and service life must be estimated to calculate the annual accrual. The straight-line method differs from accelerated methods of recovery, such as the "sum-of-the-years-digits" method and the "declining balance" method. Accelerated methods are primarily used for tax purposes and are rarely used in the regulatory context for determining annual accruals.[61] In practice, the annual accrual is expressed as a rate which is applied to the original cost of plant to determine the annual accrual in dollars. The formula for determining the straight-line rate is as follows:[62]

Equation 2:
Straight-Line Rate

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

2. <u>Grouping Procedures</u>

The "procedure" refers to the way the allocation method is applied through subdividing the total property into groups.[63] 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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[61] *Id*. at 57.

[62] *Id*. at 56.

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

conducting calculations for each unit. Whereas an individual unit of property has a single life, a group of property displays a dispersion of lives and the life characteristics of the group must be described statistically.[64] 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.[65]

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.[66] 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.[67] Under the equal life procedure the property is divided into subgroups that each has a common life.[68]

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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[64] *Id*. at 74.

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

[66] *See* Wolf *supr*a n. 9, at 74-75.

[67] *Id*. at 75.

[68] *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.[69]

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.[70] 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.[71] 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

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

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

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

in the annual accrual.[72] 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:[73]

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.[74]

4. <u>Analysis Model</u>

The fourth parameter of a depreciation system, the "model," relates to the way of viewing the life and salvage characteristics of the vintage groups that have been combined to form a continuous property group for depreciation purposes.[75] 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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[72] NARUC *supra* n. 10, at 65 ("The desirability of using the remaining life technique is that any necessary adjustments of [accumulated depreciation] . . . are accrued automatically over the remaining life of the property. Once commenced, adjustments to the depreciation reserve, outside of those inherent in the remaining life rate would require regulatory approval.").

[73] *Id*. at 64.

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

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

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

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

APPENDIX B:

IOWA CURVES

Early work in the analysis of the service life of industrial property was based on models that described the life characteristics of human populations.[76] 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.[77] A frequency curve is a graph of the frequency of retirements as a function of age. Several types of survivor and frequency curves are illustrated in the figures below.

1. <u>Development</u>

The survivor curves used by analysts today were developed over several decades from extensive analysis of utility and industrial property. In 1931, Edwin Kurtz and Robley Winfrey used extensive data from a range of 65 industrial property groups to create survivor curves representing the life characteristics of each group of property.[78] They generalized the 65 curves

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

[77] *Id*. at 23.

[78] *Id*. at 34.

into 13 survivor curve types and published their results in *Bulletin 103: Life Characteristics of Physical Property*. The 13 type curves were designed to be used as valuable aids in forecasting probable future service lives of industrial property. Over the next few years, Winfrey continued gathering additional data, particularly from public utility property, and expanded the examined property groups from 65 to 176.[79] 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."[80] 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.[81] Rather than using the original formulas, analysts typically rely on the published tables containing the percentages surviving. This is because absent knowledge of the integration technique applied to each age interval, it is not possible to recreate the exact original published table values. In the 1970s, John Russo collected data from over 2,000 property accounts reflecting

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[79] *Id*.

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

[81] Robley Winfrey, Bulletin 155: Depreciation of Group Properties 121-28, Vol XLI, No. 1 (The Iowa State College Bulletin 1942); see also Wolf supra n. 9, at 305-38 (publishing the percent surviving for each Iowa curve, including "O" type curve, at one percent intervals).

observations during the period 1965 – 1975 as part of his Ph.D. dissertation at Iowa State. Russo essentially repeated Winfrey's data collection, testing, and analysis methods used to develop the original Iowa curves, except that Russo studied industrial property in service several decades after Winfrey published the original Iowa curves. Russo drew three major conclusions from his research:[82]

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.[83]

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

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

[83] *Id.*

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

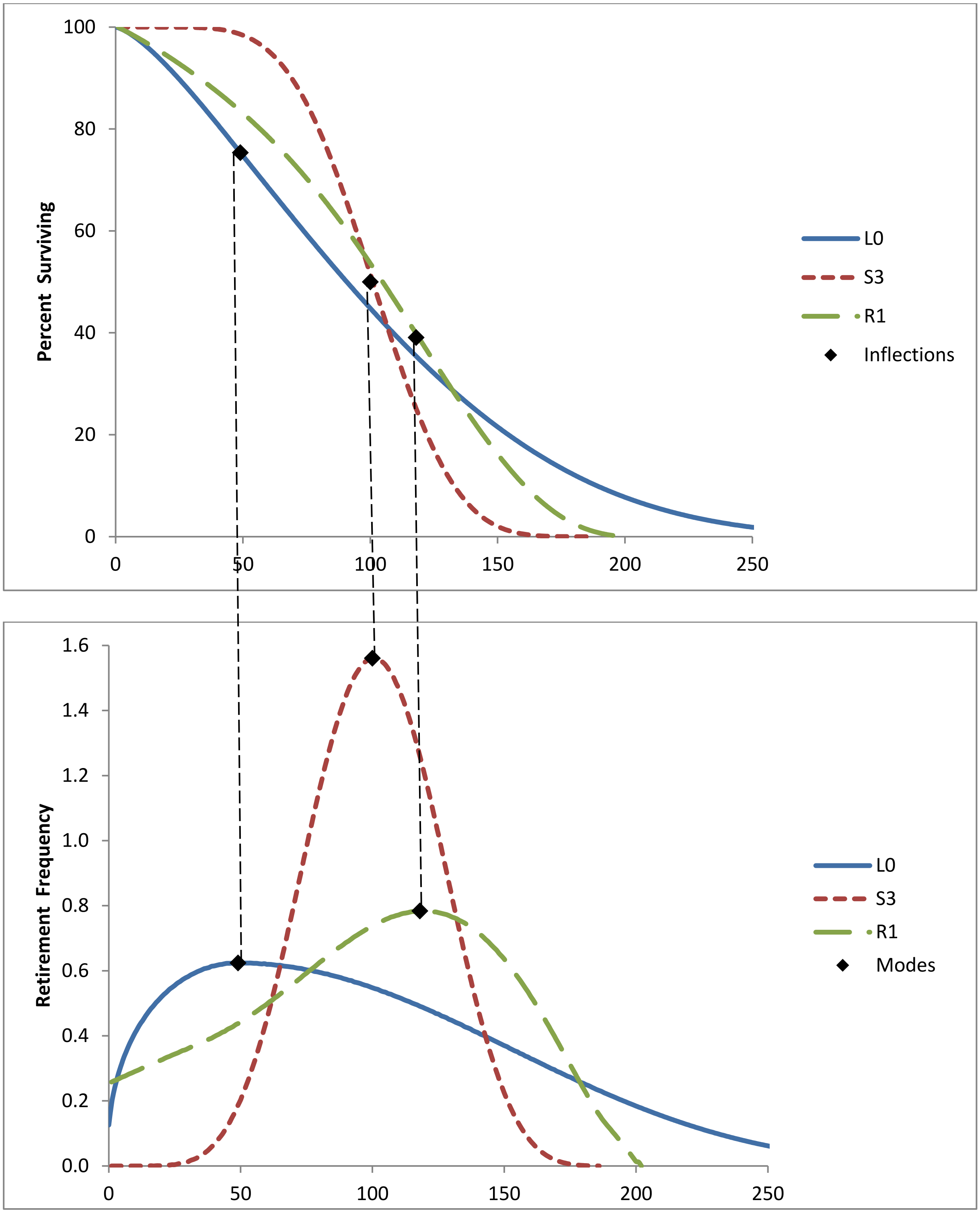
2. Classification

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

The classification of the survivor curves was made according to whether the mode of the retirement frequency curves was to the left, to the right, or coincident with average service life. There are three modal "families" of curves: six left modal curves (L0, L1, L2, L3, L4, L5); five right modal curves (R1, R2, R3, R4, R5); and seven symmetrical curves (S0, S1, S2, S3, S4, S5, S6).[84] 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.

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

Figure 16:
Modal Age Illustration



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

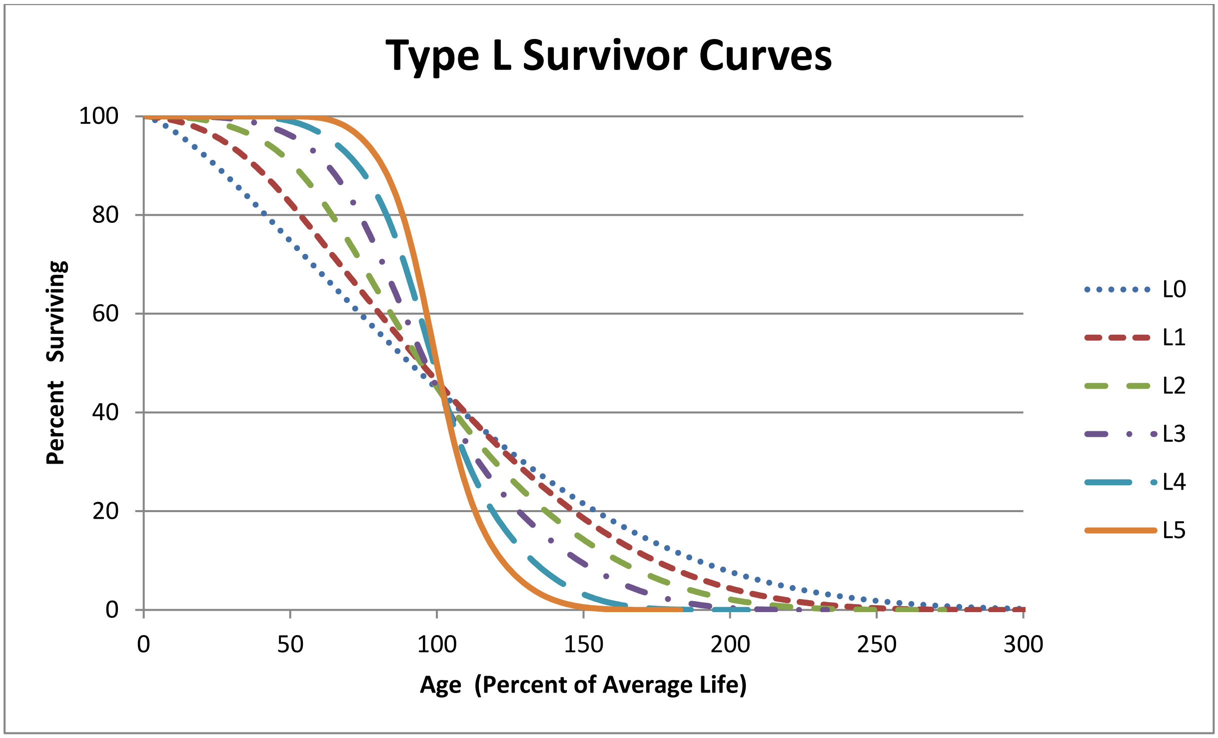
> Since the location of a particular survivor on a graph is affected by both its span in years and the shape of the curve, it is difficult to classify a group of curves unless one of these variables can be controlled. This is easily done by expressing the age in percent of average life."[85]

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.

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

Figure 17:
Type L Survivor and Frequency Curves



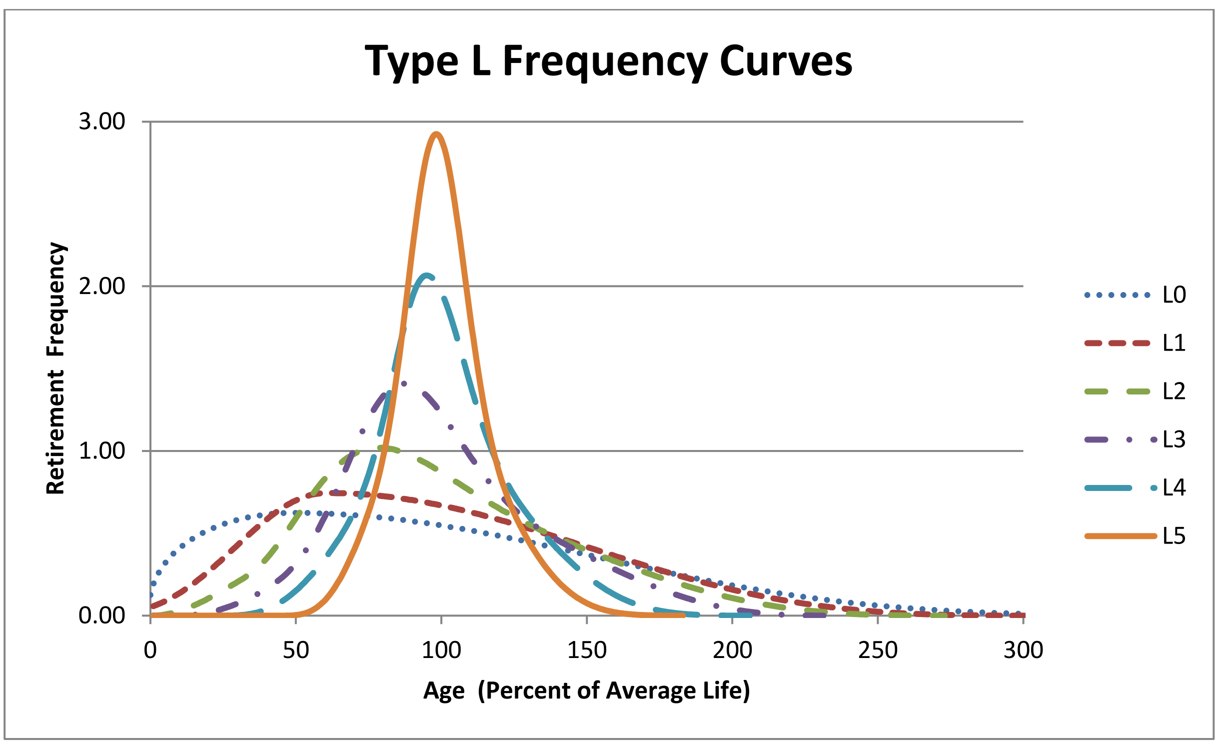
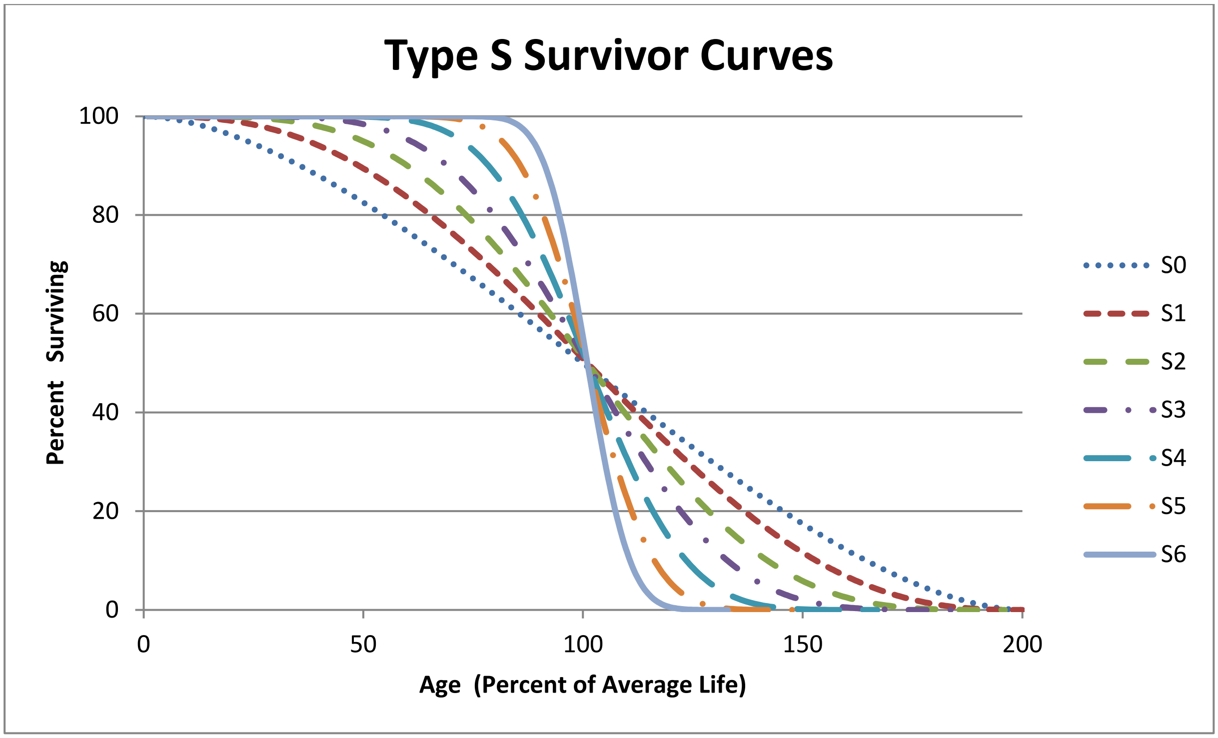


Figure 18:
Type S Survivor and Frequency Curves



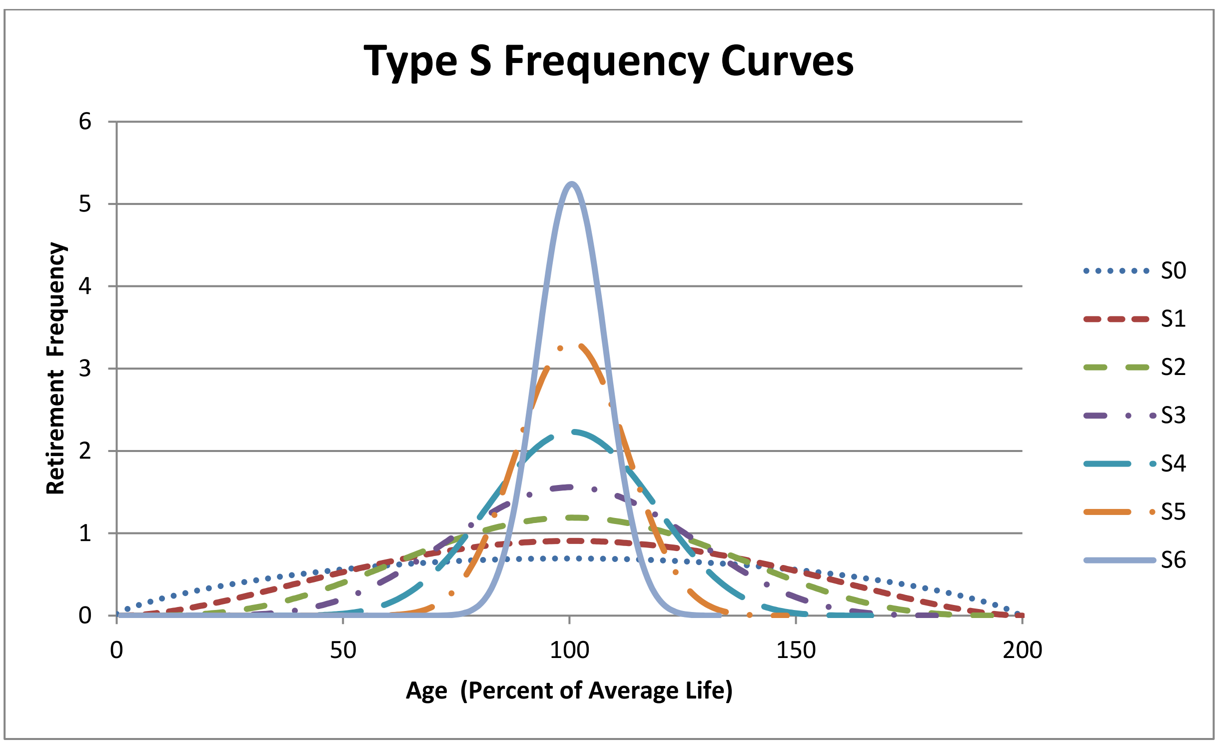
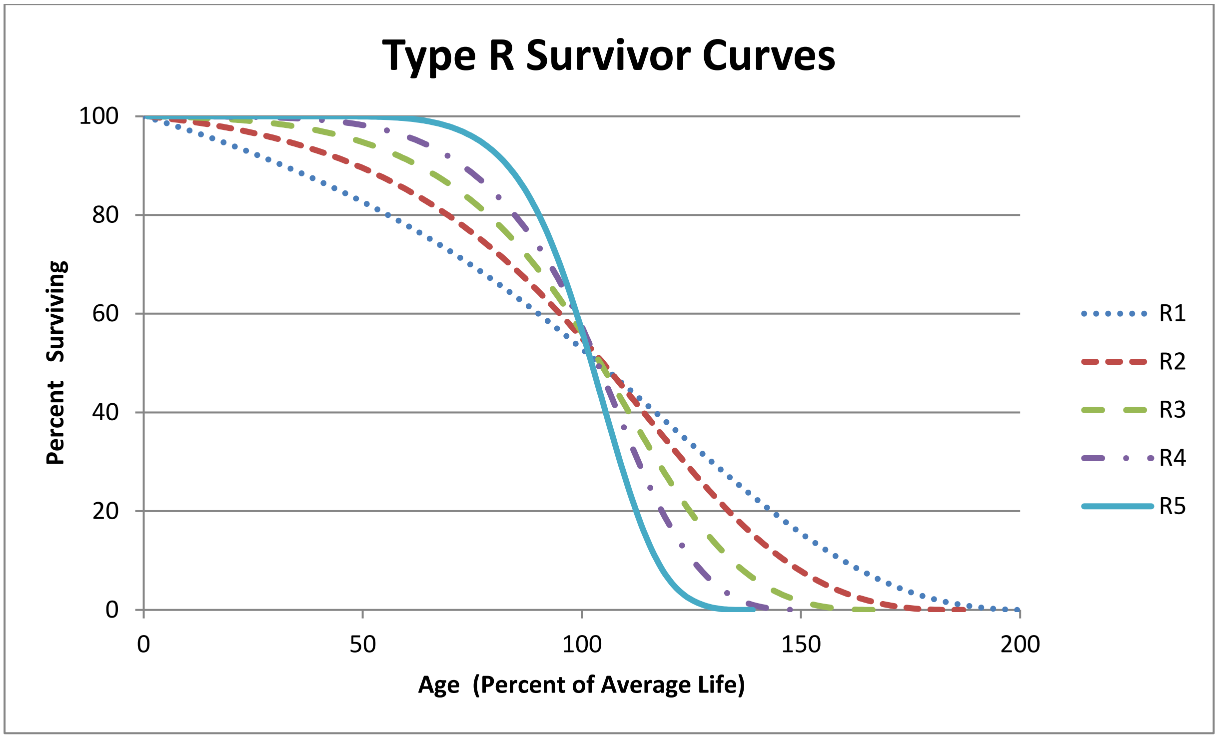
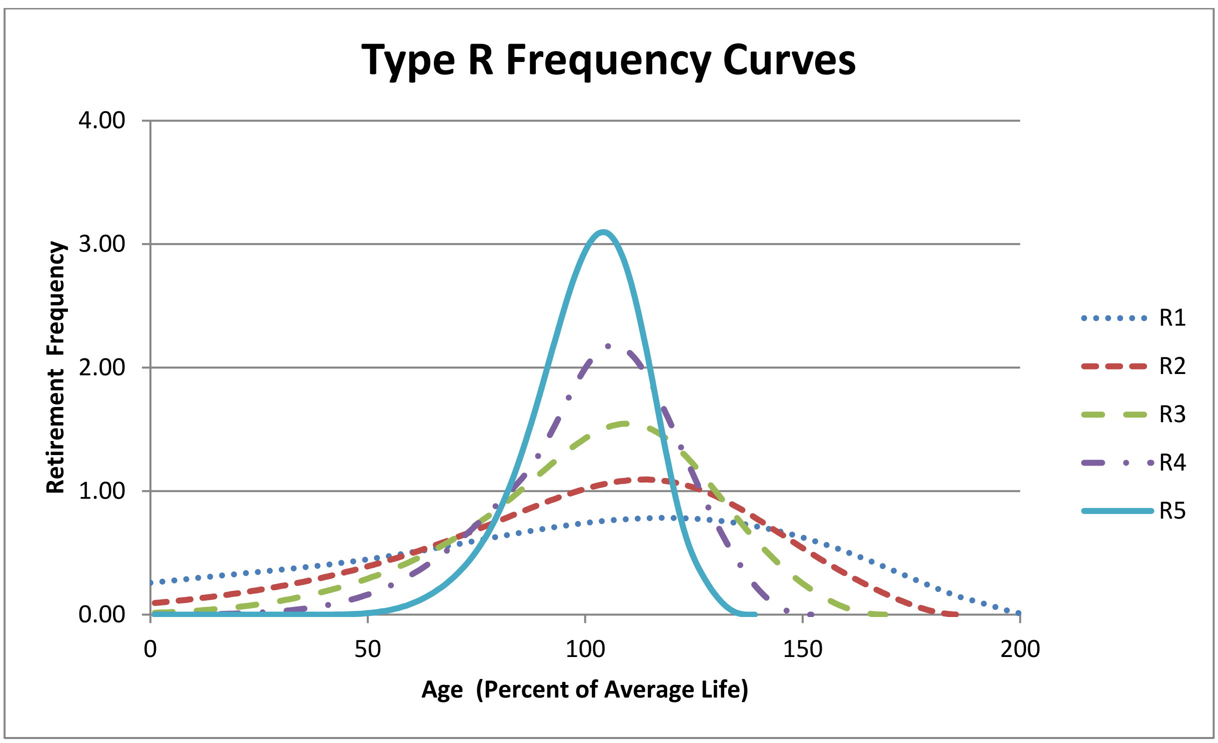


Figure 19:
Type R Survivor and Frequency Curves





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.[86]

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:[87]

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

[86] 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.

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

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

Realized life is similar to average life, except that realized life is the average years of service experienced to date from the vintage's original installations.[88] 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.[89] Remaining life is sometimes referred to as "average remaining life" and "life expectancy." To calculate average remaining life at age x, the area under the estimated future portion of the survivor curve is divided by the percent surviving at age x (denoted S_X). Thus, the average remaining life formula is:

Equation 5:
Average Remaining Life

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

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

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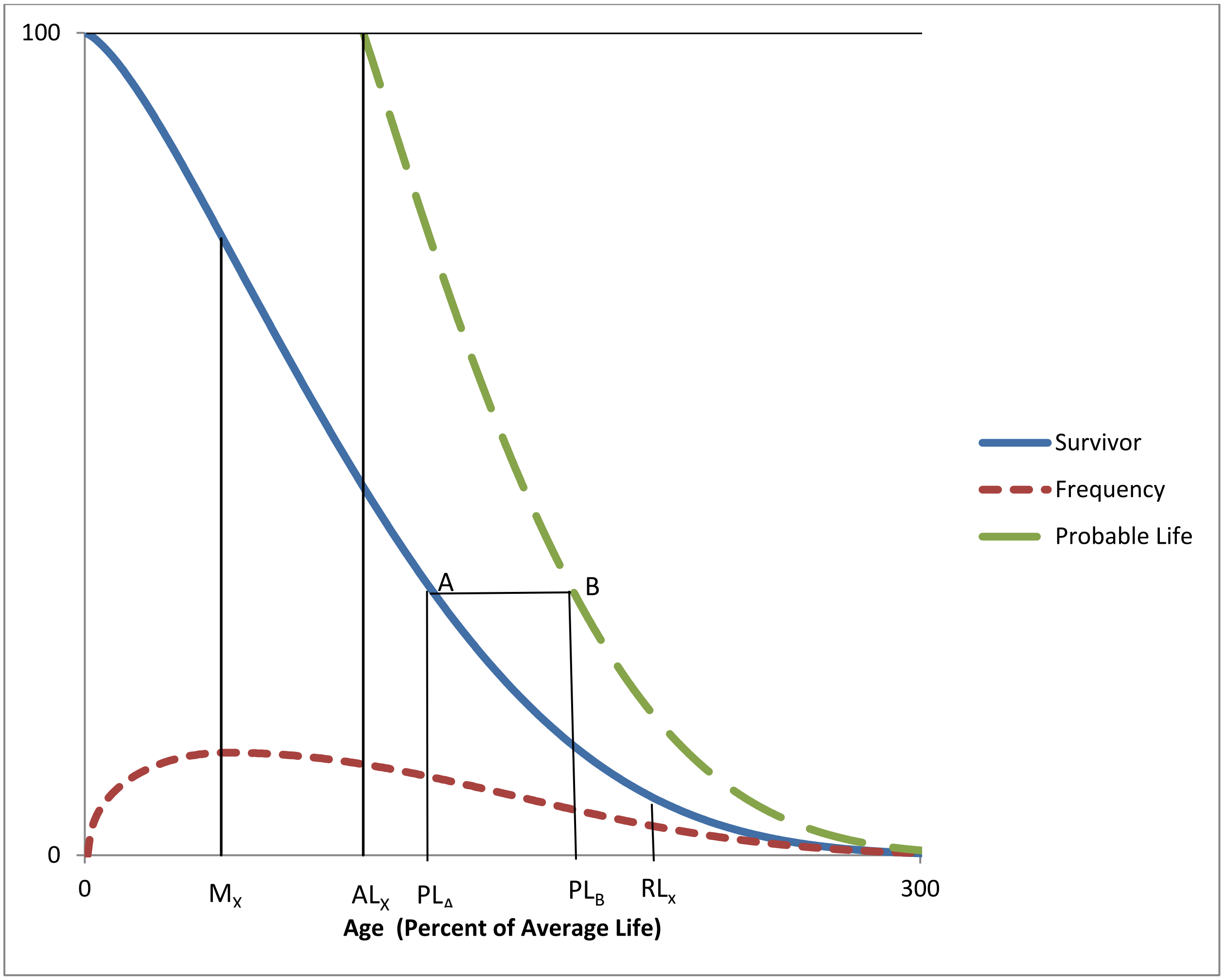
[88] *Id*. at 73.

[89] *Id*. at 74.

Figure 20:
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.[90] 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

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

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

APPENDIX C:

ACTUARIAL ANALYSIS

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

The study of human mortality is analogous to estimating service lives of industrial property groups. While some humans die solely from chance, most deaths are related to age; that is, death rates generally increase as age increases. Similarly, physical plant is also subject to forces of retirement. These forces include physical, functional, and contingent factors, as shown in the table below.[91]

Figure 21:
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

[91] NARUC *supra* n. 10, 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.[92] Historical data is used in the retirement rate actuarial method, which is discussed further below.

The Retirement Rate Method

There are several systematic actuarial methods that use historical data to calculate observed survivor curves for property groups. Of these methods, the retirement rate method is superior, and is widely employed by depreciation analysts.[93] The retirement rate method is ultimately used to develop an observed survivor curve, which can be fitted with an Iowa curve discussed in Appendix B to forecast average life. The observed survivor curve is calculated by using an observed life table ("OLT"). The figures below illustrate how the OLT is developed. First, historical property data are organized in a matrix format, with placement years on the left forming rows, and experience years on the top forming columns. The placement year (a.k.a. "vintage year" or "installation year") is the year of placement into service of a group of property. The experience year (a.k.a. "activity year") refers to the accounting data for a particular calendar year. The two matrices below use aged data – that is, data for which the dates of placements, retirements, transfers, and other transactions are known. Without aged data, the retirement rate actuarial method may not be employed. The first matrix is the exposure matrix, which shows the exposures

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

[93] 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.[94] An exposure is simply the depreciable property subject to retirement during a period. The second matrix is the retirement matrix, which shows the annual retirements during each year. Each matrix covers placement years 2003–2015, and experience years 2008-2015. In the exposure matrix, the number in the 2012 experience column and the 2003 placement row is $192,000. This means at the beginning of 2012, there was $192,000 still exposed to retirement from the vintage group placed in 2003. Likewise, in the retirement matrix, $19,000 of the dollars invested in 2003 were retired during 2012.

Figure 22:
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	

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

Figure 23:
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.[95] 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).

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

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

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

Figure 24:
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			

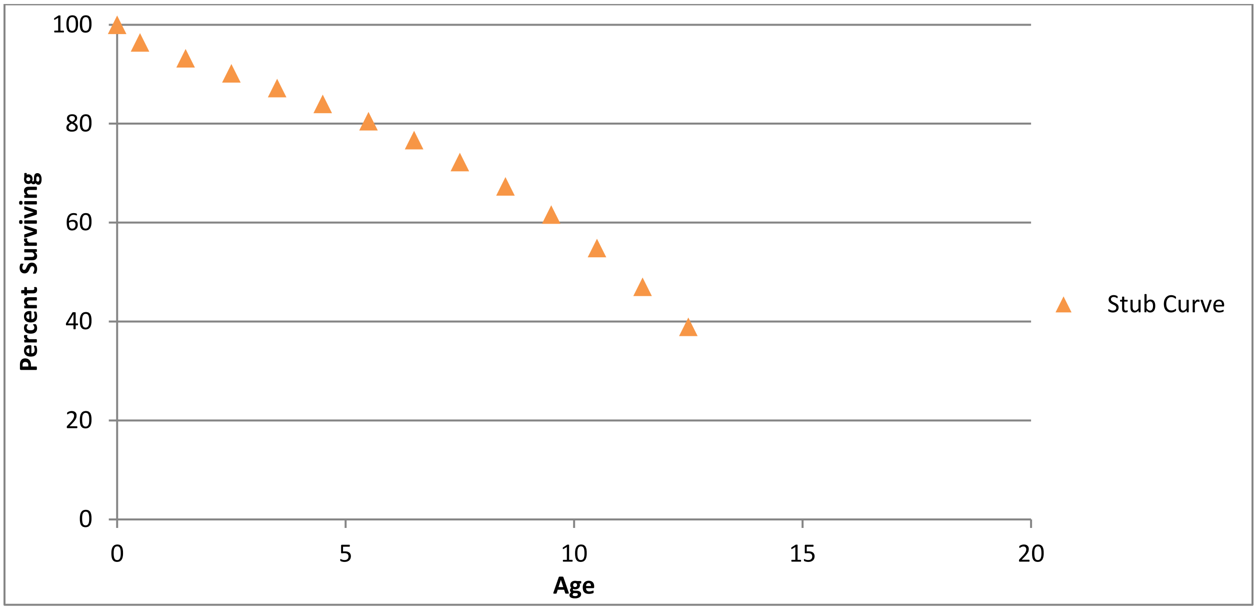
Column F on the right shows the percentages surviving at the beginning of each age interval. This column starts at 100% surviving. Each consecutive number below is calculated by multiplying the percent surviving from the previous age interval by the corresponding survivor ratio for that age interval. 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)[96].

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

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

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

Figure 25:
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.[97] 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.[98]

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.

---

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

[98] *Id*.

Figure 26:
Placement Bands

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

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

Analysts often use placement bands for comparing the survivor characteristics of properties with different physical characteristics.[99] Placement bands allow analysts to isolate the effects of changes in technology and materials that occur in successive generations of plant. For example, if in 2005 an electric utility began placing transmission poles into service with a special chemical treatment that extended the service lives of those poles, an analyst could use placement bands to isolate and analyze the effect of that change in the property group's physical characteristics. While

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

placement bands are very useful in depreciation analysis, they also possess an intrinsic dilemma. A fundamental characteristic of placement bands is that they yield fairly complete survivor curves for older vintages. However, with newer vintages, which are arguably more valuable for forecasting, placement bands yield shorter survivor curves. Longer "stub" curves are considered more valuable for forecasting average life. Thus, an analyst must select a band width broad enough to provide confidence in the reliability of the resulting curve fit yet narrow enough so that an emerging trend may be observed.[100]

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.

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

Figure 27:
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.[101] 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

[101] *Id.*

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

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

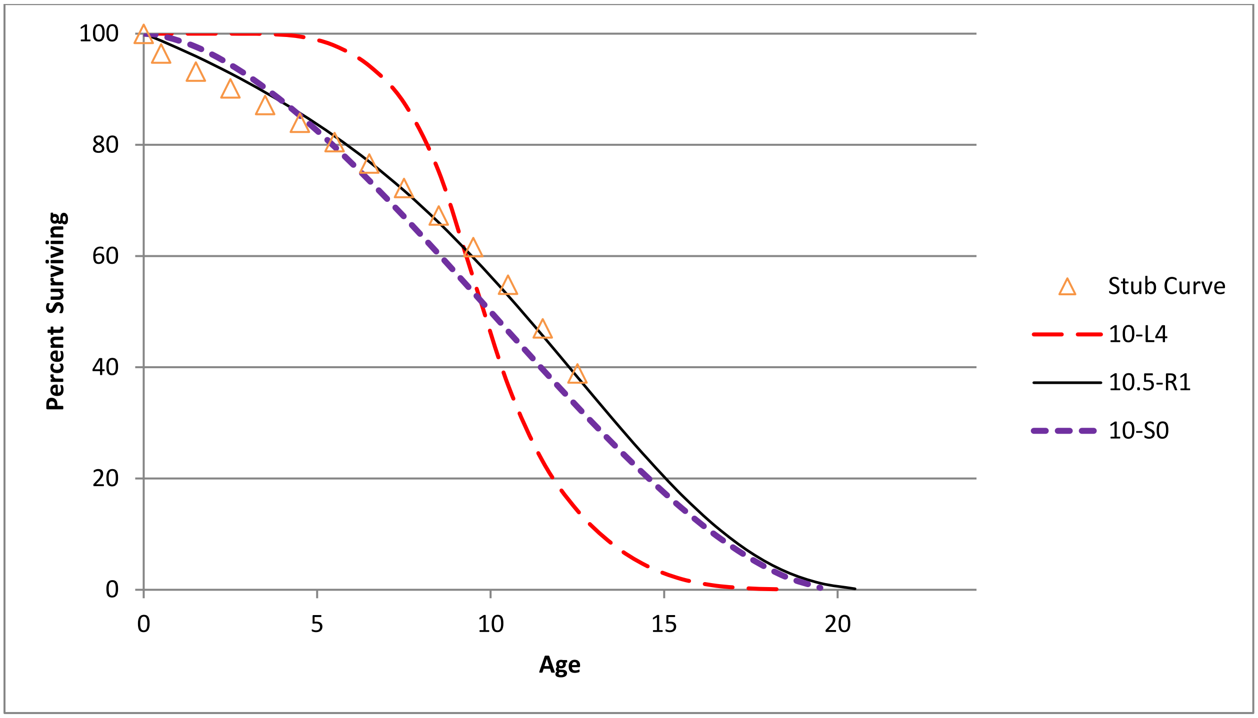
Curve Fitting

Depreciation analysts typically use the survivor curve rather than the frequency curve to fit the observed stub curves. The most commonly used generalized survivor curves in the curve fitting process are the Iowa curves discussed above. As Wolf notes, if "the Iowa curves are adopted as a model, an underlying assumption is that the process describing the retirement pattern is one of the 22 [or more] processes described by the Iowa curves."[102]

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.

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

Figure 28:
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.[103]

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."[104]

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

---

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

[104] *Id*. at 48.

Figure 29:
Mathematical Fitting

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

101 Park Avenue, Suite 1125
Oklahoma City, OK 73102

DAVID J. GARRETT

405.249.1050
dgarrett@resolveuc.com

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 Accrual Adjustment

Division / Function	Plant 12/31/2018	SCE Proposal Rate	SCE Proposal Accrual	TURN Proposal Rate	TURN Proposal Accrual	TURN Adjustment Rate	TURN Adjustment Adjustment
Transmission	13,430,553,242	2.74%	368,029,209	2.55%	342,137,448	-0.19%	(25,891,762)
Distribution	24,887,406,063	4.43%	1,103,458,116	3.68%	916,257,165	-0.75%	(187,200,951)
General	1,079,844,132	1.82%	19,616,455	1.82%	19,616,455	0.00%	-
Total Plant Studied	$ 39,397,803,437	3.78%	$ 1,491,103,781	3.24%	$ 1,278,011,068	-0.54%	**$ (213,092,713)**

Division / Function	CPUC Plant 1/1/2019	Current Parameters Rate	Current Parameters Accrual	SCE Proposal Rate	SCE Proposal Accrual	TURN Proposal Rate	TURN Proposal Accrual	TURN Proposed Change from Current Parameters Rate	TURN Proposed Change from Current Parameters Accrual	TURN Proposed Adjustment to SCE Proposal Rate	TURN Proposed Adjustment to SCE Proposal Accrual
Transmission	4,896,103,082	2.54%	124,294,566	2.72%	133,113,894	2.59%	126,959,826	0.05%	2,665,261	-0.13%	(6,154,067)
Distribution	24,887,406,063	3.72%	925,610,750	4.43%	1,103,030,433	3.68%	916,257,165	-0.04%	(9,353,585)	-0.75%	(186,773,268)
General	1,079,844,132	2.08%	22,460,758	1.82%	19,653,163	1.82%	19,616,455	-0.26%	(2,844,303)	0.00%	(36,708)
Total Plant Studied	$ 30,863,353,278	3.47%	$ 1,072,366,074	4.07%	$ 1,255,797,490	3.44%	$ 1,062,833,447	-0.03%	**$ (9,532,627)**	-0.63%	**$ (192,964,043)**

Depreciation Parameter Comparison

		[1]			[2]			[3]		
		Current Parameters			**SCE Proposal**			**TURN Proposal**		
		Net	**Iowa Curve**		**Net**	**Iowa Curve**		**Net**	**Iowa Curve**	
Account No.	**Description**	**Salvage**	**Type**	**AL**	**Salvage**	**Type**	**AL**	**Salvage**	**Type**	**AL**
	TRANSMISSION									
352.00	Structures and Improvements	-35%	L1 -	55	-35%	L1 -	55	-35%	L0.5 -	58
353.00	Station Equipment	-15%	R0.5 -	45	-15%	L0.5 -	45	-15%	L0.5 -	45
354.00	Towers and Fixtures	-60%	R5 -	65	-80%	R5 -	65	-65%	R5 -	69
355.00	Poles and Fixtures	-72%	SC -	65	-90%	SC -	65	-77%	SC -	65
356.00	Overhead Conductors & Devices	-80%	R3 -	61	-100%	R3 -	61	-85%	R3 -	65
357.00	Underground Conduit	0%	R3 -	55	0%	R3 -	55	0%	R3 -	55
358.00	Underground Conductors & Devices	-15%	S1 -	45	-30%	S1 -	45	-19%	S1 -	45
359.00	Roads and Trails	0%	R5 -	60	0%	R5 -	60	0%	R5 -	60
	DISTRIBUTION									
361.00	Structures and Improvements	-25%	L0.5 -	50	-40%	L0.5 -	55	-29%	L0 -	58
362.00	Station Equipment	-25%	L0.5 -	65	-40%	S0.5 -	65	-29%	L0 -	67
364.00	Poles, Towers and Fixtures	-210%	R1 -	55	-210%	R1 -	55	-210%	R1 -	55
365.00	Overhead Conductors & Devices	-115%	R0.5 -	55	-190%	R0.5 -	55	-134%	R0.5 -	55
366.00	Underground Conduit	-30%	R3 -	59	-80%	R3 -	59	-43%	R2.5 -	64
367.00	Underground Conductors & Devices	-60%	R1.5 -	43	-100%	L1 -	47	-70%	L1 -	47
368.00	Line Transformers	-20%	S1.5 -	33	-50%	S1.5 -	33	-28%	S1.5 -	33
369.00	Services	-100%	R1.5 -	55	-100%	R1.5 -	55	-100%	R1.5 -	60
370.00	Meters	-5%	R3 -	20	-5%	R3 -	20	-5%	R3 -	30
371.00	Installations on Customer Premises	-100%	R1.5 -	55	-100%	R1.5 -	55	-100%	R1.5 -	55
373.00	Street Lighting & Signal Systems	-30%	L1 -	48	-50%	L0.5 -	50	-35%	L0.5 -	50
	GENERAL									
390.00	Structures and Improvements	-10%	R0.5 -	45	-10%	SC -	50	-10%	SC -	50

[1], [2] See Table I-2 on p. 3 of SCE-07, Vol. 3: Depreciation Study

[3] See Exhibit DJG-5

Detailed Rate Comparison

		[1]	[2]		[3]		[4]	
			SCE Proposal		TURN Proposal		TURN Adjustment	
Account No.	Description	Plant 12/31/2018	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	Transmission Plant							
352.00	Structures and Improvements	983,751,074	2.42%	23,803,194	2.25%	22,127,118	-0.17%	-1,676,077
353.00	Station Equipment	6,071,410,213	2.59%	157,378,124	2.59%	157,356,672	0.00%	-21,452
354.00	Towers and Fixtures	2,355,779,001	2.89%	68,094,029	2.43%	57,301,198	-0.46%	-10,792,831
355.00	Poles and Fixtures	1,500,195,881	2.96%	44,392,160	2.74%	41,065,568	-0.22%	-3,326,593
356.00	Overhead Conductors & Devices	1,653,093,431	3.31%	54,719,036	2.78%	45,885,439	-0.53%	-8,833,597
357.00	Underground Conduit	271,487,039	1.83%	4,961,657	1.82%	4,929,684	-0.01%	-31,972
358.00	Underground Conductors & Devices	399,339,545	2.87%	11,462,133	2.57%	10,252,893	-0.30%	-1,209,240
359.00	Roads and Trails	195,497,058	1.65%	3,218,876	1.65%	3,218,876	0.00%	0
	TOTAL TRANSMISSION PLANT	13,430,553,242	2.74%	368,029,209	2.55%	342,137,448	-0.19%	-25,891,762
	Distribution Plant							
361.00	Structures and Improvements	696,487,874	2.38%	16,597,850	1.96%	13,680,095	-0.42%	-2,917,755
362.00	Station Equipment	2,726,408,043	2.15%	58,531,405	1.86%	50,664,060	-0.29%	-7,867,345
364.00	Poles, Towers and Fixtures	3,147,641,758	5.99%	188,697,400	5.99%	188,693,770	0.00%	-3,629
365.00	Overhead Conductors & Devices	1,842,492,281	5.64%	103,920,093	4.42%	81,475,878	-1.22%	-22,444,215
366.00	Underground Conduit	2,389,265,472	3.43%	81,841,230	2.33%	55,725,696	-1.10%	-26,115,534
367.00	Underground Conductors & Devices	6,486,079,350	4.30%	278,959,558	3.51%	227,885,844	-0.79%	-51,073,714
368.00	Line Transformers	4,218,947,448	5.66%	238,822,045	4.69%	197,751,956	-0.97%	-41,070,090
369.00	Services	1,494,348,468	3.32%	49,623,246	2.97%	44,414,428	-0.35%	-5,208,817
370.00	Meters	1,011,251,062	5.81%	58,728,186	3.12%	31,513,194	-2.69%	-27,214,992
371.00	Installations on Customer Premises	12,372,731	3.61%	447,167	3.61%	447,167	0.00%	0
373.00	Street Lighting & Signal Systems	862,111,578	3.17%	27,289,936	2.78%	24,005,076	-0.39%	-3,284,859
	TOTAL DISTRIBUTION PLANT	24,887,406,063	4.43%	1,103,458,116	3.68%	916,257,165	-0.75%	-187,200,951
	General Plant							
390.00	Structures and Improvements	1,079,844,132	1.82%	19,616,455	1.82%	19,616,455	0.00%	0
	TOTAL GENERAL PLANT	1,079,844,132	1.82%	19,616,455	1.82%	19,616,455	0.00%	0
	TOTAL PLANT STUDIED	**39,397,803,437**	**3.78%**	**1,491,103,781**	**3.24%**	**1,278,011,068**	**-0.54%**	**-213,092,713**

[1], [2] Depreciation Study
[3] From Exhibit DJG-5
[4] = [3] - [2]

Depreciation Rate Development

Account No.	Description	[1] Original Cost	[2] Iowa Curve Type	AL	[3] Net Salvage	[4] Depreciable Base	[5] Book Reserve	[6] Future Accruals	[7] Remaining Life	[8] Service Life Accrual	[9] Rate	[10] Net Salvage Accrual	[11] Rate	[12] Total Accrual	[13] Rate
	Transmission Plant														
352.00	Structures and Improvements	983,751,074	L0.5	58	-35%	1,328,063,949	176,347,464	1,151,716,485	52.05	15,512,077	1.58%	6,615,041	0.67%	22,127,118	**2.25%**
353.00	Station Equipment	6,071,410,213	L0.5	45	-15%	6,982,121,745	1,064,911,784	5,917,209,961	37.60	133,138,073	2.19%	24,218,599	0.40%	157,356,672	**2.59%**
354.00	Towers and Fixtures	2,355,779,001	R5	69	-65%	3,887,035,352	610,552,823	3,276,482,529	57.18	30,521,619	1.30%	26,779,579	1.14%	57,301,198	**2.43%**
355.00	Poles and Fixtures	1,500,195,881	SC	65	-77%	2,647,845,730	161,027,531	2,486,818,199	60.56	22,114,085	1.47%	18,951,483	1.26%	41,065,568	**2.74%**
356.00	Overhead Conductors & Devices	1,653,093,431	R3	65	-85%	3,058,222,847	689,157,643	2,369,065,205	51.63	18,670,071	1.13%	27,215,367	1.65%	45,885,439	**2.78%**
357.00	Underground Conduit	271,487,039	R3	55	0%	271,487,039	28,187,937	243,299,102	49.35	4,929,684	1.82%	0	0.00%	4,929,684	**1.82%**
358.00	Underground Conductors & Devices	399,339,545	S1	45	-19%	474,215,710	104,277,681	369,938,028	36.08	8,177,688	2.05%	2,075,205	0.52%	10,252,893	**2.57%**
359.00	Roads and Trails	195,497,058	R5	60	0%	195,497,058	27,090,022	168,407,036	52.32	3,218,876	1.65%	0	0.00%	3,218,876	**1.65%**
	TOTAL TRANSMISSION PLANT	13,430,553,242			-40.3%	18,844,489,430	2,861,552,886	15,982,936,544	46.71	236,282,173	1.76%	105,855,275	0.79%	342,137,448	**2.55%**
	Distribution Plant														
361.00	Structures and Improvements	696,487,874	L0	58	-29%	896,728,138	208,345,762	688,382,376	50.32	9,700,757	1.39%	3,979,338	0.57%	13,680,095	**1.96%**
362.00	Station Equipment	2,726,408,043	L0	67	-29%	3,510,250,355	500,805,213	3,009,445,142	59.40	37,468,061	1.37%	13,195,999	0.48%	50,664,060	**1.86%**
364.00	Poles, Towers and Fixtures	3,147,641,758	R1	55	-210%	9,757,689,449	801,444,216	8,956,245,233	47.46	49,430,632	1.57%	139,263,138	4.42%	188,693,770	**5.99%**
365.00	Overhead Conductors & Devices	1,842,492,281	R0.5	55	-134%	4,306,825,706	540,698,307	3,766,127,399	46.22	28,162,830	1.53%	53,313,048	2.89%	81,475,878	**4.42%**
366.00	Underground Conduit	2,389,265,472	R2.5	64	-43%	3,404,703,297	530,371,881	2,874,331,416	51.58	36,039,038	1.51%	19,686,658	0.82%	55,725,696	**2.33%**
367.00	Underground Conductors & Devices	6,486,079,350	L1	47	-70%	11,026,334,895	2,339,532,122	8,686,802,773	38.12	108,778,735	1.68%	119,107,109	1.84%	227,885,844	**3.51%**
368.00	Line Transformers	4,218,947,448	S1.5	33	-28%	5,379,157,996	815,452,987	4,563,705,008	23.08	147,478,350	3.50%	50,273,605	1.19%	197,751,956	**4.69%**
369.00	Services	1,494,348,468	R1.5	60	-100%	2,988,696,936	928,311,600	2,060,385,335	46.39	12,201,700	0.82%	32,212,728	2.16%	44,414,428	**2.97%**
370.00	Meters	1,011,251,062	R3	30	-5%	1,061,813,615	419,889,854	641,923,761	20.37	29,030,987	2.87%	2,482,207	0.25%	31,513,194	**3.12%**
371.00	Installations on Customer Premises	12,372,731	R1.5	55	-100%	24,745,462	151,267	24,594,196	55.00	222,208	1.80%	224,959	1.82%	447,167	**3.61%**
373.00	Street Lighting & Signal Systems	862,111,578	L0.5	50	-35%	1,163,850,630	195,899,406	967,951,224	40.32	16,521,983	1.92%	7,483,093	0.87%	24,005,076	**2.78%**
	TOTAL DISTRIBUTION PLANT	24,887,406,063			-74.9%	43,520,796,479	7,280,902,616	36,239,893,863	39.55	475,035,283	1.91%	441,221,882	1.77%	916,257,165	**3.68%**
	General Plant														
390.00	Structures and Improvements	1,079,844,132	SC	50	-10%	1,187,828,546	341,264,364	846,564,182	43.16	17,114,257	1.58%	2,502,198	0.23%	19,616,455	**1.82%**
	TOTAL GENERAL PLANT	1,079,844,132			-10.0%	1,187,828,546	341,264,364	846,564,182	43.16	17,114,257	1.58%	2,502,198	0.23%	19,616,455	**1.82%**
	TOTAL PLANT STUDIED	**39,397,803,437**			**-61.3%**	**63,553,114,455**	**10,483,719,866**	**53,069,394,589**	**41.52**	**728,431,713**	**1.85%**	**549,579,355**	**1.39%**	**1,278,011,068**	**3.24%**

[1] Company depreciation study
[2] Average life and Iowa curve shape developed through actuarial analysis and professional judgment
[3] Net salvage for mass property accounts developed through statistical analysis and professional judgment
[4] = [1]*(1-[3])
[5] Company depreciation study
[6] = [4] - [5]
[7] Composite remaining life based on Iowa cuve in [2]; see remaining life exhibit for detailed calculations
[8] = ([1] - [5]) / [7]
[9] = [8] / [1]
[10] = [12] - [8]
[11] = [13] - [9]
[12] = [6] / [7]
[13] = [12] / [1]

Account 352 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE L1-55	[5] TURN L0.5-58	[6] SCE SSD	[7] TURN SSD
0.0	863,830,696	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	800,531,786	100.00%	99.95%	99.92%	0.0000	0.0000
1.5	748,060,277	99.99%	99.82%	99.69%	0.0000	0.0000
2.5	628,675,202	99.94%	99.68%	99.39%	0.0000	0.0000
3.5	520,875,339	99.91%	99.50%	99.05%	0.0000	0.0001
4.5	474,463,227	99.66%	99.29%	98.65%	0.0000	0.0001
5.5	317,273,608	99.64%	99.05%	98.21%	0.0000	0.0002
6.5	246,521,770	99.50%	98.77%	97.74%	0.0001	0.0003
7.5	186,816,447	99.35%	98.46%	97.22%	0.0001	0.0005
8.5	169,705,452	99.11%	98.09%	96.67%	0.0001	0.0006
9.5	135,135,005	98.58%	97.69%	96.08%	0.0001	0.0006
10.5	129,653,487	98.10%	97.23%	95.45%	0.0001	0.0007
11.5	101,042,921	97.62%	96.73%	94.79%	0.0001	0.0008
12.5	109,347,502	97.11%	96.18%	94.09%	0.0001	0.0009
13.5	97,623,287	96.86%	95.57%	93.36%	0.0002	0.0012
14.5	93,861,986	96.30%	94.91%	92.59%	0.0002	0.0014
15.5	91,882,274	95.67%	94.19%	91.79%	0.0002	0.0015
16.5	97,848,331	94.49%	93.43%	90.96%	0.0001	0.0012
17.5	96,974,311	93.83%	92.60%	90.10%	0.0002	0.0014
18.5	92,744,613	93.39%	91.72%	89.20%	0.0003	0.0018
19.5	94,701,681	93.04%	90.79%	88.27%	0.0005	0.0023
20.5	89,865,965	87.89%	89.81%	87.32%	0.0004	0.0000
21.5	89,014,915	87.48%	88.78%	86.33%	0.0002	0.0001
22.5	75,938,843	87.34%	87.71%	85.32%	0.0000	0.0004
23.5	72,885,440	86.99%	86.58%	84.29%	0.0000	0.0007
24.5	61,052,336	74.34%	85.42%	83.23%	0.0123	0.0079
25.5	52,660,833	74.01%	84.22%	82.15%	0.0104	0.0066
26.5	52,524,430	73.65%	82.98%	81.05%	0.0087	0.0055
27.5	51,059,273	71.82%	81.72%	79.93%	0.0098	0.0066
28.5	49,487,970	71.60%	80.42%	78.80%	0.0078	0.0052
29.5	36,738,970	71.21%	79.11%	77.65%	0.0062	0.0042
30.5	33,383,114	70.93%	77.78%	76.50%	0.0047	0.0031
31.5	34,381,328	70.46%	76.43%	75.33%	0.0036	0.0024
32.5	29,522,547	69.23%	75.08%	74.16%	0.0034	0.0024
33.5	30,588,285	68.77%	73.72%	72.99%	0.0025	0.0018
34.5	29,547,175	63.41%	72.37%	71.81%	0.0080	0.0071
35.5	29,990,817	63.23%	71.02%	70.63%	0.0061	0.0055
36.5	27,399,252	63.06%	69.66%	69.45%	0.0044	0.0041
37.5	25,753,316	62.50%	68.32%	68.28%	0.0034	0.0033
38.5	25,544,683	61.92%	66.97%	67.11%	0.0025	0.0027
39.5	22,200,186	55.17%	65.62%	65.94%	0.0109	0.0116
40.5	21,709,997	54.93%	64.28%	64.77%	0.0087	0.0097
41.5	21,354,335	54.88%	62.95%	63.61%	0.0065	0.0076
42.5	20,913,189	54.49%	61.62%	62.45%	0.0051	0.0063
43.5	17,114,798	54.16%	60.29%	61.29%	0.0038	0.0051
44.5	16,296,643	53.97%	58.98%	60.14%	0.0025	0.0038
45.5	16,264,268	53.60%	57.66%	59.00%	0.0017	0.0029
46.5	14,907,232	52.94%	56.36%	57.85%	0.0012	0.0024
47.5	11,029,504	52.30%	55.06%	56.72%	0.0008	0.0020
48.5	9,901,825	51.74%	53.78%	55.59%	0.0004	0.0015
49.5	8,414,913	51.45%	52.50%	54.47%	0.0001	0.0009
50.5	7,028,010	50.86%	51.23%	53.35%	0.0000	0.0006
51.5	5,131,686	50.35%	49.97%	52.24%	0.0000	0.0004
52.5	4,295,237	49.79%	48.72%	51.14%	0.0001	0.0002
53.5	4,449,398	49.37%	47.48%	50.05%	0.0004	0.0000
54.5	4,613,585	49.16%	46.26%	48.96%	0.0008	0.0000
55.5	4,265,574	48.87%	45.05%	47.89%	0.0015	0.0001
56.5	4,038,561	48.77%	43.84%	46.82%	0.0024	0.0004
57.5	3,839,119	47.74%	42.66%	45.76%	0.0026	0.0004
58.5	3,709,151	47.17%	41.48%	44.71%	0.0032	0.0006
59.5	3,479,325	45.98%	40.32%	43.67%	0.0032	0.0005
60.5	3,030,957	45.05%	39.17%	42.64%	0.0035	0.0006
61.5	2,372,608	43.06%	38.04%	41.62%	0.0025	0.0002
62.5	2,234,141	42.82%	36.92%	40.61%	0.0035	0.0005
63.5	2,144,701	42.55%	35.82%	39.62%	0.0045	0.0009

Account 352 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE L1-55	[5] TURN L0.5-58	[6] SCE SSD	[7] TURN SSD
64.5	2,506,253	42.39%	34.74%	38.63%	0.0059	0.0014
65.5	2,474,000	42.33%	33.67%	37.66%	0.0075	0.0022
66.5	2,011,343	42.20%	32.61%	36.69%	0.0092	0.0030
67.5	1,828,998	41.13%	31.58%	35.74%	0.0091	0.0029
68.5	1,639,570	40.97%	30.55%	34.81%	0.0108	0.0038
69.5	1,624,290	40.94%	29.55%	33.88%	0.0130	0.0050
70.5	1,350,564	40.89%	28.57%	32.97%	0.0152	0.0063
71.5	1,181,604	40.82%	27.60%	32.06%	0.0175	0.0077
72.5	991,638	40.71%	26.65%	31.18%	0.0198	0.0091
73.5	1,015,972	40.41%	25.72%	30.30%	0.0216	0.0102
74.5	1,382,093	40.32%	24.80%	29.44%	0.0241	0.0118
75.5	1,396,894	40.14%	23.91%	28.59%	0.0264	0.0133
76.5	1,394,948	40.00%	23.03%	27.76%	0.0288	0.0150
77.5	1,355,417	39.76%	22.17%	26.94%	0.0309	0.0164
78.5	1,373,480	39.73%	21.33%	26.13%	0.0339	0.0185
79.5	1,301,136	39.43%	20.51%	25.34%	0.0358	0.0198
80.5	1,285,959	39.43%	19.71%	24.56%	0.0389	0.0221
81.5	790,297	39.18%	18.92%	23.80%	0.0410	0.0237
82.5	783,546	38.99%	18.16%	23.05%	0.0434	0.0254
83.5	778,637	38.74%	17.41%	22.31%	0.0455	0.0270
84.5	779,373	38.74%	16.69%	21.59%	0.0486	0.0294
85.5	778,520	38.74%	15.98%	20.88%	0.0518	0.0319
86.5	778,752	38.74%	15.29%	20.19%	0.0550	0.0344
87.5	1,555,796	38.73%	14.62%	19.51%	0.0581	0.0369
88.5	1,551,097	38.72%	13.97%	18.84%	0.0613	0.0395
89.5	1,548,452	38.72%	13.34%	18.19%	0.0644	0.0421
90.5	1,512,314	38.72%	12.73%	17.56%	0.0676	0.0448
91.5	978,005	34.45%	12.13%	16.94%	0.0498	0.0307
92.5	963,989	34.45%	11.55%	16.33%	0.0524	0.0328
93.5	961,102	34.45%	11.00%	15.74%	0.0550	0.0350
94.5	936,832	34.38%	10.46%	15.16%	0.0572	0.0369
95.5	917,505	34.38%	9.93%	14.60%	0.0597	0.0391
96.5	639,778	34.38%	9.43%	14.05%	0.0622	0.0413
97.5	636,964	34.38%	8.94%	13.51%	0.0647	0.0435
98.5	629,881	34.38%	8.47%	12.99%	0.0671	0.0457
99.5	625,765	34.38%	8.02%	12.48%	0.0695	0.0479
100.5	624,141	34.30%	7.58%	11.99%	0.0714	0.0498
101.5	618,066	34.02%	7.16%	11.51%	0.0721	0.0507
102.5	617,915	34.02%	6.76%	11.04%	0.0743	0.0528
103.5	611,354	33.70%	6.37%	10.59%	0.0747	0.0534
104.5			6.00%	10.15%		
Sum of Squared Differences				[8]	1.8815	1.2079
Up to 1% of Beginning Exposures				[9]	0.1381	0.1381

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 354 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R5-65	[5] TURN R5-69	[6] SCE SSD	[7] TURN SSD
0.0	1,941,625,861	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	1,943,173,798	100.00%	100.00%	100.00%	0.0000	0.0000
1.5	1,842,764,547	100.00%	100.00%	100.00%	0.0000	0.0000
2.5	1,861,069,340	100.00%	100.00%	100.00%	0.0000	0.0000
3.5	1,489,545,183	100.00%	100.00%	100.00%	0.0000	0.0000
4.5	1,053,943,340	99.95%	100.00%	100.00%	0.0000	0.0000
5.5	406,393,686	99.93%	100.00%	100.00%	0.0000	0.0000
6.5	273,132,795	99.93%	100.00%	100.00%	0.0000	0.0000
7.5	245,948,188	99.93%	100.00%	100.00%	0.0000	0.0000
8.5	241,459,740	99.93%	100.00%	100.00%	0.0000	0.0000
9.5	45,639,743	99.93%	100.00%	100.00%	0.0000	0.0000
10.5	47,657,837	99.93%	100.00%	100.00%	0.0000	0.0000
11.5	47,314,609	99.93%	100.00%	100.00%	0.0000	0.0000
12.5	97,968,189	99.93%	100.00%	100.00%	0.0000	0.0000
13.5	110,556,861	99.93%	100.00%	100.00%	0.0000	0.0000
14.5	113,766,521	99.93%	100.00%	100.00%	0.0000	0.0000
15.5	111,785,631	99.93%	100.00%	100.00%	0.0000	0.0000
16.5	124,782,273	99.93%	100.00%	100.00%	0.0000	0.0000
17.5	137,344,603	99.93%	100.00%	100.00%	0.0000	0.0000
18.5	140,117,702	99.93%	100.00%	100.00%	0.0000	0.0000
19.5	180,726,823	99.89%	100.00%	100.00%	0.0000	0.0000
20.5	178,974,403	99.89%	100.00%	100.00%	0.0000	0.0000
21.5	186,978,307	99.89%	100.00%	100.00%	0.0000	0.0000
22.5	189,051,899	99.89%	100.00%	100.00%	0.0000	0.0000
23.5	199,198,730	99.89%	100.00%	100.00%	0.0000	0.0000
24.5	190,919,871	99.89%	100.00%	100.00%	0.0000	0.0000
25.5	192,833,743	99.85%	100.00%	100.00%	0.0000	0.0000
26.5	196,703,512	99.80%	100.00%	100.00%	0.0000	0.0000
27.5	209,064,917	99.70%	100.00%	100.00%	0.0000	0.0000
28.5	223,741,414	99.69%	99.99%	100.00%	0.0000	0.0000
29.5	175,628,254	99.63%	99.99%	100.00%	0.0000	0.0000
30.5	177,498,927	99.60%	99.98%	99.99%	0.0000	0.0000
31.5	208,494,752	99.58%	99.97%	99.99%	0.0000	0.0000
32.5	237,323,036	99.56%	99.95%	99.98%	0.0000	0.0000
33.5	242,893,818	99.56%	99.92%	99.97%	0.0000	0.0000
34.5	245,198,014	99.51%	99.89%	99.95%	0.0000	0.0000
35.5	247,373,673	99.51%	99.84%	99.93%	0.0000	0.0000
36.5	207,324,125	99.20%	99.77%	99.89%	0.0000	0.0000
37.5	208,006,223	99.16%	99.68%	99.85%	0.0000	0.0000
38.5	201,998,734	98.98%	99.56%	99.78%	0.0000	0.0001
39.5	197,219,872	98.76%	99.41%	99.71%	0.0000	0.0001
40.5	187,146,666	98.70%	99.23%	99.60%	0.0000	0.0001
41.5	190,503,945	98.64%	99.00%	99.48%	0.0000	0.0001
42.5	189,846,273	98.61%	98.73%	99.32%	0.0000	0.0001
43.5	186,640,522	98.26%	98.40%	99.13%	0.0000	0.0001
44.5	171,138,106	98.24%	98.00%	98.89%	0.0000	0.0000
45.5	155,505,690	98.21%	97.54%	98.61%	0.0000	0.0000
46.5	152,805,810	98.18%	96.98%	98.28%	0.0001	0.0000
47.5	133,321,830	98.02%	96.34%	97.89%	0.0003	0.0000
48.5	96,942,613	97.88%	95.60%	97.43%	0.0005	0.0000
49.5	65,795,652	97.79%	94.73%	96.90%	0.0009	0.0001
50.5	44,634,279	97.67%	93.73%	96.29%	0.0015	0.0002
51.5	31,233,046	97.60%	92.58%	95.58%	0.0025	0.0004
52.5	26,320,122	97.44%	91.25%	94.77%	0.0038	0.0007
53.5	24,928,282	96.98%	89.73%	93.84%	0.0053	0.0010
54.5	23,882,807	96.26%	88.00%	92.78%	0.0068	0.0012
55.5	17,968,833	95.07%	86.03%	91.56%	0.0082	0.0012
56.5	17,950,263	94.77%	83.81%	90.18%	0.0120	0.0021
57.5	16,406,540	94.64%	81.31%	88.60%	0.0178	0.0036
58.5	12,751,970	94.54%	78.54%	86.83%	0.0256	0.0059
59.5	10,629,283	94.22%	75.45%	84.84%	0.0352	0.0088
60.5	10,064,001	93.91%	72.09%	82.61%	0.0476	0.0128
61.5	9,683,591	93.78%	68.41%	80.14%	0.0643	0.0186
62.5	16,694,854	93.72%	64.48%	77.40%	0.0855	0.0266
63.5	15,708,512	90.73%	60.29%	74.42%	0.0927	0.0266

Account 354 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R5-65	[5] TURN R5-69	[6] SCE SSD	[7] TURN SSD
64.5	15,283,244	90.52%	55.88%	71.15%	0.1200	0.0375
65.5	13,957,734	90.03%	51.30%	67.65%	0.1500	0.0501
66.5	13,381,437	89.94%	46.60%	63.89%	0.1878	0.0679
67.5	11,638,680	89.82%	41.85%	59.92%	0.2301	0.0894
68.5	10,551,009	89.71%	37.10%	55.75%	0.2768	0.1153
69.5	10,513,609	89.64%	32.43%	51.44%	0.3273	0.1459
70.5	10,401,609	89.09%	27.93%	47.02%	0.3740	0.1770
71.5	10,597,684	89.02%	23.64%	42.54%	0.4275	0.2161
72.5	10,665,014	88.57%	19.68%	38.05%	0.4746	0.2552
73.5	11,026,404	87.89%	16.04%	33.64%	0.5162	0.2943
74.5	12,701,901	87.82%	12.84%	29.33%	0.5622	0.3421
75.5	12,691,285	87.63%	10.04%	25.23%	0.6020	0.3893
76.5	12,541,337	87.59%	7.70%	21.36%	0.6382	0.4387
77.5	11,503,244	87.46%	5.78%	17.79%	0.6672	0.4853
78.5	11,728,301	87.46%	4.25%	14.56%	0.6924	0.5315
79.5	3,702,449	87.44%	3.07%	11.69%	0.7119	0.5737
80.5	3,701,814	87.44%	2.16%	9.22%	0.7273	0.6118
81.5	3,701,814	87.44%	1.47%	7.12%	0.7391	0.6451
82.5	3,697,805	87.44%	0.94%	5.42%	0.7482	0.6727
83.5	4,279,767	87.44%	0.56%	4.03%	0.7548	0.6957
84.5	4,342,350	87.44%	0.29%	2.96%	0.7594	0.7136
85.5	4,342,004	87.44%	0.14%	2.12%	0.7622	0.7279
86.5	4,102,719	83.36%	0.05%	1.48%	0.6941	0.6705
87.5	4,471,996	83.35%	0.01%	0.98%	0.6945	0.6785
88.5	5,202,963	83.35%	0.00%	0.60%	0.6946	0.6846
89.5	5,049,054	83.35%	0.00%	0.34%	0.6946	0.6890
90.5	3,930,848	83.33%	0.00%	0.17%	0.6944	0.6916
91.5	2,432,307	83.32%	0.00%	0.07%	0.6941	0.6930
92.5	2,401,111	83.32%	0.00%	0.02%	0.6941	0.6938
93.5	2,352,428	83.27%	0.00%	0.00%	0.6934	0.6934
94.5	2,188,963	83.27%	0.00%	0.00%	0.6934	0.6934
95.5	1,962,179	83.27%	0.00%	0.00%	0.6934	0.6934
96.5	1,897,558	80.53%	0.00%	0.00%	0.6485	0.6485
97.5	1,897,558	80.53%	0.00%	0.00%	0.6485	0.6485
98.5	1,897,558	80.53%	0.00%	0.00%	0.6485	0.6485
99.5	1,897,558	80.53%	0.00%	0.00%	0.6485	0.6485
100.5	1,375,963	80.38%	0.00%	0.00%	0.6460	0.6460
101.5	1,219,256	75.07%	0.00%	0.00%	0.5636	0.5636
102.5	1,219,256	75.07%	0.00%	0.00%	0.5636	0.5636
103.5	1,219,256	75.07%	0.00%	0.00%	0.5636	0.5636
104.5	844,604	75.07%	0.00%	0.00%	0.5636	0.5636
105.5			0.00%	0.00%		
Sum of Squared Differences				[8]	24.2953	20.7625
Up to 1% of Beginning Exposures				[9]	0.0222	0.0044

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 356 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R3-61	[5] TURN R3-65	[6] SCE SSD	[7] TURN SSD
0.0	1,215,260,307	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	1,129,641,086	99.60%	99.99%	99.99%	0.0000	0.0000
1.5	1,060,347,853	99.52%	99.96%	99.96%	0.0000	0.0000
2.5	1,055,357,625	99.43%	99.93%	99.93%	0.0000	0.0000
3.5	850,699,845	99.28%	99.89%	99.90%	0.0000	0.0000
4.5	703,893,203	98.77%	99.85%	99.86%	0.0001	0.0001
5.5	298,415,296	98.66%	99.80%	99.82%	0.0001	0.0001
6.5	216,221,639	98.47%	99.75%	99.77%	0.0002	0.0002
7.5	204,694,827	98.29%	99.69%	99.72%	0.0002	0.0002
8.5	197,866,930	98.10%	99.62%	99.66%	0.0002	0.0002
9.5	120,299,847	98.05%	99.55%	99.59%	0.0002	0.0002
10.5	117,115,494	97.96%	99.46%	99.52%	0.0002	0.0002
11.5	115,496,895	97.93%	99.37%	99.44%	0.0002	0.0002
12.5	139,915,329	97.82%	99.27%	99.35%	0.0002	0.0002
13.5	125,021,037	97.80%	99.15%	99.25%	0.0002	0.0002
14.5	131,560,087	97.71%	99.02%	99.14%	0.0002	0.0002
15.5	135,614,191	97.49%	98.88%	99.02%	0.0002	0.0002
16.5	138,551,664	97.29%	98.73%	98.89%	0.0002	0.0003
17.5	141,624,735	97.19%	98.56%	98.74%	0.0002	0.0002
18.5	142,076,962	96.61%	98.38%	98.59%	0.0003	0.0004
19.5	188,281,670	96.41%	98.17%	98.41%	0.0003	0.0004
20.5	187,107,210	96.15%	97.95%	98.23%	0.0003	0.0004
21.5	187,637,632	96.02%	97.71%	98.03%	0.0003	0.0004
22.5	190,052,596	95.94%	97.45%	97.81%	0.0002	0.0004
23.5	194,454,852	95.61%	97.17%	97.57%	0.0002	0.0004
24.5	189,377,008	95.51%	96.86%	97.32%	0.0002	0.0003
25.5	186,594,397	95.46%	96.53%	97.04%	0.0001	0.0002
26.5	185,211,269	95.25%	96.18%	96.74%	0.0001	0.0002
27.5	197,672,163	95.07%	95.79%	96.43%	0.0001	0.0002
28.5	198,919,784	94.68%	95.38%	96.08%	0.0000	0.0002
29.5	167,002,975	94.59%	94.94%	95.72%	0.0000	0.0001
30.5	170,803,621	94.53%	94.47%	95.33%	0.0000	0.0001
31.5	195,211,953	94.43%	93.96%	94.91%	0.0000	0.0000
32.5	210,688,173	94.39%	93.42%	94.47%	0.0001	0.0000
33.5	222,268,228	94.32%	92.84%	93.99%	0.0002	0.0000
34.5	233,614,189	94.15%	92.22%	93.49%	0.0004	0.0000
35.5	235,746,992	94.11%	91.57%	92.95%	0.0006	0.0001
36.5	187,372,410	93.91%	90.87%	92.38%	0.0009	0.0002
37.5	189,510,996	93.86%	90.13%	91.77%	0.0014	0.0004
38.5	186,312,624	93.75%	89.34%	91.13%	0.0019	0.0007
39.5	178,274,422	93.69%	88.51%	90.45%	0.0027	0.0010
40.5	171,709,918	93.34%	87.62%	89.74%	0.0033	0.0013
41.5	175,157,902	93.26%	86.69%	88.98%	0.0043	0.0018
42.5	177,080,753	93.12%	85.70%	88.17%	0.0055	0.0024
43.5	176,187,809	92.83%	84.65%	87.33%	0.0067	0.0030
44.5	159,153,333	92.68%	83.54%	86.43%	0.0084	0.0039
45.5	149,111,479	92.57%	82.37%	85.49%	0.0104	0.0050
46.5	142,727,154	92.44%	81.13%	84.50%	0.0128	0.0063
47.5	130,528,595	92.28%	79.83%	83.45%	0.0155	0.0078
48.5	99,452,853	92.15%	78.45%	82.35%	0.0188	0.0096
49.5	77,722,344	91.96%	77.01%	81.19%	0.0224	0.0116
50.5	58,276,234	91.81%	75.48%	79.97%	0.0267	0.0140
51.5	44,227,217	91.30%	73.88%	78.69%	0.0303	0.0159
52.5	38,057,070	91.04%	72.20%	77.35%	0.0355	0.0187
53.5	34,332,673	90.64%	70.44%	75.93%	0.0408	0.0216
54.5	31,016,740	88.29%	68.60%	74.46%	0.0388	0.0191
55.5	25,852,040	87.37%	66.68%	72.91%	0.0428	0.0209
56.5	25,169,790	87.09%	64.67%	71.29%	0.0502	0.0250
57.5	22,332,515	86.60%	62.59%	69.60%	0.0576	0.0289
58.5	18,077,325	86.46%	60.44%	67.84%	0.0677	0.0346
59.5	14,184,297	86.33%	58.21%	66.01%	0.0791	0.0413
60.5	11,827,077	85.94%	55.91%	64.11%	0.0902	0.0477
61.5	10,598,160	85.84%	53.55%	62.14%	0.1042	0.0562
62.5	23,391,705	85.73%	51.14%	60.10%	0.1196	0.0657
63.5	22,771,104	85.29%	48.68%	58.00%	0.1340	0.0745

Account 356 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R3-61	[5] TURN R3-65	[6] SCE SSD	[7] TURN SSD
64.5	22,359,765	85.17%	46.19%	55.84%	0.1520	0.0860
65.5	20,443,472	81.59%	43.67%	53.63%	0.1438	0.0782
66.5	19,948,956	80.93%	41.14%	51.37%	0.1583	0.0874
67.5	18,408,553	80.54%	38.61%	49.07%	0.1759	0.0991
68.5	15,899,763	80.36%	36.08%	46.73%	0.1960	0.1131
69.5	15,799,571	79.95%	33.59%	44.37%	0.2149	0.1266
70.5	15,679,913	79.41%	31.13%	42.00%	0.2331	0.1400
71.5	15,453,019	77.61%	28.72%	39.62%	0.2391	0.1444
72.5	15,476,619	77.23%	26.38%	37.25%	0.2586	0.1599
73.5	15,457,270	77.02%	24.11%	34.89%	0.2799	0.1775
74.5	17,780,234	76.94%	21.93%	32.56%	0.3026	0.1970
75.5	17,731,923	76.84%	19.85%	30.27%	0.3248	0.2169
76.5	17,672,577	76.78%	17.87%	28.03%	0.3470	0.2377
77.5	16,326,368	76.76%	16.00%	25.85%	0.3692	0.2592
78.5	16,697,179	76.72%	14.25%	23.74%	0.3903	0.2807
79.5	3,679,658	76.70%	12.61%	21.70%	0.4107	0.3024
80.5	3,679,658	76.70%	11.09%	19.75%	0.4304	0.3243
81.5	3,679,658	76.70%	9.70%	17.90%	0.4489	0.3457
82.5	3,673,478	76.68%	8.42%	16.14%	0.4660	0.3666
83.5	4,113,017	72.23%	7.25%	14.48%	0.4223	0.3335
84.5	4,249,581	72.23%	6.20%	12.92%	0.4361	0.3518
85.5	4,249,581	72.23%	5.25%	11.48%	0.4488	0.3691
86.5	4,035,515	68.95%	4.40%	10.13%	0.4167	0.3460
87.5	4,662,284	68.95%	3.64%	8.90%	0.4265	0.3607
88.5	5,566,204	68.88%	2.98%	7.76%	0.4343	0.3736
89.5	5,464,776	68.88%	2.40%	6.72%	0.4419	0.3864
90.5	4,803,595	68.87%	1.90%	5.77%	0.4485	0.3981
91.5	2,660,201	68.84%	1.47%	4.92%	0.4539	0.4086
92.5	2,306,153	59.68%	1.11%	4.16%	0.3430	0.3083
93.5	2,268,829	59.68%	0.81%	3.47%	0.3465	0.3159
94.5	2,268,829	59.68%	0.57%	2.87%	0.3493	0.3228
95.5	2,102,274	59.68%	0.39%	2.33%	0.3515	0.3289
96.5	2,007,632	56.99%	0.25%	1.87%	0.3220	0.3038
97.5	2,007,632	56.99%	0.15%	1.47%	0.3231	0.3083
98.5	2,007,632	56.99%	0.08%	1.13%	0.3239	0.3120
99.5	2,007,632	56.99%	0.03%	0.85%	0.3244	0.3152
100.5	1,449,222	56.99%	0.01%	0.62%	0.3247	0.3178
101.5	1,198,596	52.62%	0.00%	0.43%	0.2768	0.2723
102.5	1,194,169	52.42%	0.00%	0.29%	0.2748	0.2718
103.5	1,194,169	52.42%	0.00%	0.18%	0.2748	0.2729
104.5	917,754	52.42%	0.00%	0.10%	0.2748	0.2737
105.5			0.00%	0.05%		
Sum of Squared Differences				[8]	14.6190	11.5403
Up to 1% of Beginning Exposures				[9]	4.8243	2.9499

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 361 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE L0.5-55	[5] TURN L0-58	[6] SCE SSD	[7] TURN SSD
0.0	503,808,433	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	472,215,723	99.98%	99.91%	99.89%	0.0000	0.0000
1.5	449,401,933	99.95%	99.67%	99.54%	0.0000	0.0000
2.5	421,266,046	99.72%	99.35%	99.09%	0.0000	0.0000
3.5	366,354,562	99.53%	98.97%	98.56%	0.0000	0.0001
4.5	293,596,155	99.40%	98.55%	97.96%	0.0001	0.0002
5.5	254,121,403	99.29%	98.08%	97.30%	0.0001	0.0004
6.5	245,926,194	99.15%	97.56%	96.60%	0.0003	0.0006
7.5	216,315,710	98.89%	97.00%	95.86%	0.0004	0.0009
8.5	198,038,691	98.48%	96.40%	95.08%	0.0004	0.0012
9.5	147,047,373	97.93%	95.76%	94.26%	0.0005	0.0013
10.5	133,620,859	97.39%	95.08%	93.42%	0.0005	0.0016
11.5	138,797,434	96.74%	94.36%	92.54%	0.0006	0.0018
12.5	141,178,941	94.23%	93.60%	91.64%	0.0000	0.0007
13.5	132,126,741	93.41%	92.80%	90.72%	0.0000	0.0007
14.5	186,963,156	92.35%	91.96%	89.78%	0.0000	0.0007
15.5	179,512,838	91.22%	91.09%	88.82%	0.0000	0.0006
16.5	173,701,540	89.95%	90.18%	87.84%	0.0000	0.0004
17.5	171,737,957	88.50%	89.24%	86.84%	0.0001	0.0003
18.5	172,095,087	87.29%	88.26%	85.83%	0.0001	0.0002
19.5	165,967,747	85.89%	87.25%	84.81%	0.0002	0.0001
20.5	170,098,749	84.41%	86.21%	83.78%	0.0003	0.0000
21.5	169,000,424	83.38%	85.15%	82.74%	0.0003	0.0000
22.5	164,033,604	82.37%	84.05%	81.69%	0.0003	0.0000
23.5	151,009,393	79.17%	82.93%	80.63%	0.0014	0.0002
24.5	145,512,950	77.05%	81.78%	79.57%	0.0022	0.0006
25.5	136,756,821	75.75%	80.61%	78.50%	0.0024	0.0008
26.5	135,966,166	74.12%	79.43%	77.43%	0.0028	0.0011
27.5	127,434,052	72.68%	78.23%	76.35%	0.0031	0.0013
28.5	114,938,494	71.78%	77.01%	75.28%	0.0027	0.0012
29.5	108,878,888	71.06%	75.79%	74.20%	0.0022	0.0010
30.5	106,406,917	69.14%	74.56%	73.12%	0.0029	0.0016
31.5	60,849,929	68.56%	73.32%	72.05%	0.0023	0.0012
32.5	55,078,784	67.03%	72.08%	70.97%	0.0026	0.0016
33.5	54,356,967	65.17%	70.83%	69.90%	0.0032	0.0022
34.5	51,329,952	64.02%	69.59%	68.83%	0.0031	0.0023
35.5	44,289,374	63.01%	68.36%	67.76%	0.0029	0.0023
36.5	39,638,293	62.53%	67.12%	66.69%	0.0021	0.0017
37.5	31,813,113	61.35%	65.89%	65.63%	0.0021	0.0018
38.5	29,346,671	60.14%	64.65%	64.56%	0.0020	0.0020
39.5	29,033,019	59.48%	63.43%	63.50%	0.0016	0.0016
40.5	28,648,805	58.09%	62.21%	62.45%	0.0017	0.0019
41.5	26,221,863	57.26%	60.99%	61.40%	0.0014	0.0017
42.5	25,845,683	56.43%	59.78%	60.35%	0.0011	0.0015
43.5	22,836,782	55.83%	58.57%	59.30%	0.0007	0.0012
44.5	21,734,250	55.34%	57.37%	58.26%	0.0004	0.0009
45.5	19,108,762	54.35%	56.17%	57.23%	0.0003	0.0008
46.5	15,840,427	53.76%	54.99%	56.20%	0.0002	0.0006
47.5	13,873,374	53.42%	53.81%	55.17%	0.0000	0.0003
48.5	13,184,759	52.81%	52.63%	54.16%	0.0000	0.0002
49.5	12,180,277	50.62%	51.47%	53.14%	0.0001	0.0006
50.5	10,296,821	49.78%	50.31%	52.14%	0.0000	0.0006
51.5	10,071,030	49.02%	49.17%	51.14%	0.0000	0.0004
52.5	9,750,594	48.81%	48.03%	50.14%	0.0001	0.0002
53.5	9,635,760	48.48%	46.90%	49.16%	0.0002	0.0000
54.5	9,388,671	48.16%	45.79%	48.18%	0.0006	0.0000
55.5	9,052,685	47.89%	44.68%	47.21%	0.0010	0.0000
56.5	8,520,898	47.64%	43.59%	46.25%	0.0016	0.0002
57.5	7,571,264	47.34%	42.50%	45.29%	0.0023	0.0004
58.5	7,015,313	47.03%	41.43%	44.34%	0.0031	0.0007
59.5	6,121,268	46.91%	40.37%	43.40%	0.0043	0.0012
60.5	3,538,748	46.43%	39.32%	42.47%	0.0051	0.0016
61.5	3,031,192	45.91%	38.28%	41.55%	0.0058	0.0019
62.5	2,788,757	45.58%	37.26%	40.64%	0.0069	0.0024
63.5	2,578,378	45.06%	36.25%	39.74%	0.0078	0.0028
64.5	2,269,197	44.45%	35.26%	38.84%	0.0085	0.0031
65.5	2,040,659	43.34%	34.27%	37.96%	0.0082	0.0029
66.5	1,713,024	42.79%	33.30%	37.08%	0.0090	0.0033

Account 361 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE L0.5-55	[5] TURN L0-58	[6] SCE SSD	[7] TURN SSD
67.5	1,457,081	42.68%	32.35%	36.22%	0.0107	0.0042
68.5	1,038,773	42.18%	31.41%	35.36%	0.0116	0.0046
69.5	763,071	42.09%	30.48%	34.52%	0.0135	0.0057
70.5	426,161	42.09%	29.57%	33.69%	0.0157	0.0071
71.5	407,001	41.65%	28.68%	32.86%	0.0168	0.0077
72.5	459,538	41.59%	27.80%	32.05%	0.0190	0.0091
73.5	574,455	41.59%	26.93%	31.25%	0.0215	0.0107
74.5	700,402	41.50%	26.08%	30.46%	0.0238	0.0122
75.5	858,114	41.49%	25.25%	29.68%	0.0264	0.0140
76.5	893,856	41.41%	24.43%	28.91%	0.0288	0.0156
77.5	944,553	41.08%	23.62%	28.15%	0.0305	0.0167
78.5	1,044,721	40.93%	22.84%	27.41%	0.0327	0.0183
79.5	1,117,856	40.81%	22.06%	26.67%	0.0351	0.0200
80.5	1,125,310	40.72%	21.31%	25.95%	0.0377	0.0218
81.5	1,119,928	40.50%	20.57%	25.24%	0.0397	0.0233
82.5	1,057,380	40.41%	19.84%	24.54%	0.0423	0.0252
83.5	1,055,489	40.37%	19.14%	23.85%	0.0451	0.0273
84.5	1,043,726	40.03%	18.45%	23.17%	0.0466	0.0284
85.5	999,002	38.46%	17.77%	22.51%	0.0428	0.0255
86.5	975,111	38.35%	17.11%	21.85%	0.0451	0.0272
87.5	883,653	37.22%	16.47%	21.21%	0.0431	0.0256
88.5	774,993	36.64%	15.84%	20.58%	0.0433	0.0258
89.5	776,900	36.62%	15.23%	19.96%	0.0458	0.0277
90.5	674,179	36.61%	14.63%	19.36%	0.0483	0.0298
91.5	588,478	36.59%	14.05%	18.76%	0.0508	0.0318
92.5	426,700	36.50%	13.49%	18.18%	0.0530	0.0336
93.5	386,629	36.03%	12.94%	17.61%	0.0533	0.0339
94.5	326,727	36.03%	12.40%	17.05%	0.0558	0.0360
95.5	224,215	35.59%	11.89%	16.50%	0.0562	0.0364
96.5	146,137	35.59%	11.38%	15.97%	0.0586	0.0385
97.5	125,121	35.59%	10.89%	15.44%	0.0610	0.0406
98.5	121,735	35.59%	10.42%	14.93%	0.0633	0.0427
99.5	120,841	35.59%	9.96%	14.43%	0.0657	0.0448
100.5	120,841	35.59%	9.52%	13.94%	0.0680	0.0469
101.5	120,279	35.59%	9.09%	13.46%	0.0702	0.0490
102.5	120,279	35.59%	8.67%	12.99%	0.0724	0.0511
103.5	109,830	35.59%	8.27%	12.54%	0.0746	0.0531
104.5	109,092	35.59%	7.88%	12.09%	0.0768	0.0552
105.5	82,634	35.59%	7.51%	11.66%	0.0789	0.0573
106.5	51,751	35.59%	7.14%	11.23%	0.0809	0.0593
107.5	28,707	35.59%	6.80%	10.82%	0.0829	0.0613
108.5			6.46%	10.42%		
Sum of Squared Differences				[8]	2.0045	1.2730
Up to 1% of Beginning Exposures				[9]	0.0651	0.0501

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 362 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**SCE S0.5-65**	**TURN L0-67**	**SCE SSD**	**TURN SSD**
0.0	2,039,279,601	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	1,864,843,719	99.90%	99.99%	99.90%	0.0000	0.0000
1.5	1,751,137,484	99.61%	99.95%	99.62%	0.0000	0.0000
2.5	1,657,720,464	99.35%	99.89%	99.25%	0.0000	0.0000
3.5	1,504,706,849	99.01%	99.79%	98.82%	0.0001	0.0000
4.5	1,343,521,159	98.61%	99.67%	98.33%	0.0001	0.0000
5.5	1,217,401,617	98.21%	99.52%	97.79%	0.0002	0.0000
6.5	1,115,984,984	97.70%	99.34%	97.22%	0.0003	0.0000
7.5	973,731,916	97.28%	99.14%	96.61%	0.0003	0.0000
8.5	911,761,886	96.73%	98.91%	95.97%	0.0005	0.0001
9.5	827,583,372	96.06%	98.66%	95.30%	0.0007	0.0001
10.5	766,938,199	95.38%	98.38%	94.60%	0.0009	0.0001
11.5	722,226,075	94.75%	98.08%	93.88%	0.0011	0.0001
12.5	686,979,969	93.74%	97.75%	93.14%	0.0016	0.0000
13.5	653,527,032	92.60%	97.39%	92.38%	0.0023	0.0000
14.5	646,877,788	91.57%	97.01%	91.59%	0.0030	0.0000
15.5	611,604,016	90.77%	96.60%	90.80%	0.0034	0.0000
16.5	567,014,659	89.56%	96.16%	89.98%	0.0044	0.0000
17.5	541,714,163	88.73%	95.70%	89.16%	0.0049	0.0000
18.5	490,316,217	88.06%	95.21%	88.31%	0.0051	0.0000
19.5	460,939,480	87.43%	94.70%	87.46%	0.0053	0.0000
20.5	430,254,003	86.42%	94.16%	86.60%	0.0060	0.0000
21.5	414,583,711	85.40%	93.59%	85.72%	0.0067	0.0000
22.5	394,798,019	84.36%	93.00%	84.84%	0.0075	0.0000
23.5	359,334,729	83.30%	92.39%	83.94%	0.0083	0.0000
24.5	341,063,311	82.61%	91.74%	83.04%	0.0083	0.0000
25.5	307,871,883	81.69%	91.08%	82.14%	0.0088	0.0000
26.5	275,805,867	80.97%	90.39%	81.22%	0.0089	0.0000
27.5	257,245,387	80.43%	89.67%	80.31%	0.0085	0.0000
28.5	238,653,504	79.84%	88.93%	79.38%	0.0083	0.0000
29.5	219,963,649	79.21%	88.16%	78.46%	0.0080	0.0001
30.5	197,781,764	78.54%	87.38%	77.53%	0.0078	0.0001
31.5	157,685,858	77.88%	86.57%	76.60%	0.0075	0.0002
32.5	144,004,702	77.35%	85.74%	75.67%	0.0070	0.0003
33.5	139,583,329	76.81%	84.88%	74.74%	0.0065	0.0004
34.5	131,523,655	75.81%	84.00%	73.81%	0.0067	0.0004
35.5	119,832,538	74.88%	83.11%	72.87%	0.0068	0.0004
36.5	112,751,612	73.74%	82.19%	71.94%	0.0071	0.0003
37.5	111,130,826	72.37%	81.25%	71.01%	0.0079	0.0002
38.5	106,984,106	71.54%	80.29%	70.08%	0.0077	0.0002
39.5	104,940,062	70.34%	79.31%	69.16%	0.0081	0.0001
40.5	107,979,769	69.40%	78.32%	68.23%	0.0079	0.0001
41.5	109,286,689	68.08%	77.30%	67.30%	0.0085	0.0001
42.5	110,509,530	67.32%	76.27%	66.38%	0.0080	0.0001
43.5	115,546,945	66.20%	75.23%	65.46%	0.0081	0.0001
44.5	113,941,214	65.21%	74.16%	64.54%	0.0080	0.0000
45.5	110,519,757	64.34%	73.08%	63.62%	0.0077	0.0001
46.5	105,568,602	63.29%	71.99%	62.71%	0.0076	0.0000
47.5	99,426,709	62.18%	70.88%	61.80%	0.0076	0.0000
48.5	96,108,192	61.49%	69.76%	60.89%	0.0068	0.0000
49.5	90,336,830	60.30%	68.63%	59.98%	0.0069	0.0000
50.5	85,995,646	59.62%	67.48%	59.08%	0.0062	0.0000
51.5	83,399,326	58.56%	66.33%	58.18%	0.0060	0.0000
52.5	77,426,320	57.49%	65.16%	57.28%	0.0059	0.0000
53.5	69,579,419	56.53%	63.98%	56.39%	0.0055	0.0000
54.5	64,466,915	56.01%	62.80%	55.50%	0.0046	0.0000
55.5	59,580,336	54.88%	61.60%	54.62%	0.0045	0.0000
56.5	54,087,264	54.12%	60.40%	53.74%	0.0039	0.0000
57.5	48,679,955	53.41%	59.20%	52.86%	0.0033	0.0000
58.5	42,204,779	52.69%	57.98%	52.00%	0.0028	0.0000
59.5	35,789,192	51.92%	56.76%	51.13%	0.0023	0.0001
60.5	27,121,560	51.42%	55.54%	50.27%	0.0017	0.0001
61.5	21,661,845	50.62%	54.31%	49.42%	0.0014	0.0001
62.5	18,583,640	50.02%	53.08%	48.57%	0.0009	0.0002

Account 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE S0.5-65	[5] TURN L0-67	[6] SCE SSD	[7] TURN SSD
63.5	15,454,400	49.14%	51.85%	47.72%	0.0007	0.0002
64.5	12,553,032	48.23%	50.62%	46.88%	0.0006	0.0002
65.5	10,807,971	46.45%	49.39%	46.05%	0.0009	0.0000
66.5	9,332,413	45.84%	48.15%	45.23%	0.0005	0.0000
67.5	7,194,354	45.60%	46.92%	44.41%	0.0002	0.0001
68.5	4,291,180	45.22%	45.69%	43.59%	0.0000	0.0003
69.5	2,681,807	44.97%	44.46%	42.78%	0.0000	0.0005
70.5	1,640,701	44.31%	43.24%	41.98%	0.0001	0.0005
71.5	1,903,607	43.70%	42.02%	41.19%	0.0003	0.0006
72.5	2,099,999	43.07%	40.81%	40.40%	0.0005	0.0007
73.5	2,476,071	42.04%	39.60%	39.62%	0.0006	0.0006
74.5	2,794,228	40.91%	38.40%	38.85%	0.0006	0.0004
75.5	2,960,289	40.50%	37.21%	38.08%	0.0011	0.0006
76.5	3,017,586	39.60%	36.02%	37.32%	0.0013	0.0005
77.5	3,147,341	38.17%	34.84%	36.57%	0.0011	0.0003
78.5	3,185,168	36.88%	33.68%	35.83%	0.0010	0.0001
79.5	3,067,993	35.34%	32.52%	35.09%	0.0008	0.0000
80.5	2,956,759	34.37%	31.37%	34.36%	0.0009	0.0000
81.5	2,857,481	33.29%	30.24%	33.64%	0.0009	0.0000
82.5	2,724,796	31.77%	29.12%	32.93%	0.0007	0.0001
83.5	2,637,677	31.02%	28.01%	32.23%	0.0009	0.0001
84.5	2,550,721	29.99%	26.92%	31.53%	0.0009	0.0002
85.5	2,474,749	29.34%	25.84%	30.84%	0.0012	0.0002
86.5	2,249,039	29.04%	24.78%	30.16%	0.0018	0.0001
87.5	2,068,839	28.67%	23.73%	29.49%	0.0024	0.0001
88.5	1,565,769	28.26%	22.70%	28.83%	0.0031	0.0000
89.5	1,213,799	27.75%	21.69%	28.17%	0.0037	0.0000
90.5	905,986	27.71%	20.69%	27.52%	0.0049	0.0000
91.5	625,355	27.21%	19.71%	26.89%	0.0056	0.0000
92.5	489,584	27.20%	18.76%	26.26%	0.0071	0.0001
93.5	408,448	27.19%	17.82%	25.64%	0.0088	0.0002
94.5	224,697	27.11%	16.90%	25.02%	0.0104	0.0004
95.5	41,492	27.11%	16.00%	24.42%	0.0124	0.0007
96.5	30,928	27.11%	15.12%	23.82%	0.0144	0.0011
97.5	25,501	27.11%	14.27%	23.24%	0.0165	0.0015
98.5	25,500	27.11%	13.44%	22.66%	0.0187	0.0020
99.5	24,040	27.11%	12.63%	22.09%	0.0210	0.0025
100.5	6,834	27.11%	11.84%	21.53%	0.0233	0.0031
101.5	1	27.11%	11.07%	20.98%	0.0257	0.0038
102.5			10.33%	20.44%		
Sum of Squared Differences				[8]	0.5088	0.0267
Up to 1% of Beginning Exposures				[9]	0.3120	0.0043

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 366 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R3-59	[5] TURN R2.5-64	[6] SCE SSD	[7] TURN SSD
0.0	1,667,244,540	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	1,525,400,602	99.98%	99.99%	99.96%	0.0000	0.0000
1.5	1,336,205,269	99.89%	99.96%	99.87%	0.0000	0.0000
2.5	1,221,665,545	99.80%	99.92%	99.77%	0.0000	0.0000
3.5	1,065,837,437	99.75%	99.89%	99.67%	0.0000	0.0000
4.5	894,322,456	99.69%	99.84%	99.56%	0.0000	0.0000
5.5	769,680,616	99.62%	99.79%	99.44%	0.0000	0.0000
6.5	710,193,934	99.55%	99.74%	99.32%	0.0000	0.0000
7.5	639,319,564	99.48%	99.67%	99.19%	0.0000	0.0000
8.5	593,085,637	99.36%	99.60%	99.05%	0.0000	0.0000
9.5	574,354,019	99.28%	99.52%	98.90%	0.0000	0.0000
10.5	555,397,760	99.18%	99.43%	98.74%	0.0000	0.0000
11.5	552,974,747	99.07%	99.33%	98.57%	0.0000	0.0000
12.5	545,847,671	98.96%	99.22%	98.39%	0.0000	0.0000
13.5	546,353,896	98.83%	99.09%	98.20%	0.0000	0.0000
14.5	549,970,720	98.69%	98.96%	98.00%	0.0000	0.0000
15.5	540,265,653	98.52%	98.80%	97.78%	0.0000	0.0001
16.5	521,735,674	98.36%	98.64%	97.56%	0.0000	0.0001
17.5	517,354,087	98.22%	98.45%	97.32%	0.0000	0.0001
18.5	518,592,999	98.06%	98.25%	97.06%	0.0000	0.0001
19.5	500,253,087	97.89%	98.03%	96.79%	0.0000	0.0001
20.5	503,778,872	97.69%	97.79%	96.50%	0.0000	0.0001
21.5	500,737,422	97.52%	97.52%	96.20%	0.0000	0.0002
22.5	490,460,785	97.27%	97.24%	95.88%	0.0000	0.0002
23.5	474,516,365	97.00%	96.93%	95.54%	0.0000	0.0002
24.5	452,063,850	96.66%	96.59%	95.18%	0.0000	0.0002
25.5	431,700,983	96.23%	96.23%	94.80%	0.0000	0.0002
26.5	407,940,437	95.70%	95.83%	94.40%	0.0000	0.0002
27.5	379,862,903	95.14%	95.41%	93.98%	0.0000	0.0001
28.5	357,610,970	94.59%	94.95%	93.54%	0.0000	0.0001
29.5	327,462,246	93.98%	94.47%	93.07%	0.0000	0.0001
30.5	292,200,185	93.34%	93.94%	92.58%	0.0000	0.0001
31.5	258,600,143	92.63%	93.38%	92.06%	0.0001	0.0000
32.5	232,586,050	91.99%	92.78%	91.52%	0.0001	0.0000
33.5	215,302,080	91.49%	92.14%	90.95%	0.0000	0.0000
34.5	205,190,203	90.86%	91.45%	90.35%	0.0000	0.0000
35.5	198,485,914	89.86%	90.72%	89.72%	0.0001	0.0000
36.5	181,850,879	88.63%	89.95%	89.06%	0.0002	0.0000
37.5	160,374,076	87.41%	89.12%	88.37%	0.0003	0.0001
38.5	146,727,892	86.46%	88.24%	87.65%	0.0003	0.0001
39.5	135,767,992	85.79%	87.31%	86.89%	0.0002	0.0001
40.5	127,090,242	85.35%	86.32%	86.10%	0.0001	0.0001
41.5	118,336,750	85.01%	85.28%	85.27%	0.0000	0.0000
42.5	110,310,671	84.69%	84.17%	84.40%	0.0000	0.0000
43.5	99,877,799	84.26%	82.99%	83.49%	0.0002	0.0001
44.5	102,310,655	83.66%	81.75%	82.54%	0.0004	0.0001
45.5	88,887,555	83.04%	80.43%	81.55%	0.0007	0.0002
46.5	75,860,731	82.09%	79.04%	80.52%	0.0009	0.0002

Account 366 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**SCE R3-59**	**TURN R2.5-64**	**SCE SSD**	**TURN SSD**
47.5	61,539,286	80.95%	77.58%	79.44%	0.0011	0.0002
48.5	50,880,730	80.23%	76.03%	78.32%	0.0018	0.0004
49.5	45,987,084	79.77%	74.41%	77.15%	0.0029	0.0007
50.5	41,120,992	79.38%	72.69%	75.93%	0.0045	0.0012
51.5	37,771,348	78.97%	70.90%	74.65%	0.0065	0.0019
52.5	27,913,411	78.49%	69.02%	73.33%	0.0090	0.0027
53.5	25,135,164	78.12%	67.04%	71.96%	0.0123	0.0038
54.5	23,266,276	77.72%	64.99%	70.53%	0.0162	0.0052
55.5	21,866,616	77.36%	62.85%	69.05%	0.0210	0.0069
56.5	20,651,754	77.00%	60.62%	67.52%	0.0268	0.0090
57.5	20,027,197	76.57%	58.32%	65.93%	0.0333	0.0113
58.5	19,395,779	76.11%	55.95%	64.29%	0.0406	0.0140
59.5	18,316,364	75.25%	53.51%	62.60%	0.0472	0.0160
60.5	17,514,735	73.31%	51.02%	60.85%	0.0497	0.0155
61.5			48.47%	59.06%		
Sum of Squared Differences				[8]	0.2767	0.0922
Up to 1% of Beginning Exposures				[9]	0.2767	0.0922

[1] Age in years using half-year convention

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

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

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

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

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

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

[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 369 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R1.5-55	[5] TURN R1.5-60	[6] SCE SSD	[7] TURN SSD
0.0	870,434,636	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	832,801,014	99.95%	99.84%	99.85%	0.0000	0.0000
1.5	787,457,161	99.84%	99.51%	99.55%	0.0000	0.0000
2.5	759,761,425	99.62%	99.17%	99.24%	0.0000	0.0000
3.5	728,983,634	99.54%	98.82%	98.92%	0.0001	0.0000
4.5	706,091,573	99.41%	98.45%	98.59%	0.0001	0.0001
5.5	686,348,842	99.35%	98.07%	98.25%	0.0002	0.0001
6.5	670,829,005	99.30%	97.68%	97.90%	0.0003	0.0002
7.5	651,554,934	99.24%	97.28%	97.53%	0.0004	0.0003
8.5	644,687,819	99.11%	96.86%	97.16%	0.0005	0.0004
9.5	621,933,954	98.85%	96.43%	96.78%	0.0006	0.0004
10.5	588,351,304	98.26%	95.99%	96.38%	0.0005	0.0004
11.5	558,252,302	98.20%	95.53%	95.97%	0.0007	0.0005
12.5	530,783,188	98.13%	95.06%	95.55%	0.0009	0.0007
13.5	507,650,156	98.05%	94.57%	95.12%	0.0012	0.0009
14.5	479,003,748	97.94%	94.07%	94.67%	0.0015	0.0011
15.5	460,034,998	97.84%	93.55%	94.21%	0.0018	0.0013
16.5	447,448,422	97.77%	93.01%	93.74%	0.0023	0.0016
17.5	436,492,398	97.65%	92.46%	93.26%	0.0027	0.0019
18.5	433,570,410	97.51%	91.89%	92.76%	0.0032	0.0023
19.5	420,096,068	97.33%	91.30%	92.25%	0.0036	0.0026
20.5	410,218,457	97.19%	90.70%	91.72%	0.0042	0.0030
21.5	397,171,671	97.03%	90.08%	91.18%	0.0048	0.0034
22.5	391,996,075	96.86%	89.43%	90.62%	0.0055	0.0039
23.5	384,450,407	96.70%	88.77%	90.05%	0.0063	0.0044
24.5	376,346,120	96.52%	88.09%	89.46%	0.0071	0.0050
25.5	362,464,059	96.34%	87.38%	88.85%	0.0080	0.0056
26.5	346,000,700	96.14%	86.65%	88.23%	0.0090	0.0063
27.5	330,825,437	95.92%	85.90%	87.59%	0.0101	0.0070
28.5	307,090,545	95.72%	85.12%	86.93%	0.0112	0.0077
29.5	276,768,853	95.54%	84.31%	86.24%	0.0126	0.0086
30.5	254,513,366	95.32%	83.48%	85.54%	0.0140	0.0096
31.5	235,069,588	95.09%	82.63%	84.82%	0.0155	0.0106
32.5	218,698,517	94.82%	81.75%	84.08%	0.0171	0.0115
33.5	199,058,947	94.53%	80.83%	83.31%	0.0188	0.0126
34.5	181,604,538	94.14%	79.89%	82.52%	0.0203	0.0135
35.5	165,836,894	93.65%	78.92%	81.71%	0.0217	0.0143
36.5	154,592,494	92.45%	77.91%	80.87%	0.0211	0.0134
37.5	138,109,020	91.27%	76.88%	80.01%	0.0207	0.0127
38.5	125,099,789	89.99%	75.81%	79.12%	0.0201	0.0118
39.5	105,884,585	88.88%	74.71%	78.21%	0.0201	0.0114
40.5	90,386,687	88.15%	73.58%	77.27%	0.0212	0.0118
41.5	75,897,889	87.50%	72.42%	76.31%	0.0227	0.0125
42.5	65,169,623	86.81%	71.22%	75.31%	0.0243	0.0132
43.5	56,698,600	86.02%	69.98%	74.29%	0.0257	0.0138
44.5	48,398,825	85.08%	68.72%	73.25%	0.0268	0.0140
45.5	38,835,681	84.23%	67.42%	72.17%	0.0283	0.0145
46.5	28,733,274	83.46%	66.08%	71.06%	0.0302	0.0154

Account 369 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R1.5-55	[5] TURN R1.5-60	[6] SCE SSD	[7] TURN SSD
47.5	21,611,810	82.64%	64.71%	69.93%	0.0321	0.0162
48.5	14,416,872	82.02%	63.31%	68.77%	0.0350	0.0175
49.5	7,145,623	84.14%	61.88%	67.58%	0.0495	0.0274
50.5	6,432,652	83.82%	60.41%	66.36%	0.0548	0.0305
51.5	5,547,075	83.50%	58.92%	65.12%	0.0604	0.0338
52.5	4,997,330	83.23%	57.39%	63.84%	0.0668	0.0376
53.5	4,026,058	83.21%	55.84%	62.54%	0.0749	0.0427
54.5	3,605,090	83.25%	54.26%	61.21%	0.0841	0.0486
55.5	3,172,629	83.43%	52.66%	59.85%	0.0947	0.0556
56.5	3,218,626	83.40%	51.03%	58.47%	0.1048	0.0621
57.5	2,612,257	83.33%	49.38%	57.07%	0.1153	0.0690
58.5	2,550,368	83.27%	47.72%	55.64%	0.1264	0.0763
59.5	2,445,876	83.42%	46.04%	54.19%	0.1397	0.0854
60.5	2,407,373	83.60%	44.35%	52.72%	0.1541	0.0954
61.5	2,477	83.61%	42.66%	51.23%	0.1677	0.1048
62.5	0	83.61%	40.95%	49.73%		
Sum of Squared Differences				[8]	1.8284	1.0891
Up to 1% of Beginning Exposures				[9]	0.5353	0.3199

[1] Age in years using half-year convention
[2] Dollars exposed to retirement at the beginning of each age interval
[3] Observed life table based on the Company's property records. These numbers form the original survivor curve.
[4] The Company's selected Iowa curve to be fitted to the OLT.
[5] My selected Iowa curve to be fitted to the OLT.
[6] = ([4] - [3])^2. This is the squared difference between each point on the Company's curve and the observed survivor curve.
[7] = ([5] - [3])^2. This is the squared difference between each point on my curve and the observed survivor curve.
[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

Account 370 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] SCE R3-20	[5] TURN R3-30	[6] SCE SSD	[7] TURN SSD
0.0	826,006,547	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	801,903,056	99.99%	99.96%	99.97%	0.0000	0.0000
1.5	800,138,024	99.97%	99.85%	99.91%	0.0000	0.0000
2.5	792,661,768	99.96%	99.68%	99.82%	0.0000	0.0000
3.5	786,890,274	99.92%	99.45%	99.71%	0.0000	0.0000
4.5	783,104,731	99.91%	99.12%	99.57%	0.0001	0.0000
5.5	783,253,846	99.90%	98.68%	99.40%	0.0001	0.0000
6.5	777,522,250	99.76%	98.10%	99.18%	0.0003	0.0000
7.5	715,929,418	99.57%	97.35%	98.92%	0.0005	0.0000
8.5	667,355,754	99.22%	96.38%	98.60%	0.0008	0.0000
9.5	46,343,193	98.85%	95.17%	98.21%	0.0014	0.0000
10.5	48,235,099	98.83%	93.68%	97.75%	0.0027	0.0001
11.5	45,727,980	98.83%	91.85%	97.20%	0.0049	0.0003
12.5	41,421,100	98.83%	89.64%	96.56%	0.0084	0.0005
13.5	36,131,069	98.83%	87.00%	95.81%	0.0140	0.0009
14.5	31,452,531	98.83%	83.85%	94.95%	0.0224	0.0015
15.5	28,459,991	98.83%	80.13%	93.95%	0.0350	0.0024
16.5	22,392,404	98.83%	75.75%	92.81%	0.0533	0.0036
17.5	19,503,461	98.83%	70.66%	91.51%	0.0793	0.0054
18.5	23,043,440	98.83%	64.83%	90.04%	0.1156	0.0077
19.5	29,106,744	98.79%	58.26%	88.38%	0.1642	0.0108
20.5	38,838,942	98.79%	51.08%	86.51%	0.2276	0.0151
21.5	40,032,320	98.77%	43.48%	84.41%	0.3057	0.0206
22.5	44,810,138	98.77%	35.77%	82.07%	0.3970	0.0279
23.5	48,028,345	98.77%	28.31%	79.44%	0.4966	0.0374
24.5	49,477,930	98.77%	21.46%	76.53%	0.5978	0.0495
25.5	47,114,692	98.77%	15.51%	73.30%	0.6932	0.0648
26.5	44,077,924	98.77%	10.63%	69.74%	0.7769	0.0842
27.5	37,610,238	98.77%	6.84%	65.85%	0.8450	0.1083
28.5	29,549,201	98.77%	4.07%	61.64%	0.8968	0.1379
29.5	18,106,136	98.77%	2.15%	57.11%	0.9335	0.1736
30.5	13,459,192	98.76%	0.95%	52.31%	0.9568	0.2158
31.5	9,562,238	98.76%	0.30%	47.32%	0.9695	0.2647
32.5	4,539,571	98.76%	0.05%	42.20%	0.9745	0.3200
33.5	1,125,559	98.76%	0.00%	37.05%	0.9754	0.3809
34.5	0	98.76%	0.00%	31.98%	0.9754	0.4460
35.5	0	98.76%	0.00%	27.11%	0.9754	0.5134
36.5	0	98.76%	0.00%	22.54%	0.9754	0.5810
37.5	0	98.76%	0.00%	18.35%	0.9754	0.6467
38.5	0	98.76%	0.00%	14.62%	0.9754	0.7081
39.5	0	98.76%	0.00%	11.36%	0.9754	0.7639
40.5	0	98.76%	0.00%	8.60%	0.9754	0.8130
41.5	0	98.76%	0.00%	6.31%	0.9754	0.8547
42.5	0	98.76%	0.00%	4.46%	0.9754	0.8892
43.5	0	98.76%	0.00%	3.01%	0.9754	0.9169
44.5	105	98.76%	0.00%	1.91%	0.9754	0.9382
45.5	105	98.76%	0.00%	1.11%	0.9754	0.9537
46.5	105	98.76%	0.00%	0.56%	0.9754	0.9643

Account 370 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**SCE R3-20**	**TURN R3-30**	**SCE SSD**	**TURN SSD**
47.5	105	98.76%	0.00%	0.24%	0.9754	0.9708
48.5	105	98.76%	0.00%	0.07%	0.9754	0.9740
49.5	105	98.76%	0.00%	0.01%	0.9754	0.9752
50.5	105	98.76%	0.00%	0.00%	0.9754	0.9754
51.5	105	98.76%	0.00%	0.00%	0.9754	0.9754
52.5	105	98.76%	0.00%	0.00%	0.9754	0.9754
53.5	0	98.76%	0.00%	0.00%		
Sum of Squared Differences				[8]	29.0826	17.7696
Up to 1% of Beginning Exposures				[9]	8.5993	1.2332

[1] Age in years using half-year convention

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

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

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

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

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

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

[8] = Sum of squared differences. The smallest SSD represents the best mathematical fit.

SCE
Electric Division
352.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1914	611,353.77	58.00	10,540.42	19.01	200,382.85
1915	708.01	58.00	12.21	19.20	234.36
1916	150.97	58.00	2.60	19.39	50.47
1917	977.88	58.00	16.86	19.58	330.17
1918	207.97	58.00	3.59	19.78	70.91
1919	4,115.58	58.00	70.96	19.98	1,417.55
1920	7,083.07	58.00	122.12	20.18	2,463.79
1921	2,813.69	58.00	48.51	20.38	988.45
1922	277,727.86	58.00	4,788.34	20.58	98,539.25
1923	19,326.61	58.00	333.21	20.79	6,926.61
1924	22,250.59	58.00	383.62	20.99	8,053.92
1925	2,886.79	58.00	49.77	21.20	1,055.35
1926	14,015.69	58.00	241.65	21.42	5,175.20
1927	367,454.96	58.00	6,335.33	21.63	137,052.70
1928	36,137.72	58.00	623.05	21.85	13,613.25
1929	2,645.01	58.00	45.60	22.07	1,006.37
1930	4,488.57	58.00	77.39	22.29	1,725.14
1931	13,294.52	58.00	229.21	22.51	5,160.67
1932	475.37	58.00	8.20	22.74	186.38
1933	1,004.88	58.00	17.33	22.97	397.94
1934	241.04	58.00	4.16	23.20	96.42
1935	74.42	58.00	1.28	23.43	30.07
1936	7,016.10	58.00	120.97	23.67	2,863.03
1937	494,685.31	58.00	8,528.92	23.91	203,910.37
1938	17,990.69	58.00	310.18	24.15	7,489.93
1939	341,696.68	58.00	5,891.23	24.39	143,680.43
1940	184.96	58.00	3.19	24.63	78.55

SCE
Electric Division
352.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1941	62,244.15	58.00	1,073.16	24.88	26,702.69
1942	39.99	58.00	0.69	25.13	17.33
1943	340.96	58.00	5.88	25.38	149.21
1944	1,659.83	58.00	28.62	25.64	733.67
1945	9,050.15	58.00	156.03	25.90	4,040.57
1946	189,412.86	58.00	3,265.69	26.15	85,411.39
1947	171,077.89	58.00	2,949.57	26.42	77,915.47
1948	284,854.72	58.00	4,911.21	26.68	131,040.31
1949	14,752.79	58.00	254.35	26.95	6,854.38
1950	183,443.66	58.00	3,162.77	27.22	86,082.05
1951	131,358.49	58.00	2,264.77	27.49	62,256.81
1952	455,198.14	58.00	7,848.12	27.77	217,904.60
1953	35,811.93	58.00	617.44	28.04	17,314.20
1954	179,778.63	58.00	3,099.58	28.32	87,785.78
1955	100,568.23	58.00	1,733.91	28.60	49,597.55
1956	479,306.82	58.00	8,263.78	28.89	238,746.49
1957	530,493.50	58.00	9,146.30	29.18	266,874.99
1958	449,808.73	58.00	7,755.20	29.47	228,539.71
1959	136,039.38	58.00	2,345.47	29.76	69,810.31
1960	87,479.83	58.00	1,508.25	30.06	45,337.83
1961	115,691.38	58.00	1,994.65	30.36	60,555.46
1962	229,522.92	58.00	3,957.23	30.66	121,332.99
1963	538,346.47	58.00	9,281.69	30.97	287,424.76
1964	116,087.61	58.00	2,001.48	31.27	62,595.30
1965	101,621.32	58.00	1,752.06	31.59	55,339.50
1966	794,033.75	58.00	13,690.02	31.90	436,712.19
1967	2,028,431.07	58.00	34,972.41	32.22	1,126,691.33

SCE

Electric Division

352.00 Structures and Improvements

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1968	1,450,706.56	58.00	25,011.79	32.54	813,792.56
1969	1,930,719.97	58.00	33,287.76	32.86	1,093,813.49
1970	1,046,865.78	58.00	18,049.13	33.19	598,978.62
1971	3,889,830.76	58.00	67,065.00	33.52	2,247,687.09
1972	1,264,915.70	58.00	21,808.55	33.85	738,162.84
1973	530,712.45	58.00	9,150.07	34.18	312,777.47
1974	1,428,054.99	58.00	24,621.25	34.52	849,982.34
1975	4,191,271.74	58.00	72,262.18	34.86	2,519,373.08
1976	443,826.81	58.00	7,652.07	35.21	269,427.61
1977	462,955.38	58.00	7,981.87	35.56	283,826.80
1978	519,776.38	58.00	8,961.52	35.91	321,817.52
1979	834,490.19	58.00	14,387.54	36.27	521,787.16
1980	574,194.69	58.00	9,899.75	36.63	362,585.41
1981	1,520,513.60	58.00	26,215.34	36.99	969,665.16
1982	2,652,646.05	58.00	45,734.56	37.35	1,708,392.69
1983	318,779.44	58.00	5,496.11	37.72	207,336.47
1984	873,178.20	58.00	15,054.56	38.10	573,541.88
1985	442,498.84	58.00	7,629.17	38.47	293,531.16
1986	6,497,786.40	58.00	112,029.06	38.86	4,353,129.92
1987	2,602,755.78	58.00	44,874.40	39.25	1,761,112.54
1988	7,308,790.12	58.00	126,011.66	39.64	4,995,067.34
1989	13,939,726.31	58.00	240,336.37	40.04	9,623,647.25
1990	2,205,532.56	58.00	38,025.83	40.45	1,538,275.23
1991	1,735,115.94	58.00	29,915.33	40.87	1,222,741.47
1992	6,554,322.96	58.00	113,003.81	41.30	4,667,305.11
1993	8,777,151.33	58.00	151,327.84	41.74	6,316,885.51
1994	2,227,341.21	58.00	38,401.84	42.20	1,620,369.24

SCE
Electric Division
352.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1995	3,410,986.73	58.00	58,809.20	42.66	2,508,625.55
1996	13,951,505.33	58.00	240,539.45	43.13	10,375,449.37
1997	1,218,112.08	58.00	21,001.61	43.62	916,173.99
1998	1,239,782.25	58.00	21,375.22	44.13	943,227.56
1999	1,591,507.27	58.00	27,439.35	44.64	1,224,948.07
2000	4,416,470.17	58.00	76,144.85	45.17	3,439,767.65
2001	1,179,888.91	58.00	20,342.60	45.72	930,068.82
2002	3,839,307.85	58.00	66,193.93	46.28	3,063,522.58
2003	7,962,773.43	58.00	137,287.06	46.85	6,432,578.92
2004	6,176,508.59	58.00	106,489.87	47.45	5,052,615.16
2005	19,004,345.15	58.00	327,656.02	48.05	15,745,184.78
2006	10,379,523.93	58.00	178,954.52	48.67	8,710,389.40
2007	30,260,236.87	58.00	521,720.10	49.31	25,727,772.01
2008	6,755,156.40	58.00	116,466.40	49.97	5,819,674.38
2009	40,809,246.35	58.00	703,596.74	50.64	35,630,150.14
2010	25,922,051.03	58.00	446,924.96	51.33	22,938,597.69
2011	61,765,375.30	58.00	1,064,903.69	52.03	55,408,510.47
2012	74,625,125.75	58.00	1,286,620.07	52.75	67,875,428.60
2013	172,242,926.53	58.00	2,969,659.40	53.50	158,865,509.86
2014	46,626,915.01	58.00	803,899.81	54.25	43,615,389.05
2015	113,040,423.21	58.00	1,948,942.48	55.04	107,265,586.50
2016	130,150,016.99	58.00	2,243,930.88	55.84	125,310,331.72
2017	58,117,055.27	58.00	1,002,002.60	56.67	56,786,302.90
2018	63,163,908.20	58.00	1,089,015.95	57.54	62,666,297.11

SCE

Electric Division

352.00 Structures and Improvements

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	983,751,072.65	58.00	16,960,961.37	52.05	882,733,862.22

Composite Average Remaining Life ... 52.05 Years

SCE
Electric Division
354.00 Towers and Fixtures

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 69 *Survivor Curve:* R5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1913	844,603.53	0.00	0.00	0.00	0.00
1914	374,652.75	0.00	0.00	0.00	0.00
1917	65,890.24	0.00	0.00	0.00	0.00
1918	517,943.22	0.00	0.00	0.00	0.00
1923	226,783.45	0.00	0.00	0.00	0.00
1924	163,465.55	69.00	2,369.09	0.50	1,184.55
1925	47,467.68	69.00	687.95	0.52	355.24
1926	31,195.80	69.00	452.12	0.57	257.11
1927	1,497,839.07	69.00	21,708.05	0.84	18,130.56
1928	1,117,270.33	69.00	16,192.50	0.98	15,897.53
1929	153,908.26	69.00	2,230.58	1.25	2,794.29
1930	205,439.38	69.00	2,977.42	1.45	4,321.44
1931	9,541.27	69.00	138.28	1.72	237.78
1932	36,782.42	69.00	533.08	1.95	1,038.90
1933	345.32	69.00	5.00	2.21	11.08
1934	3,307.86	69.00	47.94	2.43	116.67
1935	1,955.74	69.00	28.34	2.66	75.39
1936	4,008.94	69.00	58.10	2.88	167.26
1938	634.80	69.00	9.20	3.25	29.93
1939	8,023,126.01	69.00	116,278.48	3.44	400,042.96
1940	1,726.60	69.00	25.02	3.67	91.95
1941	1,182,476.11	69.00	17,137.52	3.91	66,936.79
1942	191,963.82	69.00	2,782.12	4.17	11,612.90
1943	13,867.54	69.00	200.98	4.45	894.94
1944	16,230.04	69.00	235.22	4.76	1,119.91
1945	674,087.26	69.00	9,769.49	5.09	49,747.40
1946	32,993.86	69.00	478.18	5.44	2,600.62

SCE
Electric Division
354.00 Towers and Fixtures

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 69 *Survivor Curve:* R5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1947	1,622.96	69.00	23.52	5.81	136.74
1948	56,447.64	69.00	818.09	6.21	5,081.66
1949	66,319.23	69.00	961.16	6.63	6,375.61
1950	1,074,178.41	69.00	15,567.98	7.08	110,266.71
1951	1,726,964.70	69.00	25,028.75	7.55	189,071.38
1952	564,499.04	69.00	8,181.24	8.06	65,907.32
1953	1,246,912.72	69.00	18,071.40	8.58	155,036.82
1954	389,434.80	69.00	5,644.05	9.13	51,549.34
1955	454,037.01	69.00	6,580.32	9.71	63,894.88
1956	1,298,471.43	69.00	18,818.63	10.31	194,019.42
1957	367,219.81	69.00	5,322.09	10.95	58,262.52
1958	1,715,093.29	69.00	24,856.70	11.60	288,337.41
1959	2,283,309.91	69.00	33,091.81	12.29	406,611.98
1960	3,649,932.09	69.00	52,898.15	12.99	687,177.33
1961	1,535,523.41	69.00	22,254.21	13.72	305,430.33
1962	643,235.02	69.00	9,322.35	14.47	134,936.80
1963	5,651,256.77	69.00	81,903.18	15.25	1,249,091.52
1964	848,082.17	69.00	12,291.18	16.04	197,183.05
1965	1,324,718.21	69.00	19,199.03	16.85	323,521.26
1966	4,927,071.37	69.00	71,407.62	17.68	1,262,841.44
1967	15,140,545.66	69.00	219,430.63	18.53	4,065,506.35
1968	22,829,361.12	69.00	330,863.97	19.39	6,415,825.02
1969	31,623,793.93	69.00	458,320.93	20.26	9,287,051.50
1970	37,533,600.69	69.00	543,971.25	21.15	11,506,359.84
1971	19,627,174.99	69.00	284,454.96	22.05	6,272,287.79
1972	3,120,052.60	69.00	45,218.65	22.96	1,038,316.51
1973	16,908,633.77	69.00	245,055.38	23.88	5,852,475.44

SCE
Electric Division
354.00 Towers and Fixtures

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 69 **Survivor Curve: R5**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1974	15,836,465.16	69.00	229,516.53	24.81	5,695,270.92
1975	4,478,532.98	69.00	64,906.99	25.75	1,671,614.75
1976	3,275,605.21	69.00	47,473.07	26.70	1,267,605.43
1977	256,313.01	69.00	3,714.72	27.66	102,749.74
1978	11,570,862.77	69.00	167,695.52	28.62	4,799,987.99
1979	4,975,666.75	69.00	72,111.91	29.59	2,134,136.33
1980	11,487,494.64	69.00	166,487.27	30.57	5,089,563.82
1981	78,475.40	69.00	1,137.34	31.55	35,885.17
1982	40,624,783.94	69.00	588,771.51	32.54	19,156,714.96
1983	2,773,098.78	69.00	40,190.28	33.53	1,347,409.63
1984	12,879,157.06	69.00	186,656.52	34.52	6,442,849.91
1985	17,722,372.15	69.00	256,848.82	35.51	9,120,877.20
1986	2,830,580.70	69.00	41,023.36	36.51	1,497,629.66
1987	6,553,169.82	69.00	94,974.53	37.50	3,561,890.70
1988	19,168,594.48	69.00	277,808.79	38.50	10,696,164.00
1989	51,171,775.01	69.00	741,628.14	39.50	29,294,772.24
1990	2,932,697.88	69.00	42,503.34	40.50	1,721,384.24
1991	3,427,221.06	69.00	49,670.42	41.50	2,061,300.77
1992	552,338.72	69.00	8,005.00	42.50	340,207.42
1993	1,298,489.90	69.00	18,818.90	43.50	818,608.84
1994	8,535,171.76	69.00	123,699.51	44.50	5,504,535.44
1995	1,427,875.19	69.00	20,694.07	45.50	941,564.60
1996	2,900,246.20	69.00	42,033.02	46.50	1,954,503.50
1997	3,583,813.25	69.00	51,939.90	47.50	2,467,105.45
1998	1,871,892.93	69.00	27,129.18	48.50	1,315,744.67
1999	134,931.61	69.00	1,955.55	49.50	96,798.34
2001	407,673.90	69.00	5,908.38	51.50	304,277.20

SCE
Electric Division
354.00 Towers and Fixtures

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **69** *Survivor Curve:* **R5**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2002	4,725,730.24	69.00	68,489.60	52.50	3,595,651.80
2003	4,814,781.42	69.00	69,780.21	53.50	3,733,188.11
2004	3,396,264.14	69.00	49,221.76	54.50	2,682,548.55
2005	6,750,799.31	69.00	97,838.75	55.50	5,429,976.12
2006	554,681.56	69.00	8,038.95	56.50	454,194.66
2007	3,275,925.84	69.00	47,477.71	57.50	2,729,932.15
2008	1,409,127.20	69.00	20,422.36	58.50	1,194,692.42
2009	196,372,335.30	69.00	2,846,007.40	59.50	169,335,265.04
2010	5,786,938.56	69.00	83,869.60	60.50	5,074,046.93
2011	35,719,778.60	69.00	517,683.68	61.50	31,837,150.97
2012	134,688,766.10	69.00	1,952,032.72	62.50	122,000,553.40
2013	650,287,140.70	69.00	9,424,555.70	63.50	598,452,084.36
2014	438,444,329.10	69.00	6,354,336.02	64.50	409,849,817.02
2015	373,396,050.30	69.00	5,411,596.90	65.50	354,455,461.15
2016	36,445,787.98	69.00	528,205.68	66.50	35,125,273.79
2017	16,297,163.34	69.00	236,193.39	67.50	15,942,873.26
2018	18,611,101.70	69.00	269,729.10	68.50	18,476,237.15
Total	2,355,779,001.25	65.48	34,112,684.03	57.18	1,950,580,320.98

Composite Average Remaining Life ... 57.18 Years

SCE
Electric Division
356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1913	917,753.54	65.00	14,119.29	1.08	15,306.70
1914	276,415.73	65.00	4,252.55	1.34	5,680.26
1917	139,358.43	65.00	2,143.98	2.00	4,294.38
1918	558,410.13	65.00	8,590.93	2.27	19,467.90
1923	166,554.98	65.00	2,562.38	3.50	8,970.48
1925	37,324.03	65.00	574.22	4.02	2,306.15
1927	2,141,588.04	65.00	32,947.51	4.53	149,312.72
1928	660,297.27	65.00	10,158.42	4.78	48,570.39
1929	101,428.61	65.00	1,560.44	5.05	7,875.43
1930	127,585.78	65.00	1,962.86	5.30	10,395.50
1931	3,694.29	65.00	56.84	5.56	316.14
1932	20,967.42	65.00	322.58	5.81	1,875.12
1934	2,794.14	65.00	42.99	6.34	272.38
1936	5,463.33	65.00	84.05	6.87	577.77
1939	13,012,437.38	65.00	200,191.35	7.72	1,544,739.84
1941	1,342,246.49	65.00	20,649.95	8.32	171,740.50
1942	83,329.48	65.00	1,281.99	8.63	11,067.34
1943	24,111.84	65.00	370.95	8.95	3,321.76
1944	1,642.56	65.00	25.27	9.29	234.79
1945	638,008.79	65.00	9,815.52	9.64	94,583.52
1946	1,017.85	65.00	15.66	10.00	156.52
1948	17,294.23	65.00	266.07	10.75	2,860.33
1949	40,161.67	65.00	617.87	11.15	6,888.24
1950	2,466,450.94	65.00	37,945.40	11.56	438,669.76
1951	1,447,101.94	65.00	22,263.11	11.99	266,846.23
1952	328,961.48	65.00	5,060.95	12.43	62,893.33
1953	982,411.78	65.00	15,114.03	12.88	194,685.26

SCE

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1954	380,857.93	65.00	5,859.35	13.35	78,233.46
1955	499,746.87	65.00	7,688.41	13.83	106,366.30
1956	1,198,793.43	65.00	18,442.98	14.34	264,384.70
1957	1,214,947.49	65.00	18,691.50	14.85	277,508.59
1958	3,636,500.49	65.00	55,946.16	15.38	860,283.71
1959	3,973,371.14	65.00	61,128.79	15.92	972,982.98
1960	4,242,020.05	65.00	65,261.85	16.48	1,075,260.17
1961	2,698,904.02	65.00	41,521.60	17.05	707,843.61
1962	1,235,727.37	65.00	19,011.19	17.63	335,179.55
1963	4,851,332.32	65.00	74,635.88	18.23	1,360,574.43
1964	2,437,576.49	65.00	37,501.18	18.84	706,473.49
1965	3,580,698.24	65.00	55,087.67	19.46	1,072,206.91
1966	6,152,753.29	65.00	94,657.74	20.10	1,902,408.48
1967	16,621,000.98	65.00	255,707.71	20.75	5,305,279.68
1968	21,594,923.72	65.00	332,229.60	21.41	7,111,417.66
1969	21,848,879.70	65.00	336,136.61	22.08	7,421,274.83
1970	32,041,599.34	65.00	492,947.69	22.76	11,218,557.65
1971	12,341,491.47	65.00	189,869.10	23.45	4,453,023.13
1972	6,705,457.09	65.00	103,160.88	24.15	2,491,757.49
1973	11,059,779.05	65.00	170,150.45	24.87	4,231,613.87
1974	17,990,853.10	65.00	276,782.36	25.59	7,083,952.88
1975	4,272,378.48	65.00	65,728.90	26.33	1,730,372.32
1976	2,984,922.08	65.00	45,921.88	27.07	1,243,066.89
1977	798,452.95	65.00	12,283.89	27.82	341,730.93
1978	8,773,176.79	65.00	134,971.95	28.58	3,857,625.89
1979	9,293,417.88	65.00	142,975.66	29.35	4,196,153.93
1980	8,525,994.00	65.00	131,169.14	30.13	3,951,824.59

SCE

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 65 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1981	324,194.22	65.00	4,987.60	30.91	154,178.33
1982	51,629,897.31	65.00	794,306.12	31.71	25,185,914.81
1983	4,044,958.61	65.00	62,230.13	32.51	2,023,033.54
1984	5,164,548.71	65.00	79,454.60	33.32	2,647,496.06
1985	10,040,816.41	65.00	154,474.10	34.14	5,273,341.58
1986	6,698,605.62	65.00	103,055.47	34.96	3,603,334.29
1987	8,255,717.41	65.00	127,011.04	35.80	4,546,880.97
1988	8,825,649.31	65.00	135,779.22	36.64	4,974,865.02
1989	38,579,850.38	65.00	593,536.17	37.49	22,250,700.90
1990	9,586,205.08	65.00	147,480.08	38.34	5,654,828.71
1991	5,395,892.79	65.00	83,013.74	39.21	3,254,664.09
1992	5,520,695.84	65.00	84,933.78	40.07	3,403,703.95
1993	5,783,038.66	65.00	88,969.83	40.95	3,643,481.29
1994	5,712,061.08	65.00	87,877.86	41.83	3,676,246.09
1995	3,804,210.37	65.00	58,526.31	42.72	2,500,464.70
1996	6,988,736.65	65.00	107,519.03	43.62	4,689,775.86
1997	7,886,558.66	65.00	121,331.67	44.52	5,401,769.81
1998	1,015,743.66	65.00	15,626.83	45.43	709,879.24
1999	5,847,150.73	65.00	89,956.17	46.34	4,168,678.32
2000	3,560,716.69	65.00	54,780.26	47.26	2,588,928.96
2001	2,109,102.50	65.00	32,447.73	48.18	1,563,454.95
2002	6,912,015.51	65.00	106,338.70	49.11	5,222,650.03
2003	2,588,669.04	65.00	39,825.68	50.05	1,993,150.67
2004	1,990,137.10	65.00	30,617.49	50.99	1,561,066.91
2005	24,986,521.10	65.00	384,408.02	51.93	19,961,849.46
2006	14,656,177.81	65.00	225,479.66	52.88	11,922,658.02
2007	11,400,417.70	65.00	175,391.04	53.83	9,440,933.58

SCE

Electric Division

356.00 Overhead Conductors and Devices

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **65** *Survivor Curve:* **R3**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2008	8,672,304.66	65.00	133,420.07	54.78	7,309,278.32
2009	83,102,061.88	65.00	1,278,493.28	55.74	71,266,441.57
2010	12,464,652.96	65.00	191,763.89	56.71	10,874,103.68
2011	16,976,799.13	65.00	261,181.53	57.67	15,062,596.39
2012	85,512,897.74	65.00	1,315,583.06	58.64	77,146,381.03
2013	412,900,308.70	65.00	6,352,312.52	59.61	378,676,606.68
2014	150,335,204.90	65.00	2,312,849.33	60.59	140,127,791.46
2015	204,223,601.60	65.00	3,141,901.60	61.56	193,427,340.79
2016	36,959,764.33	65.00	568,611.77	62.54	35,562,570.36
2017	57,523,995.74	65.00	884,984.56	63.52	56,218,096.36
2018	88,598,030.15	65.00	1,363,046.63	64.51	87,926,740.18
Total	1,653,078,278.65	65.00	25,431,973.82	51.63	1,313,047,143.79

Composite Average Remaining Life ... **51.63 Years**

SCE
Electric Division
361.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1910	28,707.15	58.00	494.97	20.96	10,376.74
1911	23,044.00	58.00	397.32	21.17	8,410.15
1912	30,882.81	58.00	532.48	21.37	11,381.21
1913	26,457.98	58.00	456.19	21.58	9,843.74
1914	737.91	58.00	12.72	21.78	277.17
1915	10,449.41	58.00	180.17	21.99	3,962.43
1917	561.97	58.00	9.69	22.42	217.19
1919	894.00	58.00	15.41	22.84	352.13
1920	3,386.00	58.00	58.38	23.06	1,346.23
1921	21,015.56	58.00	362.35	23.28	8,433.98
1922	78,078.36	58.00	1,346.22	23.49	31,628.82
1923	98,459.87	58.00	1,697.64	23.72	40,263.00
1924	59,902.26	58.00	1,032.83	23.94	24,724.02
1925	34,583.01	58.00	596.28	24.16	14,406.82
1926	160,394.62	58.00	2,765.51	24.39	67,441.03
1927	118,035.21	58.00	2,035.15	24.61	50,095.16
1928	125,654.46	58.00	2,166.52	24.84	53,822.39
1929	28,745.17	58.00	495.62	25.07	12,426.56
1930	121,527.43	58.00	2,095.37	25.31	53,026.70
1931	63,291.24	58.00	1,091.26	25.54	27,870.11
1932	31,492.55	58.00	542.99	25.77	13,995.17
1933	3,838.64	58.00	66.19	26.01	1,721.56
1934	3,493.97	58.00	60.24	26.25	1,581.47
1935	723.88	58.00	12.48	26.49	330.64
1936	61,039.49	58.00	1,052.44	26.73	28,135.71
1937	2,789.40	58.00	48.09	26.98	1,297.60
1938	12,202.66	58.00	210.40	27.23	5,728.18

SCE
Electric Division
361.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1939	5,933.27	58.00	102.30	27.47	2,810.53
1940	13,882.37	58.00	239.36	27.72	6,635.74
1941	2,593.32	58.00	44.71	27.98	1,250.94
1942	13,862.31	58.00	239.01	28.23	6,747.27
1943	5,018.48	58.00	86.53	28.49	2,464.78
1944	1,503.76	58.00	25.93	28.74	745.24
1945	15,646.76	58.00	269.78	29.00	7,824.75
1946	17,836.73	58.00	307.54	29.27	9,000.34
1947	149,039.94	58.00	2,569.74	29.53	75,882.91
1948	406,713.25	58.00	7,012.52	29.80	208,952.37
1949	305,484.91	58.00	5,267.15	30.06	158,355.11
1950	405,192.42	58.00	6,986.30	30.33	211,927.52
1951	255,142.05	58.00	4,399.14	30.61	134,645.53
1952	302,693.24	58.00	5,219.01	30.88	161,179.31
1953	244,255.03	58.00	4,211.43	31.16	131,226.59
1954	276,945.87	58.00	4,775.08	31.44	150,122.24
1955	194,152.52	58.00	3,347.56	31.72	106,185.45
1956	226,871.60	58.00	3,911.70	32.00	125,193.45
1957	482,108.46	58.00	8,312.48	32.29	268,415.64
1958	2,523,342.94	58.00	43,507.29	32.58	1,417,428.71
1959	890,599.13	58.00	15,355.64	32.87	504,755.33
1960	511,343.03	58.00	8,816.54	33.16	292,390.95
1961	896,309.04	58.00	15,454.09	33.46	517,085.98
1962	506,173.46	58.00	8,727.41	33.76	294,617.12
1963	304,167.83	58.00	5,244.44	34.06	178,621.07
1964	341,292.30	58.00	5,884.54	34.36	202,205.19
1965	477,987.39	58.00	8,241.42	34.67	285,712.37

SCE
Electric Division
361.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1966	644,778.75	58.00	11,117.23	34.98	388,848.18
1967	550,069.23	58.00	9,484.25	35.29	334,678.21
1968	2,015,874.08	58.00	34,757.55	35.60	1,237,413.23
1969	773,764.37	58.00	13,341.19	35.92	479,183.39
1970	884,290.99	58.00	15,246.88	36.24	552,504.76
1971	2,285,211.95	58.00	39,401.45	36.56	1,440,470.78
1972	3,265,755.13	58.00	56,307.91	36.88	2,076,821.31
1973	2,481,961.05	58.00	42,793.79	37.21	1,592,386.06
1974	1,423,022.94	58.00	24,535.66	37.54	921,099.80
1975	5,681,317.97	58.00	97,956.86	37.87	3,710,039.62
1976	1,033,063.72	58.00	17,812.01	38.21	680,599.55
1977	2,745,433.45	58.00	47,336.56	38.55	1,824,800.10
1978	797,701.19	58.00	13,753.90	38.89	534,905.77
1979	600,269.51	58.00	10,349.80	39.24	406,084.76
1980	2,164,701.31	58.00	37,323.62	39.58	1,477,413.87
1981	7,464,724.39	58.00	128,706.22	39.94	5,139,896.60
1982	4,947,627.33	58.00	85,306.62	40.29	3,436,924.63
1983	6,943,463.32	58.00	119,718.68	40.65	4,866,113.97
1984	2,929,339.42	58.00	50,507.45	41.01	2,071,139.72
1985	2,042,862.48	58.00	35,222.88	41.37	1,457,180.65
1986	5,383,497.07	58.00	92,821.86	41.74	3,874,111.00
1987	45,773,046.27	58.00	789,215.46	42.11	33,231,588.71
1988	2,270,279.58	58.00	39,143.99	42.48	1,662,858.42
1989	8,840,925.63	58.00	152,434.58	42.86	6,532,926.02
1990	13,400,438.48	58.00	231,049.36	43.24	9,989,956.74
1991	7,383,382.08	58.00	127,303.72	43.62	5,553,112.23
1992	4,945,746.09	58.00	85,274.19	44.01	3,752,785.85

SCE
Electric Division
361.00 Structures and Improvements

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1993	7,405,853.79	58.00	127,691.18	44.40	5,669,562.72
1994	5,315,823.66	58.00	91,655.04	44.80	4,105,932.99
1995	7,503,289.10	58.00	129,371.15	45.20	5,847,525.68
1996	3,626,852.15	58.00	62,533.92	45.61	2,852,053.21
1997	3,069,949.25	58.00	52,931.84	46.02	2,436,077.32
1998	3,414,848.20	58.00	58,878.56	46.44	2,734,583.33
1999	10,251,501.90	58.00	176,755.63	46.87	8,284,967.68
2000	7,548,033.47	58.00	130,142.63	47.31	6,156,960.50
2001	3,744,194.72	58.00	64,557.13	47.75	3,082,889.38
2002	6,513,039.91	58.00	112,297.35	48.21	5,413,664.44
2003	13,820,259.35	58.00	238,287.88	48.67	11,597,609.24
2004	4,483,588.47	58.00	77,305.70	49.14	3,799,142.86
2005	11,043,727.62	58.00	190,415.13	49.63	9,450,096.49
2006	6,914,108.58	58.00	119,212.55	50.12	5,975,287.79
2007	10,720,648.19	58.00	184,844.62	50.63	9,359,069.54
2008	22,241,030.88	58.00	383,478.20	51.15	19,616,639.73
2009	56,745,032.60	58.00	978,393.63	51.69	50,574,422.69
2010	26,069,580.02	58.00	449,489.76	52.24	23,482,035.92
2011	34,914,217.58	58.00	601,988.34	52.81	31,792,525.86
2012	16,973,792.41	58.00	292,660.87	53.40	15,628,863.50
2013	44,213,365.59	58.00	762,323.56	54.01	41,176,227.13
2014	75,945,749.24	58.00	1,309,450.96	54.65	71,557,956.78
2015	54,072,616.81	58.00	932,316.04	55.31	51,569,675.25
2016	40,993,218.14	58.00	706,802.02	56.01	39,590,739.50
2017	31,777,083.05	58.00	547,898.10	56.75	31,092,901.84
2018	36,581,828.71	58.00	630,741.17	57.56	36,302,911.51

SCE

Electric Division

361.00 Structures and Improvements

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **58** *Survivor Curve:* **L0**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	696,502,261.59	58.00	12,009,040.20	50.32	604,321,645.14

Composite Average Remaining Life ... **50.32 Years**

SCE
Electric Division
362.00 Station Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 67 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1911	0.24	67.00	0.00	28.02	0.10
1912	0.12	67.00	0.00	28.25	0.05
1914	0.08	67.00	0.00	28.71	0.03
1916	0.49	67.00	0.01	29.17	0.21
1917	6,832.70	67.00	101.98	29.40	2,998.50
1918	17,206.44	67.00	256.82	29.64	7,611.45
1919	1,460.08	67.00	21.79	29.88	651.07
1920	0.66	67.00	0.01	30.11	0.30
1921	5,427.15	67.00	81.00	30.35	2,458.68
1922	10,564.17	67.00	157.68	30.59	4,823.61
1923	183,204.63	67.00	2,734.48	30.84	84,319.12
1924	182,693.97	67.00	2,726.86	31.08	84,744.67
1925	80,835.76	67.00	1,206.54	31.33	37,794.94
1926	135,625.28	67.00	2,024.32	31.57	63,909.07
1927	264,279.63	67.00	3,944.60	31.82	125,521.25
1928	306,063.09	67.00	4,568.25	32.07	146,504.05
1929	323,805.37	67.00	4,833.07	32.32	156,222.89
1930	473,383.12	67.00	7,065.64	32.58	230,171.91
1931	151,565.53	67.00	2,262.24	32.83	74,276.73
1932	200,747.50	67.00	2,996.33	33.09	99,146.04
1933	22,949.49	67.00	342.54	33.35	11,423.59
1934	12,914.56	67.00	192.76	33.61	6,478.53
1935	43,237.42	67.00	645.36	33.87	21,860.13
1936	4,481.05	67.00	66.88	34.14	2,283.15
1937	17,456.38	67.00	260.55	34.40	8,963.92
1938	55,653.61	67.00	830.68	34.67	28,800.14
1939	46,546.90	67.00	694.75	34.94	24,275.79

SCE
Electric Division
362.00 Station Equipment

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 67 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1940	120,882.80	67.00	1,804.28	35.21	63,533.09
1941	24,122.00	67.00	360.04	35.49	12,776.84
1942	47,714.03	67.00	712.17	35.76	25,468.58
1943	26,800.02	67.00	400.01	36.04	14,416.59
1944	14,779.20	67.00	220.59	36.32	8,011.67
1945	24,766.09	67.00	369.65	36.60	13,529.82
1946	284,062.10	67.00	4,239.87	36.88	156,382.92
1947	354,859.46	67.00	5,296.58	37.17	196,874.64
1948	1,216,541.31	67.00	18,157.91	37.46	680,139.74
1949	1,836,674.94	67.00	27,413.93	37.75	1,034,799.26
1950	2,888,574.22	67.00	43,114.42	38.04	1,639,993.99
1951	2,128,562.37	67.00	31,770.60	38.33	1,217,847.75
1952	1,377,162.80	67.00	20,555.32	38.63	794,006.57
1953	1,291,410.52	67.00	19,275.40	38.93	750,320.82
1954	2,641,616.76	67.00	39,428.37	39.23	1,546,614.91
1955	2,877,912.91	67.00	42,955.29	39.53	1,697,970.41
1956	2,875,362.44	67.00	42,917.22	39.83	1,709,513.66
1957	5,182,336.13	67.00	77,350.76	40.14	3,104,861.67
1958	8,356,161.91	67.00	124,722.79	40.45	5,044,860.41
1959	5,855,988.13	67.00	87,405.58	40.76	3,562,674.26
1960	5,866,413.29	67.00	87,561.19	41.07	3,596,437.05
1961	4,782,981.05	67.00	71,390.04	41.39	2,954,809.10
1962	4,721,155.66	67.00	70,467.25	41.71	2,939,012.54
1963	4,118,353.51	67.00	61,469.91	42.03	2,583,481.30
1964	5,109,633.31	67.00	76,265.61	42.35	3,229,926.16
1965	8,404,974.47	67.00	125,451.36	42.68	5,353,844.19
1966	7,172,089.44	67.00	107,049.51	43.00	4,603,574.27

SCE

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 67 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1967	5,414,710.15	67.00	80,819.14	43.33	3,502,267.49
1968	6,064,415.53	67.00	90,516.54	43.67	3,952,595.93
1969	5,800,568.43	67.00	86,578.40	44.00	3,809,667.93
1970	3,995,505.93	67.00	59,636.31	44.34	2,644,278.26
1971	7,772,468.17	67.00	116,010.67	44.68	5,183,417.71
1972	6,808,138.65	67.00	101,617.24	45.02	4,575,135.56
1973	5,554,431.85	67.00	82,904.60	45.37	3,761,284.53
1974	7,132,842.59	67.00	106,463.72	45.72	4,867,177.58
1975	4,064,964.13	67.00	60,673.03	46.07	2,795,062.67
1976	6,003,010.74	67.00	89,600.02	46.42	4,159,315.68
1977	4,176,126.80	67.00	62,332.23	46.78	2,915,722.21
1978	1,639,603.54	67.00	24,472.47	47.14	1,153,531.15
1979	6,092,101.43	67.00	90,929.77	47.50	4,318,938.61
1980	8,663,896.52	67.00	129,315.99	47.86	6,189,297.89
1981	5,971,216.67	67.00	89,125.47	48.23	4,298,434.47
1982	16,640,509.39	67.00	248,373.70	48.60	12,070,707.56
1983	19,367,818.82	67.00	289,081.10	48.97	14,156,834.29
1984	13,371,312.77	67.00	199,578.17	49.35	9,848,695.22
1985	11,563,040.47	67.00	172,588.17	49.73	8,582,152.84
1986	19,716,564.99	67.00	294,286.43	50.11	14,746,034.82
1987	44,250,862.85	67.00	660,481.61	50.49	33,349,384.18
1988	29,898,682.69	67.00	446,263.16	50.88	22,706,166.43
1989	24,547,349.61	67.00	366,389.99	51.27	18,785,924.60
1990	19,582,012.73	67.00	292,278.13	51.67	15,101,771.52
1991	25,704,791.37	67.00	383,665.78	52.07	19,977,697.90
1992	34,543,579.76	67.00	515,592.19	52.48	27,056,288.10
1993	36,912,262.74	67.00	550,946.79	52.89	29,138,448.55

SCE

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 67 *Survivor Curve:* L0

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1994	20,430,568.31	67.00	304,943.54	53.30	16,254,810.81
1995	32,471,329.82	67.00	484,662.10	53.73	26,039,907.39
1996	21,375,807.60	67.00	319,052.03	54.16	17,278,768.60
1997	21,306,126.65	67.00	318,011.99	54.59	17,361,389.91
1998	32,851,942.54	67.00	490,343.07	55.04	26,986,461.47
1999	44,957,214.86	67.00	671,024.51	55.49	37,233,593.52
2000	68,630,980.73	67.00	1,024,375.52	55.95	57,309,180.88
2001	34,936,671.14	67.00	521,459.41	56.41	29,417,559.68
2002	50,759,063.80	67.00	757,622.02	56.89	43,100,342.53
2003	54,980,385.29	67.00	820,628.82	57.38	47,084,459.12
2004	50,104,060.19	67.00	747,845.54	57.87	43,278,281.48
2005	59,204,120.73	67.00	883,671.65	58.38	51,587,673.35
2006	55,578,571.51	67.00	829,557.26	58.90	48,857,091.93
2007	63,954,601.86	67.00	954,576.61	59.43	56,728,207.30
2008	84,706,048.48	67.00	1,264,309.52	59.97	75,820,089.43
2009	118,788,522.70	67.00	1,773,019.32	60.53	107,320,239.31
2010	101,776,682.30	67.00	1,519,103.19	61.10	92,819,034.05
2011	163,204,214.70	67.00	2,435,961.15	61.69	150,284,882.00
2012	133,783,761.30	67.00	1,996,835.96	62.30	124,405,528.86
2013	147,618,103.60	67.00	2,203,325.24	62.93	138,665,849.90
2014	180,588,694.00	67.00	2,695,439.23	63.59	171,392,556.01
2015	187,631,822.50	67.00	2,800,563.88	64.27	179,997,485.59
2016	139,900,391.50	67.00	2,088,131.85	64.98	135,692,228.33
2017	183,380,138.80	67.00	2,737,103.90	65.74	179,948,667.98
2018	211,497,961.70	67.00	3,156,786.23	66.55	210,084,127.01

SCE

Electric Division

362.00 Station Equipment

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

***Average Service Life:* 67** ***Survivor Curve:* L0**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
Total	2,727,819,402.22	67.00	40,715,015.18	59.40	2,418,355,572.20

***Composite Average Remaining Life ...* 59.40 Years**

SCE
Electric Division
366.00 Underground Conduit

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 64 *Survivor Curve:* R2.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1957	17,423,690.48	64.00	272,244.75	16.48	4,487,749.64
1958	331,267.99	64.00	5,176.05	16.98	87,898.84
1959	858,465.61	64.00	13,413.50	17.50	234,691.94
1960	511,984.18	64.00	7,999.74	18.02	144,184.78
1961	1,015,046.69	64.00	15,860.08	18.56	294,387.99
1962	1,114,440.03	64.00	17,413.10	19.11	332,845.30
1963	1,290,626.28	64.00	20,166.01	19.68	396,812.58
1964	1,739,128.63	64.00	27,173.84	20.26	550,418.94
1965	2,649,064.45	64.00	41,391.57	20.84	862,675.84
1966	9,629,484.14	64.00	150,460.46	21.44	3,226,464.04
1967	3,136,518.13	64.00	49,008.02	22.06	1,080,925.67
1968	4,638,706.05	64.00	72,479.67	22.68	1,643,661.62
1969	4,602,405.41	64.00	71,912.48	23.31	1,676,411.84
1970	10,114,252.06	64.00	158,034.95	23.95	3,785,585.53
1971	13,263,275.90	64.00	207,238.37	24.61	5,099,997.34
1972	12,011,007.28	64.00	187,671.70	25.27	4,742,710.13
1973	12,660,002.98	64.00	197,812.25	25.95	5,132,510.99
1974	14,892,548.73	64.00	232,695.72	26.63	6,196,005.04
1975	10,269,476.86	64.00	160,460.33	27.32	4,383,927.48
1976	8,524,579.86	64.00	133,196.36	28.02	3,732,506.53
1977	8,828,737.11	64.00	137,948.81	28.73	3,963,421.32
1978	9,305,709.65	64.00	145,401.49	29.45	4,282,112.18
1979	11,053,255.57	64.00	172,706.86	30.18	5,211,487.65
1980	13,323,236.15	64.00	208,175.25	30.91	6,434,960.57
1981	20,827,235.79	64.00	325,425.07	31.65	10,300,433.49
1982	17,020,691.79	64.00	265,947.91	32.40	8,617,848.45
1983	14,789,507.77	64.00	231,085.71	33.16	7,663,499.12

SCE
Electric Division
366.00 Underground Conduit

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 64 *Survivor Curve:* R2.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1984	13,242,312.16	64.00	206,910.81	33.93	7,020,072.81
1985	21,354,260.12	64.00	333,659.81	34.70	11,578,662.63
1986	29,183,449.76	64.00	455,990.71	35.48	16,179,224.50
1987	42,183,739.17	64.00	659,119.92	36.27	23,906,398.62
1988	47,029,830.68	64.00	734,839.99	37.06	27,235,850.18
1989	40,724,666.81	64.00	636,321.95	37.87	24,095,314.67
1990	33,763,015.31	64.00	527,546.31	38.67	20,402,086.58
1991	42,283,517.75	64.00	660,678.96	39.49	26,090,296.26
1992	33,611,483.49	64.00	525,178.63	40.31	21,171,227.66
1993	28,781,957.53	64.00	449,717.40	41.14	18,501,314.93
1994	32,037,415.54	64.00	500,583.86	41.98	21,012,056.71
1995	25,247,647.35	64.00	394,493.89	42.81	16,890,176.84
1996	21,361,657.80	64.00	333,775.40	43.66	14,573,438.16
1997	16,687,357.93	64.00	260,739.57	44.51	11,606,529.57
1998	17,974,167.35	64.00	280,845.94	45.37	12,742,909.52
1999	36,109,340.04	64.00	564,207.58	46.24	26,087,641.79
2000	14,411,820.99	64.00	225,184.36	47.11	10,607,675.58
2001	18,403,165.84	64.00	287,549.03	47.98	13,797,164.56
2002	41,588,380.48	64.00	649,817.46	48.86	31,750,910.48
2003	40,737,026.76	64.00	636,515.08	49.75	31,664,693.01
2004	40,861,199.71	64.00	638,455.28	50.64	32,328,866.50
2005	48,613,505.58	64.00	759,584.87	51.53	39,142,553.31
2006	49,847,100.40	64.00	778,859.76	52.43	40,835,496.11
2007	37,375,479.09	64.00	583,990.98	53.33	31,146,820.90
2008	62,437,722.34	64.00	975,587.93	54.24	52,918,585.73
2009	53,196,022.30	64.00	831,186.59	55.15	45,843,660.08
2010	75,180,753.14	64.00	1,174,697.49	56.07	65,866,540.82

SCE
Electric Division
366.00 Underground Conduit

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 64 *Survivor Curve:* R2.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2011	103,321,093.90	64.00	1,614,389.64	56.99	92,004,929.76
2012	84,767,491.54	64.00	1,324,490.05	57.91	76,707,552.11
2013	145,670,799.90	64.00	2,276,102.80	58.84	133,929,162.59
2014	187,604,480.80	64.00	2,931,315.57	59.77	175,212,859.61
2015	173,365,509.90	64.00	2,708,831.98	60.71	164,445,094.51
2016	149,820,046.00	64.00	2,340,934.67	61.64	144,304,436.14
2017	204,409,696.50	64.00	3,193,896.66	62.58	199,888,299.03
2018	151,659,154.80	64.00	2,369,670.70	63.53	150,538,698.77
Total	2,390,670,614.33	64.00	37,354,171.69	51.58	1,926,593,335.89

Composite Average Remaining Life ... 51.58 Years

SCE
Electric Division
369.00 Services

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 *Survivor Curve:* R1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1956	2,476.64	60.00	41.28	18.14	748.86
1957	2,405,108.15	60.00	40,084.69	18.59	745,356.60
1958	43,795.25	60.00	729.91	19.05	13,908.35
1959	109,198.64	60.00	1,819.96	19.52	35,534.20
1960	59,910.47	60.00	998.50	20.00	19,973.13
1961	603,829.44	60.00	10,063.71	20.49	206,201.55
1963	439,823.23	60.00	7,330.31	21.49	157,521.32
1964	423,201.93	60.00	7,053.29	22.00	155,194.74
1965	970,064.05	60.00	16,167.55	22.53	364,183.77
1966	531,558.19	60.00	8,859.20	23.06	204,259.64
1967	861,236.73	60.00	14,353.78	23.59	338,667.97
1968	686,071.80	60.00	11,434.40	24.14	276,052.84
1969	7,643,937.74	60.00	127,397.54	24.70	3,146,257.76
1970	7,030,862.63	60.00	117,179.73	25.26	2,960,124.97
1971	6,840,299.97	60.00	114,003.72	25.83	2,945,190.25
1972	9,748,642.02	60.00	162,475.55	26.41	4,291,714.92
1973	9,080,337.74	60.00	151,337.27	27.00	4,086,377.92
1974	9,613,512.08	60.00	160,223.41	27.60	4,421,907.75
1975	7,926,185.96	60.00	132,101.62	28.20	3,725,314.61
1976	10,237,141.41	60.00	170,617.11	28.81	4,915,943.93
1977	13,815,799.49	60.00	230,260.75	29.43	6,777,052.31
1978	15,431,570.39	60.00	257,189.96	30.06	7,730,700.95
1979	17,692,208.57	60.00	294,866.84	30.69	9,049,686.64
1980	11,522,154.84	60.00	192,033.76	31.33	6,016,745.61
1981	14,972,558.40	60.00	249,539.85	31.98	7,979,623.57
1982	10,314,895.09	60.00	171,912.99	32.63	5,609,942.55
1983	15,955,940.52	60.00	265,929.37	33.29	8,853,781.26

SCE
Electric Division
369.00 Services

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **60** *Survivor Curve:* **R1.5**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1984	18,188,753.96	60.00	303,142.51	33.96	10,295,052.58
1985	21,415,938.02	60.00	356,928.30	34.63	12,361,806.64
1986	25,442,114.80	60.00	424,030.50	35.31	14,974,283.38
1987	27,749,202.06	60.00	462,481.52	36.00	16,648,631.50
1988	29,259,553.00	60.00	487,653.76	36.69	17,892,556.57
1989	40,221,497.84	60.00	670,350.79	37.39	25,063,790.77
1990	32,715,124.38	60.00	545,245.97	38.09	20,769,635.46
1991	24,810,005.22	60.00	413,495.46	38.80	16,043,615.22
1992	24,744,609.51	60.00	412,405.54	39.51	16,295,876.72
1993	23,906,341.03	60.00	398,434.56	40.23	16,029,720.98
1994	22,550,660.96	60.00	375,840.14	40.96	15,393,059.87
1995	23,028,549.78	60.00	383,804.87	41.69	15,999,106.37
1996	22,992,100.66	60.00	383,197.39	42.42	16,254,844.37
1997	24,454,931.84	60.00	407,577.63	43.16	17,589,526.30
1998	24,712,851.60	60.00	411,876.25	43.90	18,080,951.01
1999	23,439,512.11	60.00	390,654.16	44.64	17,440,540.18
2000	19,253,815.63	60.00	320,893.33	45.40	14,567,262.02
2001	29,333,975.64	60.00	488,894.12	46.15	22,563,079.71
2002	34,475,123.79	60.00	574,578.96	46.91	26,952,993.28
2003	44,695,816.18	60.00	744,921.93	47.67	35,512,462.71
2004	56,744,468.37	60.00	945,730.55	48.44	45,811,221.88
2005	53,788,524.23	60.00	896,465.37	49.21	44,114,967.28
2006	68,388,928.60	60.00	1,139,802.72	49.99	56,973,503.10
2007	63,473,693.46	60.00	1,057,883.05	50.76	53,703,008.50
2008	55,324,270.43	60.00	922,060.85	51.55	47,529,895.22
2009	46,341,676.55	60.00	772,352.63	52.33	40,420,007.75
2010	30,556,338.19	60.00	509,266.60	53.12	27,054,573.27

SCE
Electric Division
369.00 Services

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 60 **Survivor Curve: R1.5**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2011	39,878,669.80	60.00	664,637.06	53.92	35,835,950.62
2012	36,257,788.76	60.00	604,289.71	54.72	33,064,970.83
2013	41,156,880.55	60.00	685,940.33	55.52	38,083,198.71
2014	44,340,164.33	60.00	738,994.47	56.33	41,624,547.53
2015	53,202,037.30	60.00	886,690.70	57.14	50,661,438.60
2016	52,025,818.11	60.00	867,087.26	57.95	50,247,339.32
2017	73,552,166.84	60.00	1,225,855.72	58.77	72,038,972.37
2018	67,013,437.01	60.00	1,116,878.11	59.59	66,552,897.89
Total	1,494,397,661.91	60.00	24,906,348.89	46.39	1,155,473,256.45

Composite Average Remaining Life ... 46.39 Years

SCE
Electric Division
370.00 Meters

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 30 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1958	128.63	0.00	0.00	0.00	0.00
1959	456.07	0.00	0.00	0.00	0.00
1960	600.49	0.00	0.00	0.00	0.00
1961	512.55	0.00	0.00	0.00	0.00
1962	367.53	0.00	0.00	0.00	0.00
1963	3,114.65	0.00	0.00	0.00	0.00
1964	3,690.75	0.00	0.00	0.00	0.00
1965	6,127.78	0.00	0.00	0.00	0.00
1966	2,308.78	0.00	0.00	0.00	0.00
1967	592.14	0.00	0.00	0.00	0.00
1968	716.56	30.00	23.89	0.50	11.94
1969	908.13	30.00	30.27	0.51	15.48
1970	651.14	30.00	21.70	0.65	14.06
1971	1,171.12	30.00	39.04	0.83	32.40
1972	1,434.56	30.00	47.82	1.06	50.74
1973	258,107.96	30.00	8,603.59	1.30	11,189.85
1974	1,812.49	30.00	60.42	1.54	92.89
1975	1,425.26	30.00	47.51	1.79	85.11
1976	1,419.54	30.00	47.32	2.05	96.88
1977	3,524.00	30.00	117.47	2.30	269.77
1978	2,886.08	30.00	96.20	2.55	245.68
1979	3,542.75	30.00	118.09	2.81	332.24
1980	3,502.70	30.00	116.76	3.07	358.76
1981	3,615.06	30.00	120.50	3.35	403.19
1982	2,774.37	30.00	92.48	3.63	335.93
1983	2,907.77	30.00	96.93	3.93	381.28
1984	1,132,276.15	30.00	37,742.49	4.26	160,738.15

SCE
Electric Division
370.00 Meters

Original Cost Of Utility Plant In Service
And Development Of Composite Remaining Life as of December 31, 2019
Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **30** *Survivor Curve:* **R3**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1985	3,420,013.53	30.00	114,000.30	4.61	525,354.32
1986	5,029,456.84	30.00	167,648.34	4.98	835,707.56
1987	3,904,135.15	30.00	130,137.67	5.39	701,588.95
1988	4,657,980.98	30.00	155,265.83	5.83	904,874.86
1989	13,994,561.33	30.00	466,484.76	6.30	2,937,689.85
1990	11,448,562.20	30.00	381,618.23	6.80	2,594,218.45
1991	6,708,927.27	30.00	223,630.61	7.33	1,639,119.66
1992	3,092,518.61	30.00	103,083.82	7.89	813,725.15
1993	3,480,178.57	30.00	116,005.80	8.49	984,442.64
1994	1,829,926.84	30.00	60,997.48	9.11	555,466.51
1995	3,255,920.56	30.00	108,530.54	9.76	1,058,728.48
1996	1,345,067.96	30.00	44,835.54	10.43	467,517.26
1997	1,252,316.59	30.00	41,743.83	11.12	464,311.61
1998	1,739,699.03	30.00	57,989.89	11.84	686,720.94
1999	2,879,556.74	30.00	95,985.10	12.58	1,207,565.88
2000	2,440,441.64	30.00	81,347.95	13.34	1,085,096.10
2001	6,285,538.72	30.00	209,517.68	14.12	2,957,832.85
2002	9,930,155.06	30.00	331,004.73	14.91	4,936,155.94
2003	5,766,637.71	30.00	192,221.00	15.73	3,022,695.23
2004	6,525,857.26	30.00	217,528.29	16.56	3,601,288.26
2005	8,867,440.07	30.00	295,580.94	17.40	5,143,417.57
2006	9,910,002.10	30.00	330,332.97	18.26	6,032,515.47
2007	10,840,431.93	30.00	361,347.25	19.14	6,915,688.15
2008	31,428,929.67	30.00	1,047,629.60	20.03	20,982,556.50
2009	633,785,708.80	30.00	21,126,162.31	20.93	442,207,305.31
2010	62,426,012.76	30.00	2,080,864.34	21.85	45,462,912.14
2011	76,529,957.49	30.00	2,550,995.20	22.78	58,099,728.33

SCE

Electric Division

370.00 Meters

Original Cost Of Utility Plant In Service

And Development Of Composite Remaining Life as of December 31, 2019

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: **30** *Survivor Curve:* **R3**

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2012	12,481,590.06	30.00	416,052.45	23.71	9,865,855.30
2013	5,388,070.14	30.00	179,602.10	24.66	4,429,140.03
2014	7,997,360.85	30.00	266,578.34	25.62	6,828,888.24
2015	8,831,612.30	30.00	294,386.69	26.58	7,824,898.07
2016	11,410,301.98	30.00	380,342.90	27.55	10,478,791.60
2017	7,075,700.15	30.00	235,856.36	28.53	6,728,259.24
2018	23,827,820.73	30.00	794,259.64	29.51	23,436,888.15
Total	1,011,228,966.63	25.08	33,706,990.92	20.37	686,591,598.97

Composite Average Remaining Life ... 20.37 Years

Detailed Rate Comparison - Net Salvage Impact Only

Exhibit DJG-15

Account No.	Description	[1] CPUC Plant 1/1/2019	[2] Current Parameters Depr Rate	[2] Current Parameters Annual Accrual	[3] SCE Proposal Depr Rate	[3] SCE Proposal Annual Accrual	[4] TURN Proposal (Net Salvage Only) Depr Rate	[4] TURN Proposal (Net Salvage Only) Annual Accrual	[5] Proposed Change to Current Rates (NS Only) Depr Rate	[5] Proposed Change to Current Rates (NS Only) Annual Accrual	[6] TURN's Adjustment to SCE Proposal (NS ONLY) Depr Rate	[6] TURN's Adjustment to SCE Proposal (NS ONLY) Annual Accrual
	Transmission Plant											
352.00	Structures and Improvements	340,075,763	2.41%	8,195,826	2.42%	8,229,833	2.42%	8,228,595	0.01%	32,769	0.00%	-1,238
353.00	Station Equipment	2,612,060,862	2.58%	67,391,170	2.59%	67,652,376	2.59%	67,698,474	0.01%	307,303	0.00%	46,097
354.00	Towers and Fixtures	71,069,207	2.46%	1,748,302	2.89%	2,053,900	2.61%	1,854,280	0.15%	105,977	-0.28%	-199,621
355.00	Poles and Fixtures	1,113,653,589	2.54%	28,286,801	2.96%	32,964,146	2.74%	30,484,564	0.20%	2,197,762	-0.22%	-2,479,583
356.00	Overhead Conductors & Devices	341,584,044	2.83%	9,666,828	3.31%	11,306,432	3.00%	10,235,571	0.17%	568,743	-0.31%	-1,070,861
357.00	Underground Conduit	80,595,837	1.73%	1,394,308	1.83%	1,466,844	1.82%	1,463,466	0.09%	69,158	-0.01%	-3,378
358.00	Underground Conductors & Devices	315,350,326	2.30%	7,253,057	2.87%	9,082,089	2.57%	8,096,501	0.27%	843,443	-0.30%	-985,588
359.00	Roads and Trails	21,713,455	1.65%	358,272	1.65%	358,272	1.65%	357,514	0.00%	-758	0.00%	-758
	TOTAL TRANSMISSION PLANT	4,896,103,082	2.54%	124,294,566	2.72%	133,113,894	2.62%	128,418,964	0.08%	4,124,398	-0.10%	-4,694,930
	Distribution Plant											
361.00	Structures and Improvements	696,487,874	2.27%	15,810,275	2.38%	16,576,411	2.14%	14,901,281	-0.13%	-908,994	-0.24%	-1,675,130
362.00	Station Equipment	2,726,408,043	1.90%	51,801,753	2.15%	58,617,773	1.95%	53,086,051	0.05%	1,284,298	-0.20%	-5,531,722
364.00	Poles, Towers and Fixtures	3,147,641,758	5.96%	187,599,449	5.99%	188,543,741	5.99%	188,693,770	0.03%	1,094,321	0.00%	150,029
365.00	Overhead Conductors & Devices	1,842,492,281	3.85%	70,935,953	5.64%	103,916,565	4.42%	81,475,878	0.57%	10,539,925	-1.22%	-22,440,686
366.00	Underground Conduit	2,389,265,472	2.27%	54,236,326	3.42%	81,712,879	2.61%	62,350,674	0.34%	8,114,348	-0.81%	-19,362,205
367.00	Underground Conductors & Devices	6,486,079,350	3.51%	227,661,385	4.30%	278,901,412	3.51%	227,885,844	0.00%	224,459	-0.79%	-51,015,568
368.00	Line Transformers	4,218,947,448	4.35%	183,524,214	5.66%	238,792,426	4.69%	197,751,956	0.34%	14,227,742	-0.97%	-41,040,470
369.00	Services	1,494,348,468	3.27%	48,865,195	3.32%	49,612,369	3.32%	49,623,152	0.05%	757,957	0.00%	10,783
370.00	Meters	1,011,251,062	5.99%	60,573,939	5.81%	58,753,687	5.81%	58,728,186	-0.18%	-1,845,753	0.00%	-25,501
371.00	Installations on Customer Premises	12,372,731	4.44%	549,349	3.61%	446,656	3.61%	447,167	-0.83%	-102,182	0.00%	512
373.00	Street Lighting & Signal Systems	862,111,578	2.79%	24,052,913	3.15%	27,156,515	2.78%	24,005,076	-0.01%	-47,837	-0.37%	-3,151,438
	TOTAL DISTRIBUTION PLANT	24,887,406,063	3.72%	925,610,750	4.43%	1,103,030,433	3.85%	958,949,035	0.13%	33,338,285	-0.58%	-144,081,398
	General Plant											
390.00	Structures and Improvements	1,079,844,132	2.08%	22,460,758	1.82%	19,653,163	1.67%	18,024,289	-0.41%	-4,436,469	-0.15%	-1,628,874
	TOTAL GENERAL PLANT	1,079,844,132	2.08%	22,460,758	1.82%	19,653,163	7.55%	18,024,289	5.47%	-4,436,469	5.73%	-1,628,874
	TOTAL PLANT STUDIED	**30,863,353,278**	**3.47%**	**1,072,366,074**	**4.07%**	**1,255,797,490**	**3.71%**	**1,105,392,288**	**0.24%**	**33,026,214**	**-0.36%**	**-150,405,202**

[1], [2], [3] From WPSCE-07V03Gunn - Depreciation Proposal Impacts

[4] Annual accrual = [1] * depr rate

[5] = [4] - [2]

[6] = [4] - [3]

Detailed Rate Comparison - Jan. 1, 2019 Plant Balances

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		SCE Proposal		TURN Proposal		TURN's Proposed Change to Current Parameters		TURN's Adjustment to SCE Proposal	
Account No.	Description	CPUC Plant 1/1/2019	Depr Rate	Annual Accrual	Depr Rate	Annual Accrual	Depr Rate	Annual Accrual	Depr Rate	Annual Accrual	Depr Rate	Annual Accrual
	Transmission Plant											
352.00	Structures and Improvements	340,075,763	2.41%	8,195,826	2.42%	8,229,833	2.25%	7,649,188	-0.16%	-546,638	-0.17%	-580,646
353.00	Station Equipment	2,612,060,862	2.58%	67,391,170	2.59%	67,652,376	2.59%	67,698,474	0.01%	307,303	0.00%	46,097
354.00	Towers and Fixtures	71,069,207	2.46%	1,748,302	2.89%	2,053,900	2.43%	1,728,664	-0.03%	-19,638	-0.46%	-325,236
355.00	Poles and Fixtures	1,113,653,589	2.54%	28,286,801	2.96%	32,964,146	2.74%	30,484,564	0.20%	2,197,762	-0.22%	-2,479,583
356.00	Overhead Conductors & Devices	341,584,044	2.83%	9,666,828	3.31%	11,306,432	2.78%	9,481,457	-0.05%	-185,372	-0.53%	-1,824,975
357.00	Underground Conduit	80,595,837	1.73%	1,394,308	1.83%	1,466,844	1.82%	1,463,466	0.09%	69,158	-0.01%	-3,378
358.00	Underground Conductors & Devices	315,350,326	2.30%	7,253,057	2.87%	9,082,089	2.57%	8,096,501	0.27%	843,443	-0.30%	-985,588
359.00	Roads and Trails	21,713,455	1.65%	358,272	1.65%	358,272	1.65%	357,514	0.00%	-758	0.00%	-758
	TOTAL TRANSMISSION PLANT	4,896,103,082	2.54%	124,294,566	2.72%	133,113,894	2.59%	126,959,826	0.05%	2,665,261	-0.13%	-6,154,067
	Distribution Plant											
361.00	Structures and Improvements	696,487,874	2.27%	15,810,275	2.38%	16,576,411	1.96%	13,680,095	-0.31%	-2,130,180	-0.42%	-2,896,316
362.00	Station Equipment	2,726,408,043	1.90%	51,801,753	2.15%	58,617,773	1.86%	50,664,060	-0.04%	-1,137,693	-0.29%	-7,953,713
364.00	Poles, Towers and Fixtures	3,147,641,758	5.96%	187,599,449	5.99%	188,543,741	5.99%	188,693,770	0.03%	1,094,321	0.00%	150,029
365.00	Overhead Conductors & Devices	1,842,492,281	3.85%	70,935,953	5.64%	103,916,565	4.42%	81,475,878	0.57%	10,539,925	-1.22%	-22,440,686
366.00	Underground Conduit	2,389,265,472	2.27%	54,236,326	3.42%	81,712,879	2.33%	55,725,696	0.06%	1,489,370	-1.09%	-25,987,183
367.00	Underground Conductors & Devices	6,486,079,350	3.51%	227,661,385	4.30%	278,901,412	3.51%	227,885,844	0.00%	224,459	-0.79%	-51,015,568
368.00	Line Transformers	4,218,947,448	4.35%	183,524,214	5.66%	238,792,426	4.69%	197,751,956	0.34%	14,227,742	-0.97%	-41,040,470
369.00	Services	1,494,348,468	3.27%	48,865,195	3.32%	49,612,369	2.97%	44,414,428	-0.30%	-4,450,766	-0.35%	-5,197,941
370.00	Meters	1,011,251,062	5.99%	60,573,939	5.81%	58,753,687	3.12%	31,513,194	-2.87%	-29,060,745	-2.69%	-27,240,493
371.00	Installations on Customer Premises	12,372,731	4.44%	549,349	3.61%	446,656	3.61%	447,167	-0.83%	-102,182	0.00%	512
373.00	Street Lighting & Signal Systems	862,111,578	2.79%	24,052,913	3.15%	27,156,515	2.78%	24,005,076	-0.01%	-47,837	-0.37%	-3,151,438
	TOTAL DISTRIBUTION PLANT	24,887,406,063	3.72%	925,610,750	4.43%	1,103,030,433	3.68%	916,257,165	-0.04%	-9,353,585	-0.75%	-186,773,268
	General Plant											
390.00	Structures and Improvements	1,079,844,132	2.08%	22,460,758	1.82%	19,653,163	1.82%	19,616,455	-0.26%	-2,844,303	0.00%	-36,708
	TOTAL GENERAL PLANT	1,079,844,132	2.08%	22,460,758	1.82%	19,653,163	1.82%	19,616,455	-0.26%	-2,844,303	0.00%	-36,708
	TOTAL PLANT STUDIED	**30,863,353,278**	**3.47%**	**1,072,366,074**	**4.07%**	**1,255,797,490**	**3.44%**	**1,062,833,447**	**-0.03%**	**-9,532,627**	**-0.63%**	**-192,964,043**

[1], [2], [3] From WPSCE-07V03Gunn - Depreciation Proposal Impacts
[4] Annual accrual = [1] * depr rate
[5] = [4] - [2]
[6] = [4] - [3]