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October 20, 2017

Trisha Osborne
Assistant Commission Secretary
Public Utilities Commission of Nevada
1150 East William Street
Carson City, NV 89701

Re: Docket Nos. 17-06003 and 17-06004

Dear Ms. Osborne:

Please accept for filing the Testimony of David J. Garrett, with work papers, filed by the Bureau of Consumer Protection in the above-referenced dockets.

If you have any questions, please call Paul Stuhff, Senior Deputy Attorney General, at (702) 486-3490.

Sincerely,

ERNEST D. FIGUEROA
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PES/bj
cc: Parties of Record

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

Nevada Power Company
d/b/a NV Energy
2017 Depreciation Study

Docket Nos. 17-06003 and 17-06004

Responsive Testimony of

David J. Garrett

on behalf of the
Bureau of Consumer Protection

October 20, 2017

TABLE OF CONTENTS

APPENDICES

List of Exhibits

LIST OF FIGURES

INTRODUCTION

Q1. State your name and occupation.

A1. My name is David J. Garrett. I am a consultant specializing in public utility regulation. I am the managing member of Resolve Utility Consulting. I focus my practice on the primary capital recovery mechanisms for public utility companies: cost of capital and depreciation.

Q2. Summarize your educational background and professional experience.

A2. I received a B.B.A. degree with a major in Finance, an M.B.A. degree, and a Juris Doctor degree from the University of Oklahoma. I worked in private legal practice for several years before accepting a position as assistant general counsel at the Oklahoma Corporation Commission in 2011. At the Commission, I worked in the Office of General Counsel in regulatory proceedings. In 2012, I began working for the Public Utility Division as a regulatory analyst providing testimony in regulatory proceedings. 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. I have testified in many regulatory proceedings regarding cost of capital and depreciation. A more complete description of my qualifications and regulatory experience is included in my curriculum vitae.[1]

Q3. On whose behalf are you testifying in this proceeding?

A3. I am testifying on behalf of the Bureau of Consumer Protection ("BCP").

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[1] Exhibit DJG 1.

Q4. Describe the purpose and scope of your testimony in this proceeding.

A4. I am responding to the depreciation study conducted by Gannett Fleming on the depreciable assets of Nevada Power Company d/b/a NV Energy ("NPC" or the "Company") and the corresponding testimony of NPC witness Mr. Ned W. Allis, who sponsors the depreciation study.

EXECUTIVE SUMMARY

Q5. Please summarize the key points of your testimony.

A5. In the context of utility ratemaking, "depreciation" refers to a cost allocation system designed to measure the rate by which a utility may recover its capital investments in a systematic and rational manner. I employed a well-established depreciation system and used actuarial analysis to statistically analyze the Company's depreciable assets to develop reasonable depreciation rates in this case. The table below compares NPC's and BCP's proposed rates and accruals by plant function.[2]

Figure 1:
Depreciation Rate Comparison by Plant Function

Plant Function	Original Cost	NPC's Proposal		BCP's Proposal		Difference	
		Rate	Accrual	Rate	Accrual	Rate	Accrual
Intangible Plant	$ 259,088,647	7.43%	$ 19,250,286	5.03%	$ 13,029,650	-2.40%	$ (6,220,636)
Transmission	1,268,796,654	1.75%	22,183,525	1.69%	21,405,206	-0.06%	(778,319)
Distribution	3,188,398,843	2.61%	83,064,549	2.26%	72,033,045	-0.35%	(11,031,504)
General	316,105,015	5.75%	18,167,198	5.75%	18,167,198	0.00%	-
Total Accounts Studied	$ 5,032,389,158	2.83%	$ 142,665,559	2.48%	$ 124,635,100	**-0.36%**	**$ (18,030,459)**

BCP's adjustments result in a decrease of $18 million in the annual accrual. The depreciation accruals shown in this table were calculated based on the original cost of plant

[2] *See also* Exhibits DJG-2 and DJG-3.

as of the depreciation study date – December 31, 2016. For BCP's final adjustment to NPC's proposed depreciation expense, please refer to the responsive testimony and exhibits of BCP witness James R. Dittmer.

Q6. Summarize the primary factors driving BCP's adjustment.

A6. There are two primary factors driving BCP's adjustment in this case: (1) extending the proposed Iowa curves and service lives for several of NPC's transmission and distribution accounts to reflect a better and more reasonable representation of the historical and future retirement rates of the assets in these accounts; and (2) extending the proposed amortization period of Account 303 (Software) by three years.

LEGAL STANDARDS

Q7. Discuss the standard by which regulated utilities are allowed to recover depreciation expense.

A7. 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."[3] 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.[4] Moreover, the *Lindheimer* Court found:

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

[4] *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."

> [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.[5]

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.

Q8. Should depreciation represent an allocated cost of capital to operation, rather than a mechanism to determine loss of value.

A8. 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.[6] 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.[7] The definition of "depreciation accounting" published by the American Institute of Certified Public Accountants ("AICPA") properly reflects the cost allocation concept:

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[5] *Id.* at 169.

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

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

> 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.[8]

Thus, the concept of depreciation as "the allocation of cost has proven to be the most useful and most widely used concept."[9]

ANALYTIC METHODS

Q9. Discuss the definition and purpose of a depreciation system, as well as the depreciation system you employed for this project.

A9. The legal standards set forth above do not mandate a specific procedure for conducting depreciation analysis. Nonetheless, depreciation analysts must 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 four 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.[10] In this case, I used the straight-line method, the average life procedure, the remaining life technique, and the broad group model; this system would be denoted as an "SL-AL-RL-BG" system. This depreciation system conforms to the legal standards set forth above, and is commonly used by depreciation analysts in regulatory proceedings. The

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

[9] Wolf *supra* n. 6, at 73.

[10] *See* Wolf *supra* n. 6, at 70, 140.

Company used a very similar approach in this case. I provide a more detailed discussion of depreciation system parameters, theories, and equations in Appendix A.

Q10. Please describe the actuarial process you used to analyze the Company's depreciable property.

A10. The study of retirement patterns of industrial property is derived from the actuarial process used to study human mortality. Just as actuarial scientists study historical human mortality data in order to predict how long a group of people will live, depreciation analysts study historical plant data in order to estimate the average lives of property groups. The most common actuarial method used by depreciation analysts is called the "retirement rate method." In the retirement rate method, original property data, including additions, retirements, transfers, and other transactions, are organized by vintage and transaction year.[11] The retirement rate method is ultimately used to develop an "observed life table," ("OLT") which shows the percentage of property surviving at each age interval. This pattern of property retirement is described as a "survivor curve." The survivor curve derived from the observed life table, however, must be fitted and smoothed with a complete curve in order to determine the ultimate average life of the group.[12] The most widely used survivor curves for this curve fitting process were developed at Iowa State University in the early 1900s and are commonly known as the "Iowa curves."[13] A more detailed

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

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

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

explanation of how the Iowa curves are used in the actuarial analysis of depreciable property is set forth in Appendix C, pages 77-91.

Q11. Describe the Company's depreciable assets in this case.

A11. The Company's depreciable assets can be divided into two main groups: life span property (i.e., production plant) and mass property (i.e., transmission and distribution plant). The analytical process is slightly different for each type of property, as discussed further below.

LIFE SPAN PROPERTY ANALYSIS

Q12. Describe the approach to analyzing life span property.

A12. For life span property, there are essentially three steps to the analytical process. First, I reviewed the Company's proposed life spans for each of its production units and compared them life span estimates of other similar production units in other jurisdictions. Second, I examined the Company's proposed interim retirement curves for each account in order to assess the remaining lives and depreciation rates for each production unit. Finally, I analyzed the weighted net salvage for each account, which involved reviewing the Company's weighting of interim and terminal retirements for each production account as well as analyzing the Company's proposed interim and terminal net salvage rates.

Q13. Describe life span property.

A13. The Company's depreciable property could be divided into two main groups: life span property and mass property. "Life span" property accounts usually consist of property within a production plant. The assets within a production plant will be retired concurrently at the time the plant is retired, regardless of their individual ages or remaining economic lives. For example, a production plant will contain property from several accounts, such as structures, fuel holders, and generators. When the plant is ultimately retired, all of the property associated with the plant will be retired together, regardless of the age of each individual unit. Analysts often use the analogy of a car to explain the treatment of life span property. Throughout the life of a car, the owner will retire and replace various components, such as tires, belts, and brakes. When the car reaches the end of its useful life and is finally retired, all of the car's individual components are retired together. Some of the components may still have some useful life remaining, but they are nonetheless retired along with the car. Thus, the various accounts of life span property are scheduled to retire as of the unit's probable retirement date. The retirement rate of these components are described by "interim" survivor curves.

Q14. Are you recommending any adjustments to NPC's proposed depreciation rates for its production accounts?

A14. No. However, I am proposing adjustments to several of the Company's mass property accounts, as discussed further below.

MASS PROPERTY ANALYSIS

Q15. Describe mass property.

A15. Unlike life span property accounts, "mass" property accounts usually contain a large number of small units that will not be retired concurrently. For example, poles, conductors, transformers, and other transmission and distribution plant are usually classified as mass property. Estimating the service life of any single unit contained in a mass account would not require any actuarial analysis or curve-fitting techniques. Since we must develop a single rate for an entire group of assets, however, actuarial analysis is required to calculate the average remaining life of the group.

Q16. How did you determine the depreciation rates for the mass property accounts?

A16. To develop depreciation rates for NPC's mass property accounts, I obtained the Company's historical plant data to develop observed life tables for each account. I used Iowa curves to smooth and complete the observed data to calculate the average remaining life of each account. Finally, I analyzed the Company's proposed net salvage rates for each mass account by reviewing the historical salvage data. After estimating the remaining life and salvage rates for each account, I calculated the corresponding depreciation rates. Further details about the actuarial analysis and curve-fitting techniques involved in this process are presented in Appendices B and C, pages 64-91.

Service Life Estimates

Q17. Please describe your approach in estimating the service lives of mass property.

A17. I used all of the Company's property data and created an observed life table ("OLT") for each account. The data points on the OLT can be plotted to form a curve (the "OLT curve"). The OLT curve is not a theoretical curve, rather, it is actual observed data from the Company's records that indicate the rate of retirement for each property group. An OLT curve by itself, however, is rarely a smooth curve, and is often not a "complete" curve (i.e., it does not end at zero percent surviving). In order to calculate average life (the area under a curve), a complete survivor curve is needed. The Iowa curves are empirically-derived curves based on the extensive studies of the actual mortality patterns of many different types of industrial property. The curve-fitting process involves selecting the best Iowa curve to fit the OLT curve. This can be accomplished through a combination of visual and mathematical curve-fitting techniques, as well as professional judgment. The first step of my approach to curve-fitting involves visually inspecting the OLT curve for any irregularities. For example, if the "tail" end of the curve is erratic and shows a sharp decline over a short period of time, it may indicate that this portion of the data is less reliable, as further discussed below. After inspecting the OLT curve, I use a mathematical curve-fitting technique which essentially involves measuring the distance between the OLT curve and the selected Iowa curve in order to get an objective, mathematical assessment of how well the curve fits. After selecting an Iowa curve, I observe the OLT curve along with the Iowa curve on the same graph to determine how well the curve fits. I may repeat this process several times for any given account to ensure that the most reasonable Iowa curve is selected.

Q18. Do you always select the mathematically best-fitting curve?

A18. Not necessarily. Mathematical fitting is a very important part of the curve-fitting process because it promotes objective, unbiased results. However, the best curve indicated by mathematical curve fitting may not always yield the most reasonable result, especially for accounts with limited historical data or unusual observed retirement patterns. In fact, for many of the accounts analyzed in this case, I selected curves that were not the mathematical best fit, and in almost every instance. this decision resulted in a shorter curve (i.e., higher depreciation rate) being selected.

Q19. Should every portion of the OLT curve be given equal weight?

A19. Not necessarily. Many analysts have observed that the points comprising the "tail end" of the OLT curve may often have less analytical value than other portions of the curve. "Points at the end of the curve are often based on fewer exposures and may be given less weight than points based on larger samples. The weight placed on those points will depend on the size of the exposures."[14] In accordance with this standard, an analyst may decide to truncate the tail end of the OLT curve at a certain percent of initial exposures, such as one percent. 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 analyses that involved fitting Iowa curves to the most significant part of the OLT curve. 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.

Analysis of Adjusted Accounts

Q20. Discuss your analysis of material accounts.

A20. In this case I am proposing adjustments to six of the Company's transmission and distribution accounts. I analyzed these accounts using both visual and mathematical curve fitting techniques. I applied mathematical curve fitting techniques not only for the entirety of the OLT curve, but also for the most significant portion of the curve, which includes the top 99% of the dollars exposed to retirement. By conducting additional analysis on the most significant portions of the OLT, I ensured that the Iowa curves I selected provide a reasonable fit to the Company's historical data, and thus also provide a reasonable indication of remaining life.

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[14] Wolf *supra* n. 6, at 46.

Q21. Discuss the differences between your service life estimates and the Company's service life estimates for these material accounts

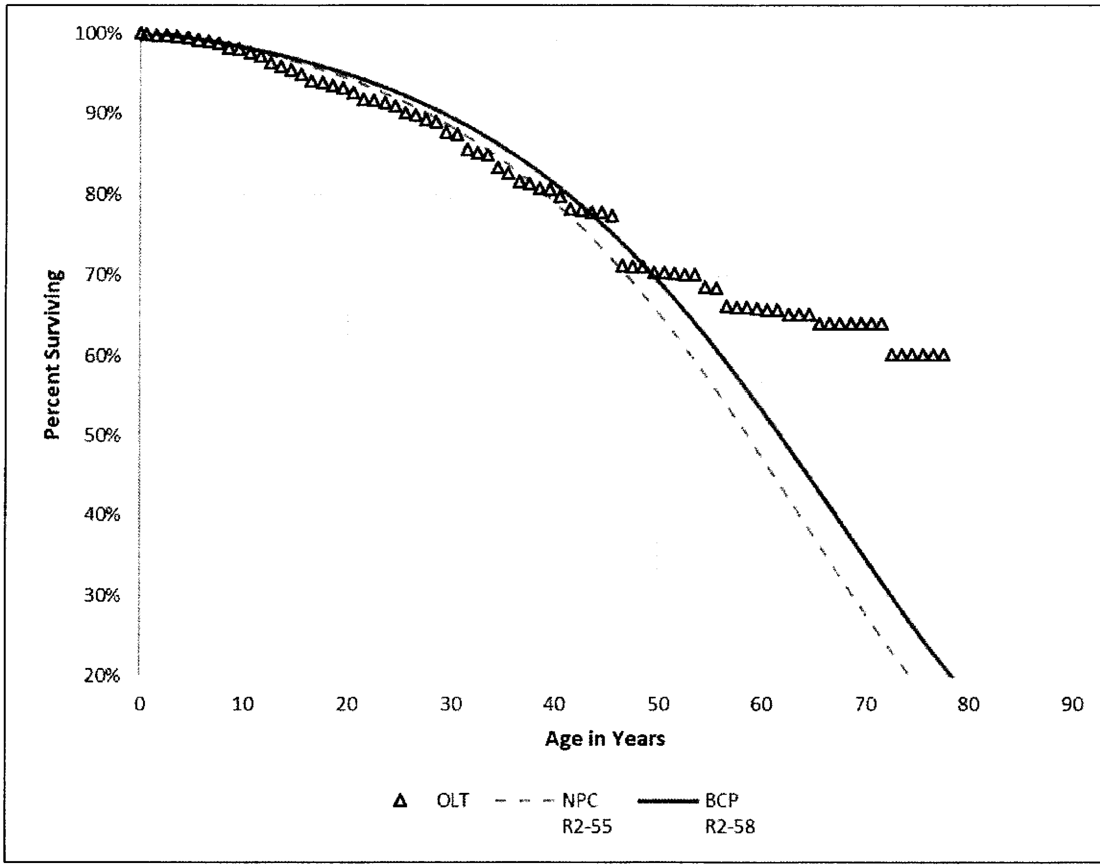
A21. While the Company and I used similar curve-fitting approaches in this case, the curves I selected for these accounts provide a better mathematical fit to the observed data, and provide a more reasonable and accurate representation of the mortality characteristics for each account. In each of the following accounts, the Company has selected a curve that underestimates the average remaining life of the assets in the account, which results in unreasonably high depreciation rates. The analysis of each material account is discussed individually below.

Account 355 – Transmission Poles and Fixtures

Q22. Describe your service life estimate for Account 355, and compare it with the Company's estimate.

A22. The observed survivor curve Account 355 is well-suited for standard curve-fitting techniques using Iowa Curves. This is because the OLT curve is relatively smooth and resembles a portion of a typical Iowa curve shape. The observed survivor curve is derived from the OLT calculated from the Company's aged plant data. Thus, the OLT curve is not an estimate or a theoretical curve, rather, it represents actual data. Using both mathematical and visual curve-fitting techniques, I selected the Iowa R2-58 curve type to best represent the past and future retirement rate in this account. The Company selected an R2-55 curve. In the graph below (as well as the graphs that follow), the black triangles represent the OLT curve. The graphs also show the Iowa curve I selected as well as the Company's selected curve.

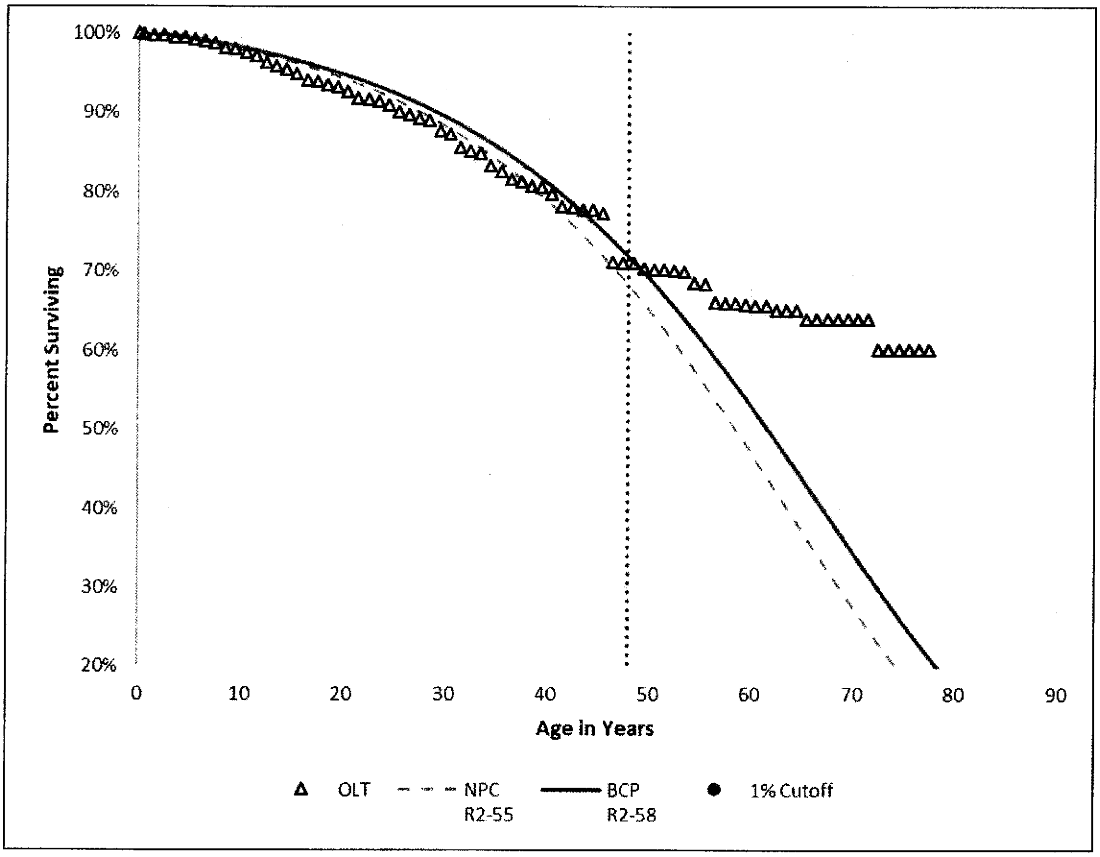
Figure 2:
Account 355 – Poles and Fixtures



As shown in the graph, both selected Iowa curves have similar shapes and lengths. Also, both curves correctly ignore the "tail" end of this OLT curve, which is not as statistically relevant as the other portions of the OLT curve.

Q23. Please provide an example of the 1% exposure cutoff discussed above.

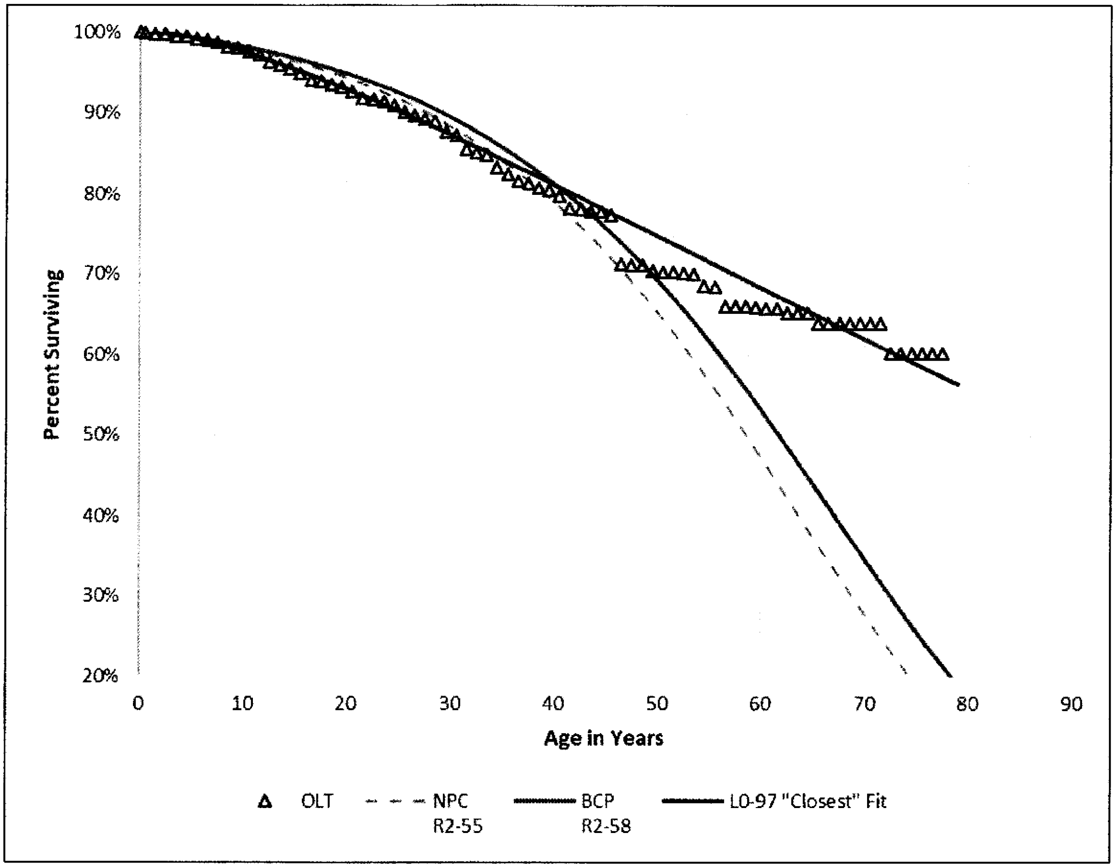
A23. The OLT curve for this account provides a good example of why we should generally give less weight to the tail end of OLT curves. If we "cutoff" or truncate the tail end of this OLT curve based on 1% of the beginning dollars exposed to retirement, we see that both selected Iowa curves closely track the OLT curve from a visual standpoint, as shown below.



This graph shows the same curves as above, along with a vertical dotted line representing the 1% exposure cutoff in dollars (not time or length). Thus, from a visual both selected Iowa curves provide a relatively close fit to the observed data (the OLT curve). Once the most appropriate portion of the curve is considered, mathematical curve fitting techniques can be useful in determining the better-fitting curve.

Q24. Please illustrate the best-fitting curve when the tail-end of this OLT curve is given the same statistical weight as the other portions of the OLT curve.

A24. If one were to simply conduct a mathematical curve-fitting process on the entirety of the OLT curve for this account by giving each part of the OLT curve the same statistical weighting, the closest fitting Iowa curve would be the L0-97 curve, as illustrated in the graph below.



This is a good example of why more weight should be given to the upper and middle potions of the OLT curve in both the mathematical and visual curve-fitting processes. An average life of 97 years for this account is outside of industry norms.

Q25. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A25. Yes. Whether the entire OLT curve is considered, or the more relevant portion of the OLT curve (excluding the tail end) is considered, the R2-58 curve I selected provides a better fit to the observed data and arguably a better indication of the future retirement rate and remaining life of the assets in this account. Mathematical curve fitting essentially involves measuring the distance between the OLT curve and the selected Iowa curve. The best mathematically-fitted curve is the one that minimizes the distance between the OLT curve and the Iowa curve, thus providing the closest fit. The "distance" between the curves is calculated using the "sum-of-squared differences" ("SSD") technique. In this account, the total SSD, or "distance" between the Company's curve and the OLT curve is 0.0202, while the total SSD between R2-58 curve and the OLT curve is only 0.0074.[15] Thus, the R2-58 curve I selected provides a better overall fit to the observed data, and is the curve that should be considered when calculating the remaining life and depreciation rate for this account.

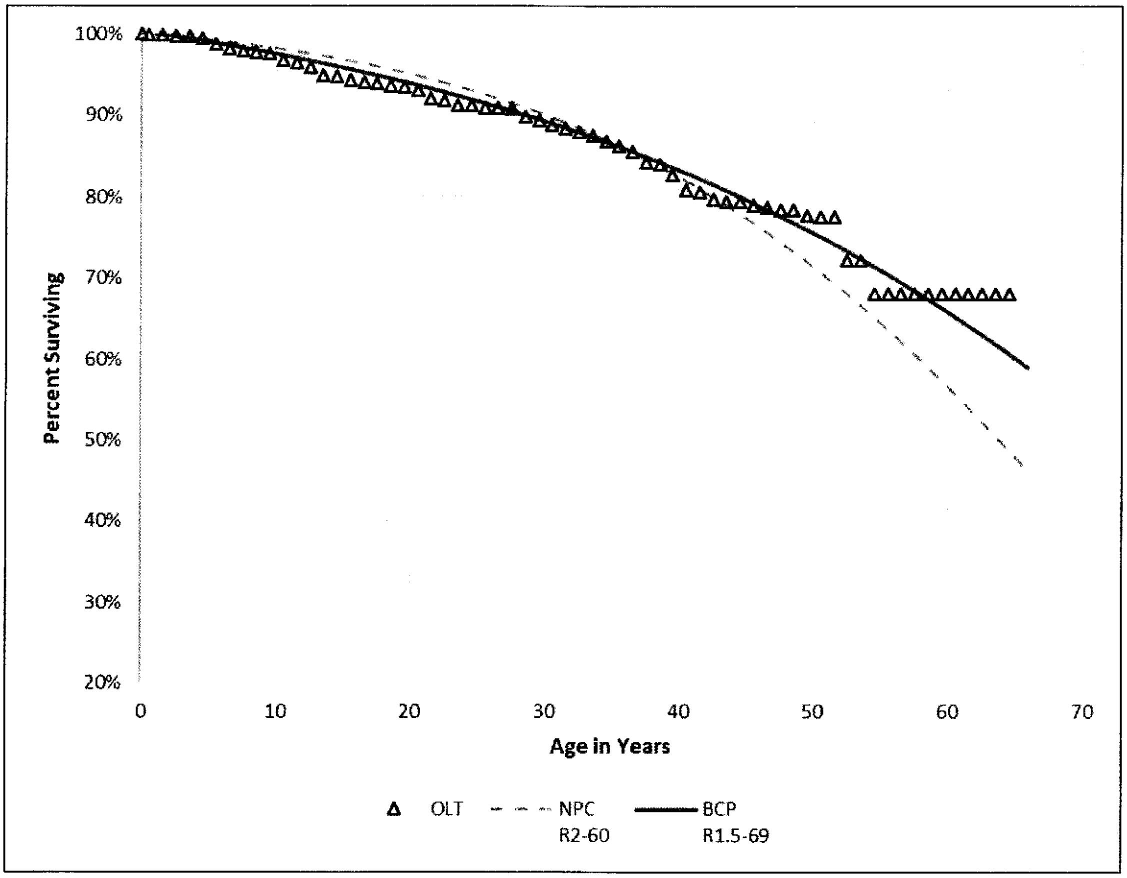
<u>Account 356 – Transmission Overhead Conductors and Devices</u>

Q26. Describe your service life estimate for Account 356, and compare it with the Company's estimate.

A26. As with the previous account, the OLT curve for Account 356 is well-suited for visual and mathematical Iowa curve-fitting techniques because there is sufficient retirement history in the account, and the historical retirement rate yields a relatively smooth OLT curve. I selected the R1.5-69 curve for this account and the Company selected the R2-60 curve, as shown in the graph below.

[15] Exhibit DJG-6.

Figure 3:
Account 356 – Overhead Conductors and Devices



From a visual standpoint, both Iowa curves provide relatively close fits to the observed data, however, the Company's curve appears to ignore relevant historical data around age interval 45 and beyond. As a result, the Company's curve is too short, which leads to overestimated depreciation rates.

Q27. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A27. Yes. The sum-of-squared differences approach mathematically proves that the R1.5-69 curve is a better fit to the OLT curve for this account. This is true not only when fitting to the entire OLT curve, but also when fitting to the top 99% of exposed dollars on the OLT curve. Specifically, the SSD for the Company's curve is 0.0136, while the SSD for the better-fitting R1.5-69 curve is only 0.0022.[16] Thus, the R1.5-69 curve provides a better fit to the observed data and arguably results in a more reasonable depreciation rate for this account.

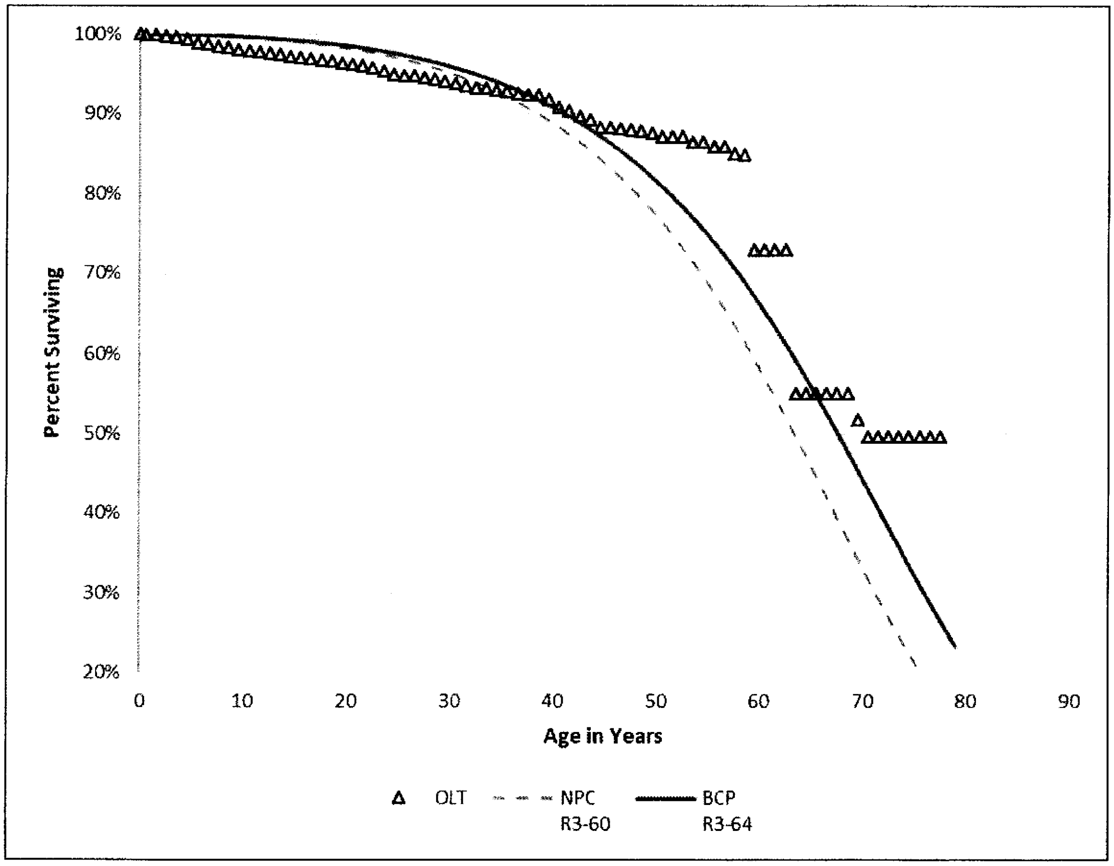
Account 362 – Distribution Station Equipment

Q28. Describe your service life estimate for Account 362, and compare it with the Company's estimate.

A28. I selected the R3-64 curve for this account and the Company selected the R3-60 curve. As with the other accounts discussed in my testimony, the Company's curve is too short, which results in higher depreciation rates. Both Iowa curves are shown below with the OLT curve.

[16] Exhibit DJG-7.

Figure 4:
Account 362 – Distribution Station Equipment



Q29. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A29. Yes. While it is visually clear that the R3-64 curve provides a better fit to the observed data, I have also confirmed this mathematically. Specifically, the SSD for the Company's curve is 0.0262 while the SSD for the better-fitting R3-64 curve is only 0.0124.[17]

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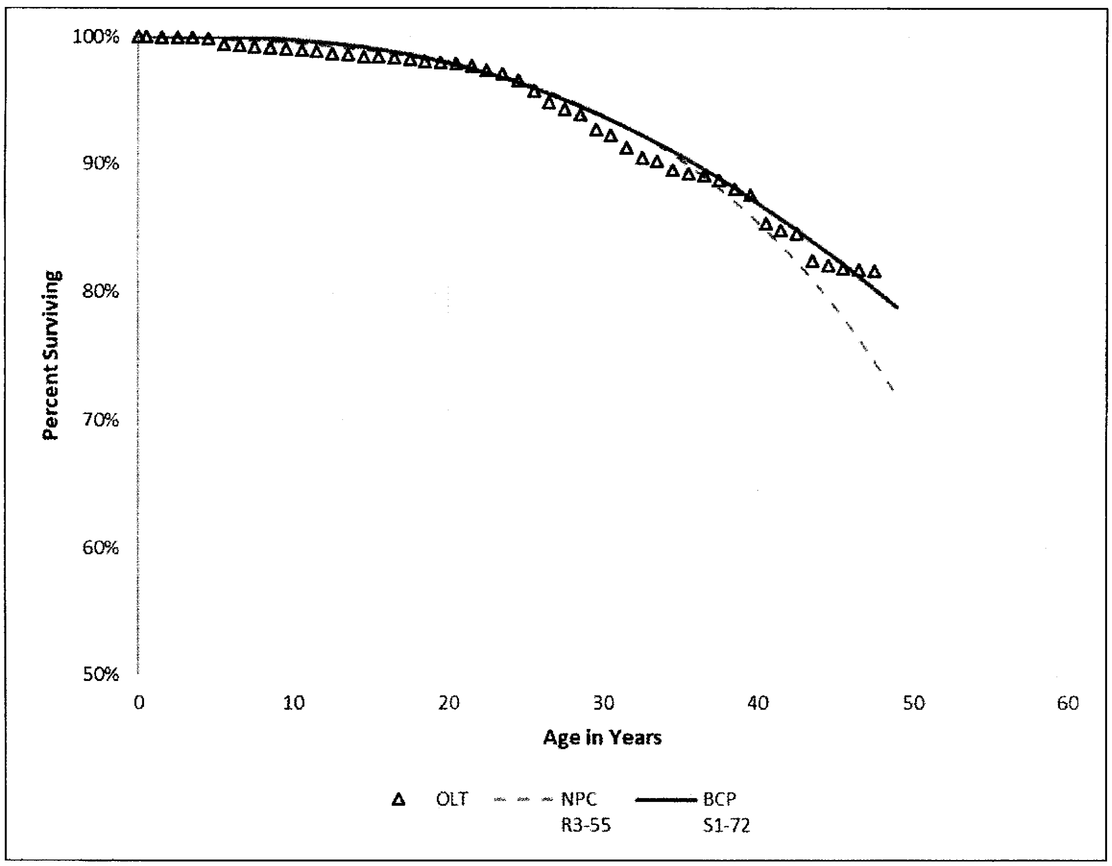
[17] Exhibit DJG-8.

Account 366 – Distribution Underground Conduit

Q30. Describe your service life estimate for Account 366, and compare it with the Company's estimate.

A30. There is a considerable discrepancy between the Iowa curves and average service lives proposed for this account. The Company selected the R3-55 curve to describe this account while I selected the S1-72 curve. As shown in the graph below, both curves provide reasonably close fits to the observed historical data for this account; however, each curve has a different estimation of the future retirement rate and remaining life for this account.

Figure 5:
Account 366 – Distribution Underground Conduit



Q31. Why did you choose a longer service life for this account?

A31. In this case, the Company's selected curve initially appears to provide a reasonable fit to the historical data in this account, however, a service life of only 55 years is considerably short for this account when compared to proposals for comparable utilities.

Q32. Did Gannett Fleming recommend a much longer service life for this account in Sierra Pacific's most recent rate case?

A32. Yes. In Sierra Pacific Power Company's (SPPC) most recent rate case, Gannett Fleming recommended an average life of 70 years for this account.[18] While the mortality characteristics for the assets in a particular account may vary somewhat among utilities, it is highly unlikely that SPPC and NPC would experience a discrepancy of 15 years in average service life for the same account.

Q33. Did any party oppose Gannett Fleming's proposed 70-year average service life for Account 366 in SPPC's rate case?

A33. No. Staff, BCP, and the Northern Nevada Utility Customers all offered detailed depreciation analyses proposing various adjustments. However, no party opposed Gannett Fleming's recommended average service life of 70 years for Account 366. Therefore, the depreciation rate approved by the Commission for that account was based upon an average service life of 70 years.

Q34. Are you making a similar recommendation in this case for the same account?

A34. Yes. I am recommending an average service life of 72 years for NPC's Account 366 in this case based on mathematical curve fitting a professional judgment in light of the service

[18] *See* Exhibit DJG-14.

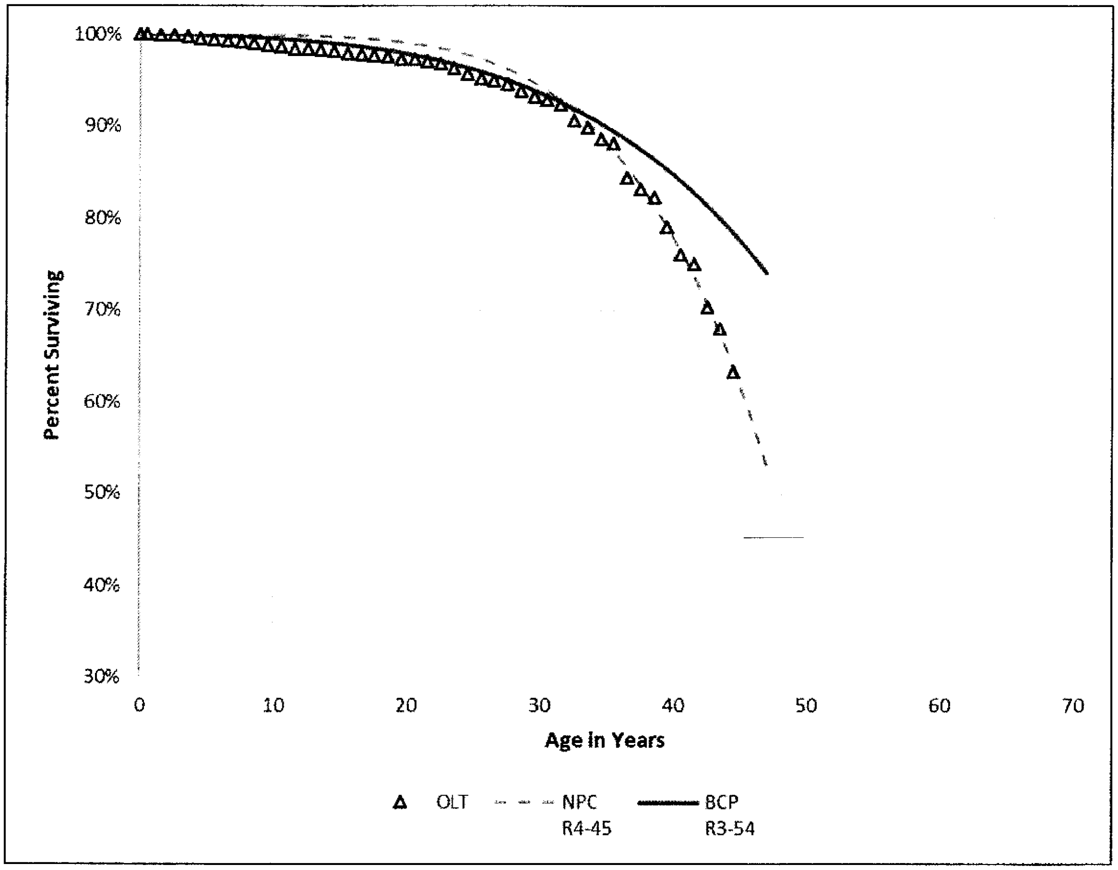
life approved for SPPC for the same account. While it is not always necessary to compare the rates approved for other utilities in determining the most appropriate service life for the utility being studied, it is helpful for this particular account given the large discrepancy in recommendations made by the same witness for the same account.

Account 367 – Distribution Underground Conductors and Devices

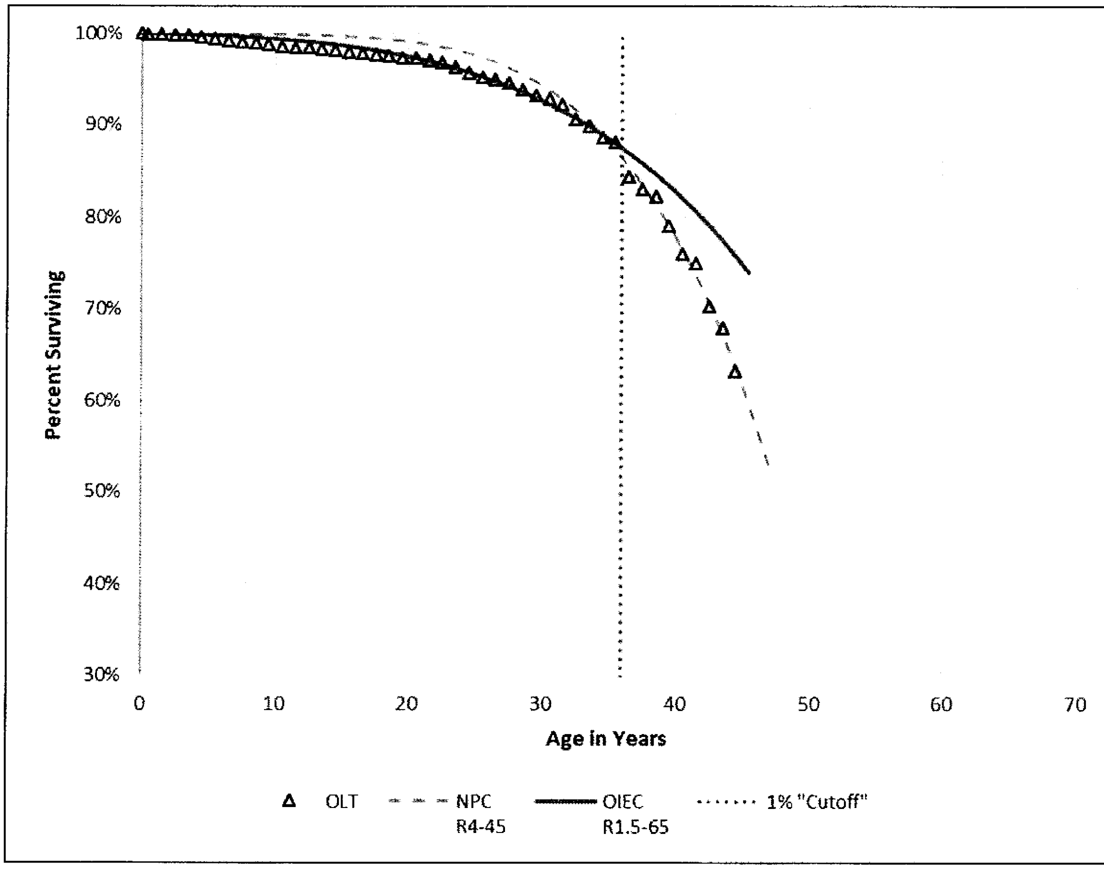
Q35. Describe your service life estimate for Account 367, and compare it with the Company's estimate.

A35. Given the substantial amount of net plant in Account 367 – more than $1.3 billion – adjustments in average service life can result in a substantial dollar impacts. For this account, the Company chose the R4-45 curve and I chose the R3-54 curve, as shown below.

Figure 6:
Account 367 – Distribution Underground Conductors and Devices



As shown in this graph, the Company's curve tracks closely to the entire OLT curve. However, as discussed above, this may actually be an unreasonable course of action when the tail-end of the OLT curve is not supported by a significant amount of dollar exposures. Further examination of the observed life table in this account reveals that the 1% exposure cutoff occurs at the 36-year age interval, as shown in the graph below.



The Company's curve appears to be giving equal weight to all of the data points on the OLT curve, including the last point, which represents dollars exposed to retirement of only $1,746.[19] To put this in perspective, the amount of beginning dollars exposed to retirement in this account is over $1.4 billion dollars. This means that the Company's curve seems to be giving an equal amount of consideration to the data point based on $1.4 million dollars as it is to the data point based on 0.0001% of that amount. This is why it is important to consider the most relevant portions of the OLT curve when conducting visual and mathematical curve-fitting techniques.

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[19] Exhibit DJG-10.

Q36. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A36. Yes. When the mathematical analysis and calculations are conducted on the most statistically relevant portions of the OLT curve, the Iowa curve I selected for this account provides a better fit than the curve selected by the Company. Specifically, the Company's curve results in an SSD of 0.0063, while the better-fitting R3-54 curve results in an SSD of only 0.0007 – a very close fit.[20] By selecting an unreasonably short curve for this account, the Company has proposed an unreasonably high depreciation rate and expense.

<u>Account 369 – Services</u>

Q37. Describe your service life estimate for Account 369, and compare it with the Company's estimate.

A37. Unlike many of the other accounts discussed in this section, the OLT curve derived from the Company's historical data for this account is not well-suited for traditional Iowa curve-fitting techniques. This is because, as illustrated below, there is insufficient retirement history in this account such that the OLT can begin to form a sufficient curve to be fitted. Nonetheless, a complete Iowa curve must be selected based on some reasonable criteria so that the remaining life and depreciation rate can be calculated for this account. The Company selected the R4-50 curve for this account, while I selected the R4-56 curve, as shown below.

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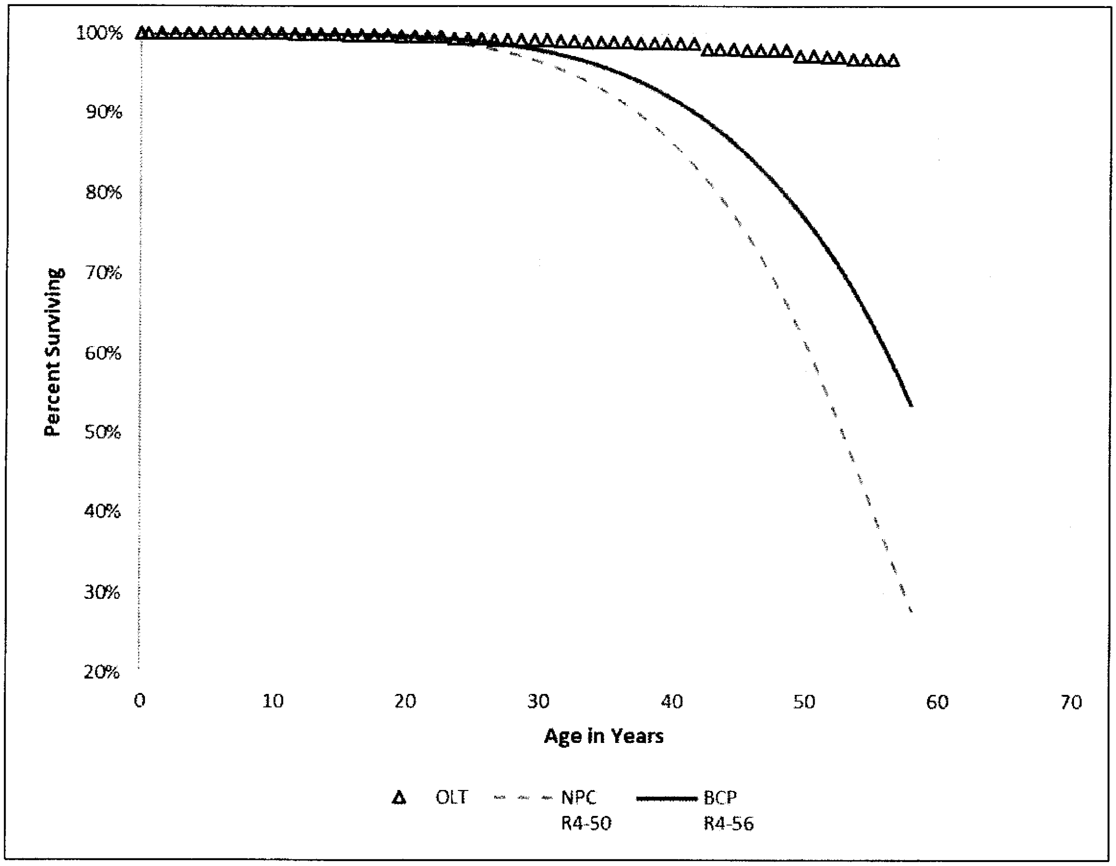
[20] Exhibit DJG-10.

Figure 7:
Account 369 – Services



Q38. Since the OLT curve cannot reasonably be fitted with an Iowa curve, what criteria did you rely on in selecting the R4-56 curve?

A38. I selected the R4-56 curve for this account based on the recent recommendations proposed by utility witnesses, including Gannett Fleming. For example, in El Paso Electric Company's most recent rate case (with a full depreciation study), Gannett Fleming recommended an average service life of 60 years for this account. By comparison, the 56-year average life I am recommending would result in a higher depreciation rate and expense, all else held constant.

Q39. Is it always advisable to consider the service lives recommended or approved for other utilities when determining the most appropriate service life the utility being studied?

A39. No, it is not always advisable. When the utility being studied has sufficient retirement history data for a particular account such that standard Iowa curve-fitting techniques can provide valuable indications of remaining life, it is preferable to consider the current data of the utility being studied when conduction depreciation analysis, rather than relying the results obtained for another utility or industry averages. However, as discussed above, the retirement data for this account is insufficient to provide a reliable OLT curve for Iowa curve-fitting purposes; therefore, it is instructive to consider the recommended service lives for this account among other utilities in order to base the recommendation in this case on some objective criteria.

Q40. Does your selected curve provide a better mathematical fit to the observed data than the Company's curve?

A40. Yes. While as discussed above, mathematical curve fitting is not as applicable to this account as it is to many of the other accounts discussed in this section, the Iowa curve I selected nonetheless provides a better mathematical fit to the observed data.[21]

<u>Account 303 – Software</u>

Q41. Describe the Company's position regarding Account 303 – Software.

A41. Account 303 contains the Company's software assets. The plant balance in this account is substantial – $259 million – which is greater than many of the Company's other mass property accounts. The Company chose an SQ-12 curve to represent this account, which

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[21] Exhibit DJG-11.

means the Company is suggesting that the assets in this account will have a service life of 12 years, on average.

Q42. Do you agree with the Company's position?

A42. No. By choosing an SQ-12 curve for software, the Company estimates that the average service life of its software programs are only 12 years on average. Unlike basic consumer software systems, large enterprise software systems can be customized to the specific needs of the company. These modular systems require substantial upfront engineering costs along with periodic maintenance and support fees to ensure that the system performs reliably over a long period of time. For example, many utility companies rely on Enterprise Resource Planning ("ERP") systems comprising a suite of modular applications that collect and integrate data from different facets of the firm.

Q43. Are you aware of service life estimates of Enterprise Resource Planning systems of 20 years or more?

A43. Yes. ERP systems are designed to provide long term solutions to companies. SAP is one of several providers of ERP systems. According to a report by CGI Consulting Services, SAP systems can last 25 – 30 years.[22] Given the extremely high installation costs for these complex systems as well as the annual maintenance fees, it is not surprising that companies using ERP systems would demand that the systems last longer than 10 years.

Q44. Have utility companies recognized that their ERP systems can last at least 20 years?

A44. Yes. Florida Power & Light ("FP&L") is one of many utilities that utilize ERP systems. In 2011, FP&L implemented SAP's ERP system to replace its previous accounting

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[22] *Taking the Long View to SAP Value*, CGI, "Enlightened Managed Services Series," CGI Group Inc. 2011 p. 2.

system.[23] FP&L had previously amortized its software over a five-year period. FP&L, however, requested that the amortization period be extended to 20 years in order to reflect the much longer lifespan of the new ERP system.[24] Kim Ousdahl, FP&L's Vice President, Controller and Chief Accounting Officer, gave the following testimony regarding FP&L's software account:

> In 2011, the Company implemented a new general ledger accounting system (SAP) to replace its legacy system . . . . FPL's policy for accounting for new software requires . . . amortization on a straight-line basis over a period of five years, which is the current amortization period approved for this account. <u>The Company is requesting to extend the amortization period of this system from five to twenty years in order to more appropriately recognize the longer benefit period expected from this major business system</u>.[25]

While a 10-year average life may have been appropriate for older, more basic software systems, it does not reflect the much longer service life of newer, more complex systems.

Q45. Has Gannett Fleming recommended service lives of up to 15 years for this account?

A45. Yes. In NSTAR's recent rate case, Gannett Fleming recommended a 15-year service life for assets in Account 303.[26]

Q46. What is your recommendation for this account?

A46. Although it would not be unreasonable to consider a 20-year service life for this account, I am recommending a 15-year lifespan for this account to be conservative. I have

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[23] Petition for Rate Increase by Florida Power & Light Company, Docket No. 120015-EI, Testimony & Exhibits of Kim Ousdahl. p. 14.

[24] *Id.*

[25] *Id.*

[26] Exhibit DJG-16.

calculated the remaining life and depreciation rate for Account 303 under an SQ-15 curve, which is an amortization period of 15 years.[27]

CONCLUSION

Q47. Summarize the key points of your testimony.

A47. I employed a well-established depreciation system and used actuarial analysis to statistically analyze the Company's depreciable assets in order to develop reasonable depreciation rates in this case. For NPC's production units, I did not propose any adjustments to the Company's proposed interim retirement curves or terminal net salvage values. I am recommending several adjustments to the Company's transmission and distribution accounts. The adjustments I proposed for these accounts are based on reasonable curve-fitting techniques and professional judgment that result in more reasonable depreciation rates than those proposed by the Company. Finally, I recommend extending the service life proposed by the Company for its software account by three years in light of the evidence presented in this testimony.

Q48. Does this conclude your testimony?

A48. Yes.

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[27] Exhibit DJG-5.

Application of Nevada Power Company d/b/a NV Energy for authority to adjust its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto
Docket No. 17-06003

Application of Nevada Power Company d/b/a NV Energy for approval of new and revised depreciation and amortization rates for its electric and common accounts
Docket No. 17-06004

AFFIRMATION

STATE OF OKLAHOMA)
) ss
COUNTY OF OKLAHOMA)

Pursuant to the requirements of NRS 53.045(2) and NAC 703.710, David J. Garrett, being first duly sworn under penalty of perjury, says that he/she is the person identified in the foregoing prepared testimony and/or exhibits; that such testimony and/or exhibits were prepared by or under the direction of said person; that the answers and/or information appearing therein are true to the best of his knowledge and belief; and that if asked the questions appearing therein, his answers thereto would, under oath, be the same.

I declare under penalty of perjury under the law of the State of Nevada that the foregoing is true and correct.

Further affiant sayeth naught.

Dated: 10-5-17

David J. Garrett

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.[28] 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.[29] The figure below illustrates the basic concept of a depreciation system and includes some of the available parameters.[30]

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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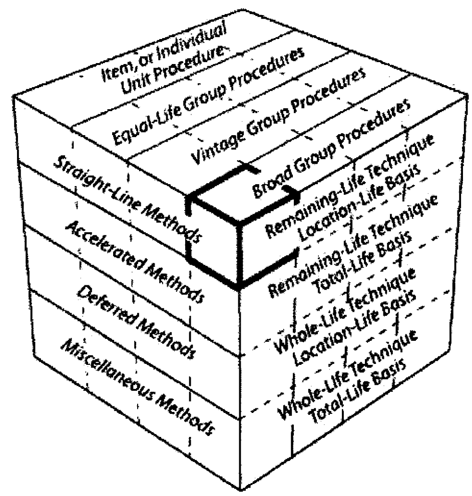
[28] Wolf *supra* n. 6, at 69-70.

[29] *See* Wolf *supra* n. 6, at 70, 139-40.

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

Figure 8:
The Depreciation System Cube



1. <u>Allocation Methods</u>

The "method" refers to the pattern of depreciation in relation to the accounting periods. The method most commonly used in the regulatory context is the "straight-line method" – a type of age-life method in which the depreciable cost of plant is charged in equal amounts to each accounting period over the service life of plant.[31] 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.[32] The basic formula for the straight-line method is as follows:[33]

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[31] NARUC *supra* n. 7, at 56.

[32] *Id.*

[33] *Id.*

Equation 1:
Straight-Line Accrual

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

Gross plant is a known figure from the utility's records, while both net salvage and service life must be estimated in order to calculate the annual accrual. The straight-line method differs from accelerated methods of recovery, such as the "sum-of-the-years-digits" method and the "declining balance" method. Accelerated methods are primarily used for tax purposes and are rarely used in the regulatory context for determining annual accruals.[34] In practice, the annual accrual is expressed as a rate which is applied to the original cost of plant in order to determine the annual accrual in dollars. The formula for determining the straight-line rate is as follows:[35]

Equation 2:
Straight-Line Rate

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

2. Grouping Procedures

The "procedure" refers to the way the allocation method is applied through subdividing the total property into groups.[36] 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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[34] *Id.* at 57.

[35] *Id.* at 56.

[36] Wolf *supra* n. 6, at 74-75.

excessively conducting calculations for each unit. Whereas an individual unit of property has a single life, a group of property displays a dispersion of lives and the life characteristics of the group must be described statistically.[37] 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.[38]

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.[39] 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.[40] Under the equal life procedure the property is divided into subgroups that each has a common life.[41]

3. Application Techniques

The third factor of a depreciation system is the "technique" for applying the depreciation rate. There are two commonly used techniques: "whole life" and "remaining life." The whole life technique applies the depreciation rate on the estimated average service life of group, while

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[37] *Id.* at 74.

[38] NARUC *supra* n. 7, at 61-62.

[39] *See* Wolf *supra* n. 6, at 74-75.

[40] *Id.* at 75.

[41] *Id.*

the remaining life technique seeks to recover undepreciated costs over the remaining life of the plant.[42]

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.[43] 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.[44] 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

[42] NARUC *supra* n. 7, at 63-64.

[43] Wolf *supra* n. 6, at 83.

[44] NARUC *supra* n. 7, at 325.

in the annual accrual.[45] 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:[46]

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.[47]

4. Analysis Model

The fourth parameter of a depreciation system, the "model," relates to the way of viewing the life and salvage characteristics of the vintage groups that have been combined to form a continuous property group for depreciation purposes.[48] 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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[45] NARUC *supra* n. 7, 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.").

[46] *Id.* at 64.

[47] Wolf *supra* n. 6, at 178.

[48] *See* Wolf *supra* n. 6, at 139 (I added the term "model" to distinguish this fourth depreciation system parameter from the other three parameters).

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

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

APPENDIX B:

IOWA CURVES

Early work in the analysis of the service life of industrial property was based on models that described the life characteristics of human populations.[49] 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.[50] 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.[51] They generalized the 65 curves

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[49] Wolf *supra* n. 6, at 276.

[50] *Id.* at 23.

[51] *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.[52] 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."[53] 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.[54] 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.

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[52] *Id.*

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

[54] 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. 6, at 305-38 (publishing the percent surviving for each Iowa curve, including "O" type curve, at one percent intervals).

In the 1970s, John Russo collected data from over 2,000 property accounts reflecting observations during the period 1965 – 1975 as part of his Ph.D. dissertation at Iowa State. Russo essentially repeated Winfrey's data collection, testing, and analysis methods used to develop the original Iowa curves, except that Russo studied industrial property in service several decades after Winfrey published the original Iowa curves. Russo drew three major conclusions from his research:[55]

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.[56]

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,

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[55] *See* Wolf *supra* n. 6, at 37.

[56] *Id.*

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

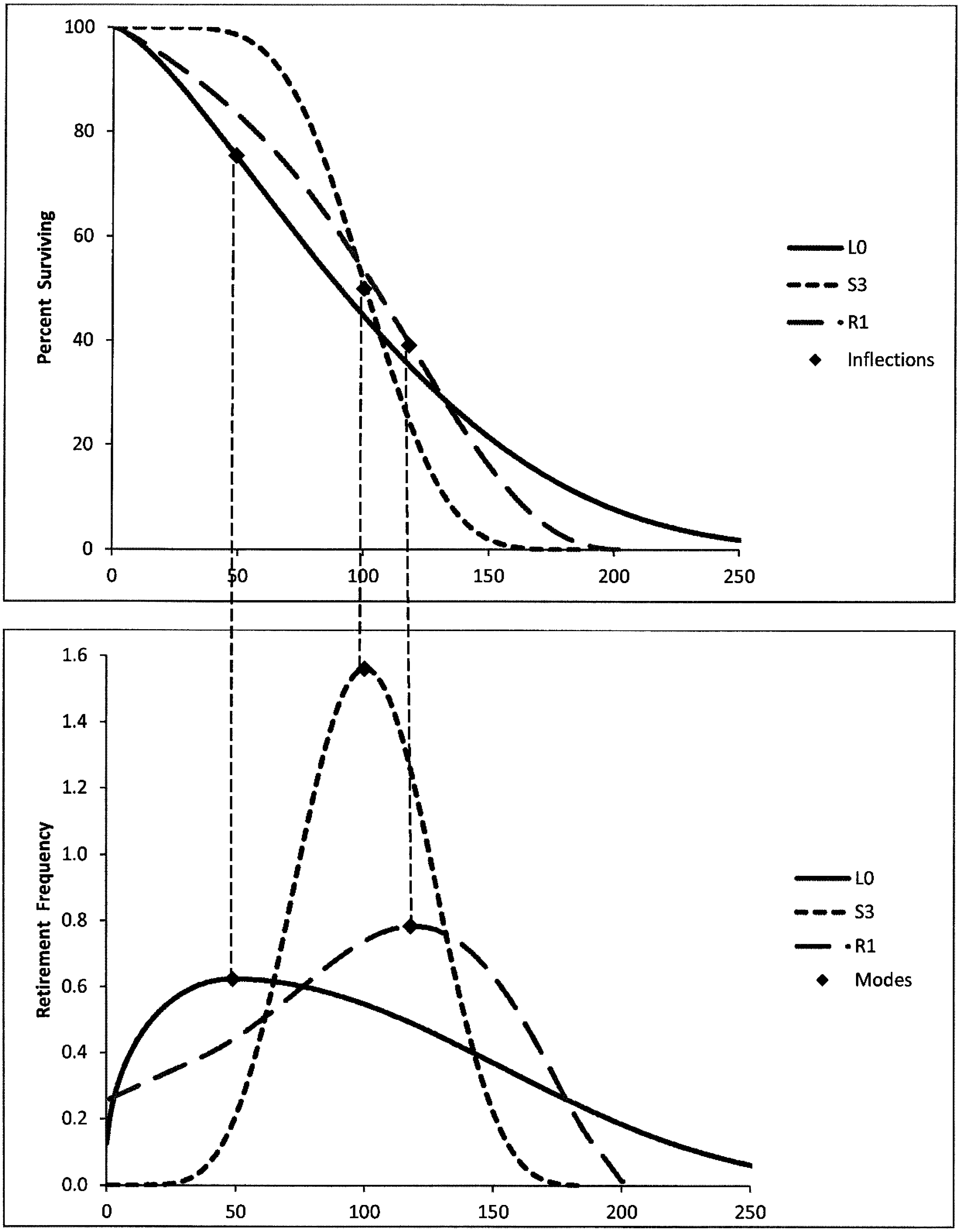
2. Classification

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

The classification of the survivor curves was made according to whether the mode of the retirement frequency curves was to the left, to the right, or coincident with average service life. There are three modal "families" of curves: six left modal curves (L0, L1, L2, L3, L4, L5); five right modal curves (R1, R2, R3, R4, R5); and seven symmetrical curves (S0, S1, S2, S3, S4, S5, S6).[57] 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.

[57] 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. 7, at 68).

**Figure 9:
Modal Age Illustration**



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

> Since the location of a particular survivor on a graph is affected by both its span in years and the shape of the curve, it is difficult to classify a group of curves unless one of these variables can be controlled. This is easily done by expressing the age in percent of average life."[58]

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

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

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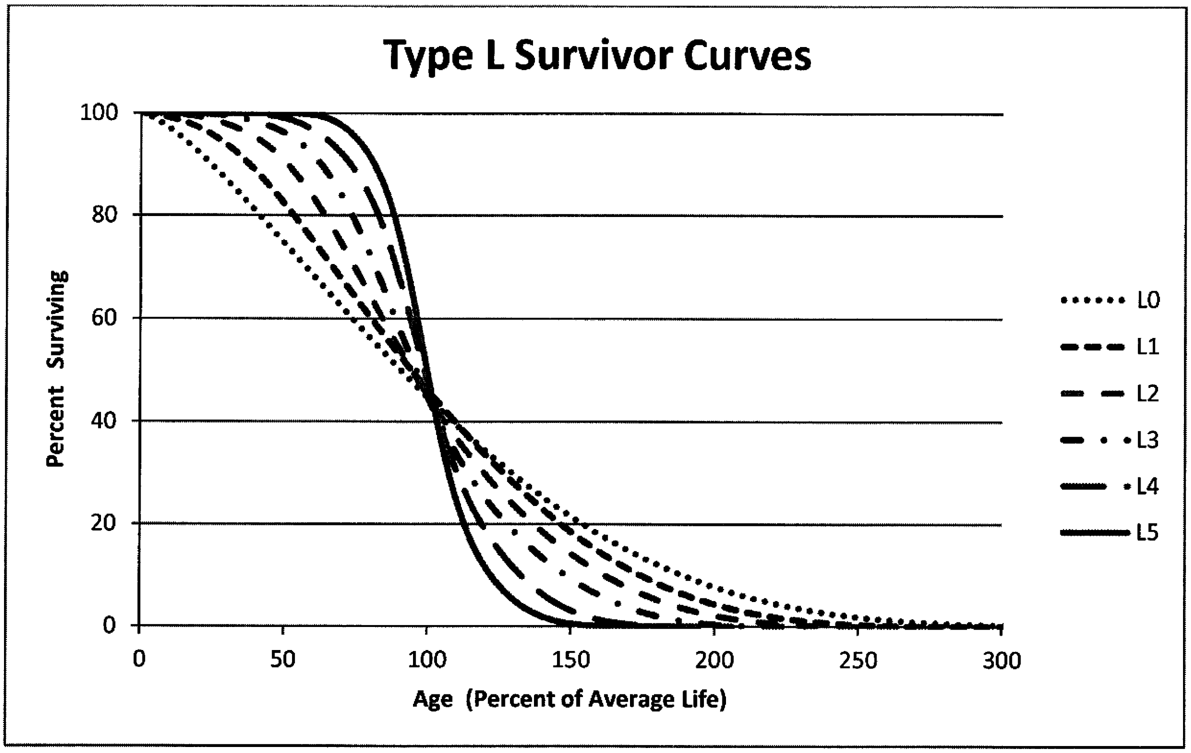
[58] Robley Winfrey, *Bulletin 125: Statistical Analyses of Industrial Property Retirements* 60, Vol. XXXIV, No. 23 (Iowa State College of Agriculture and Mechanic Arts 1935).

Figure 10:
Type L Survivor and Frequency Curves



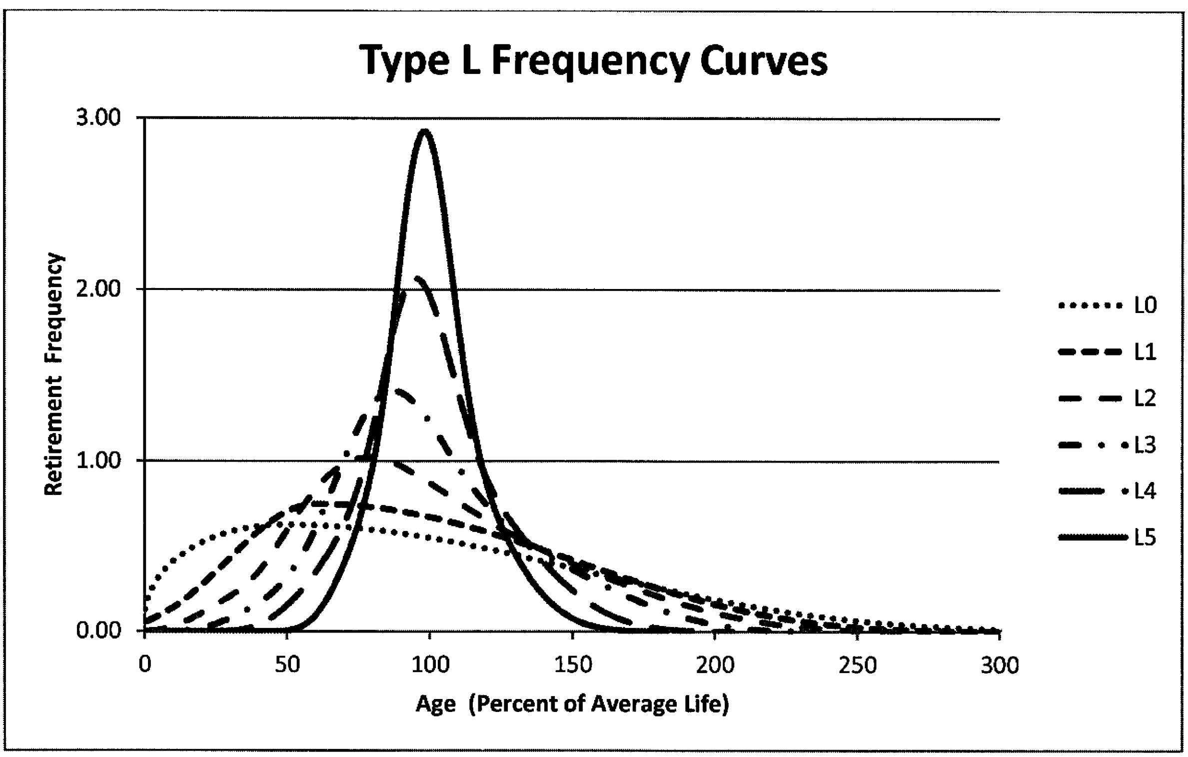
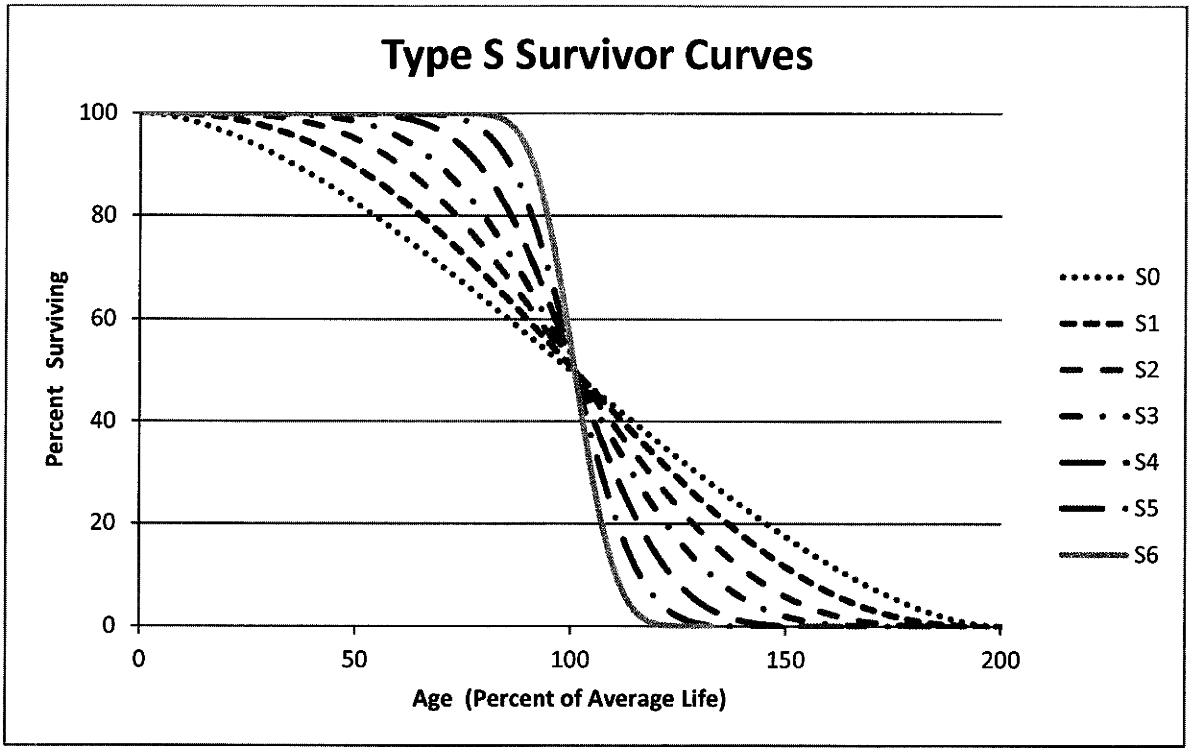


Figure 11:
Type S Survivor and Frequency Curves



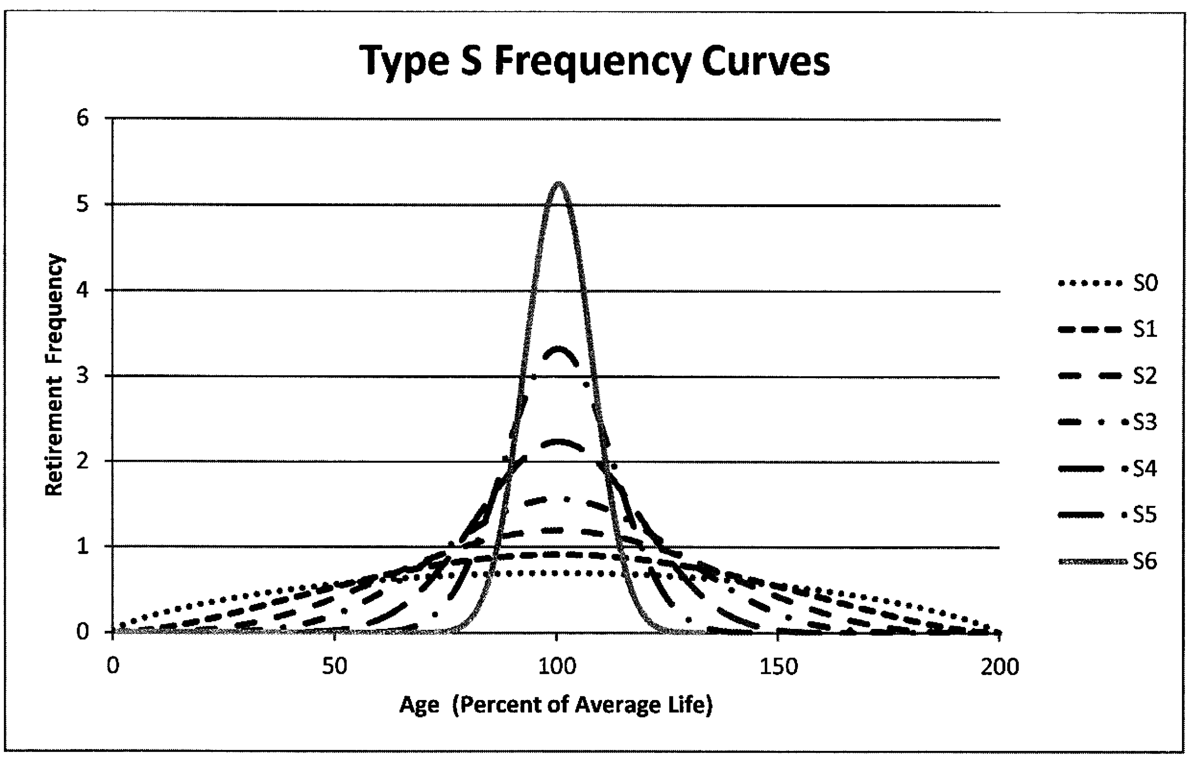
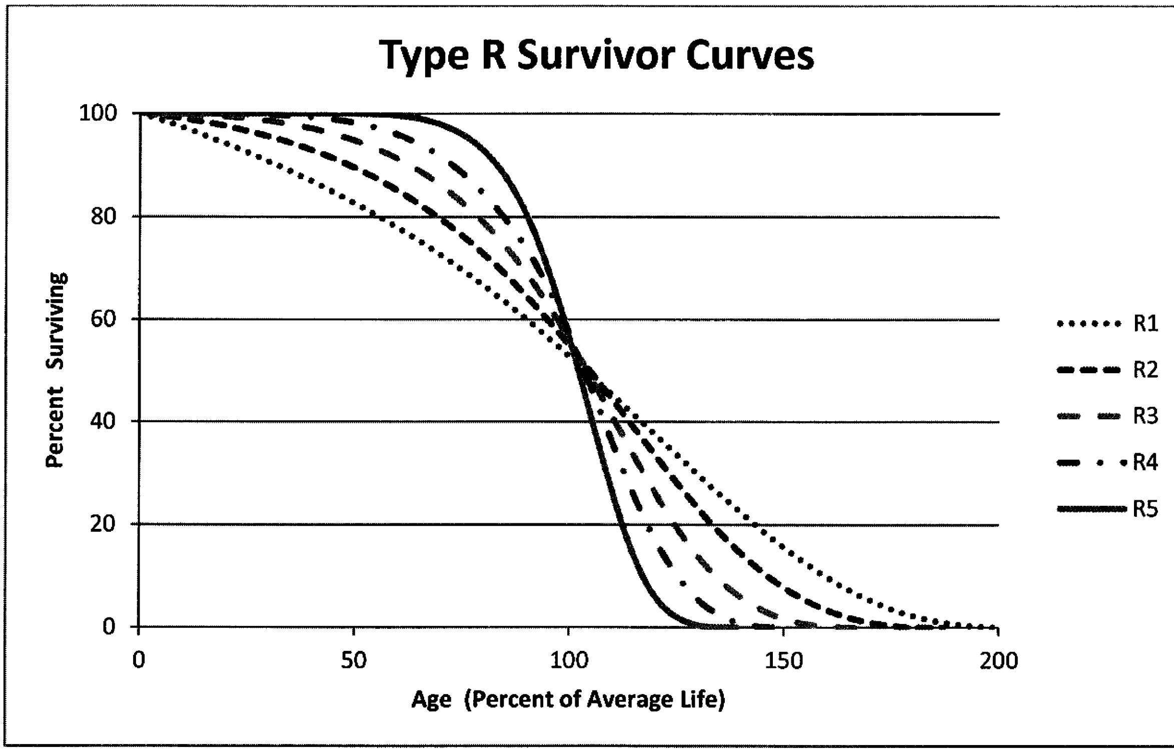
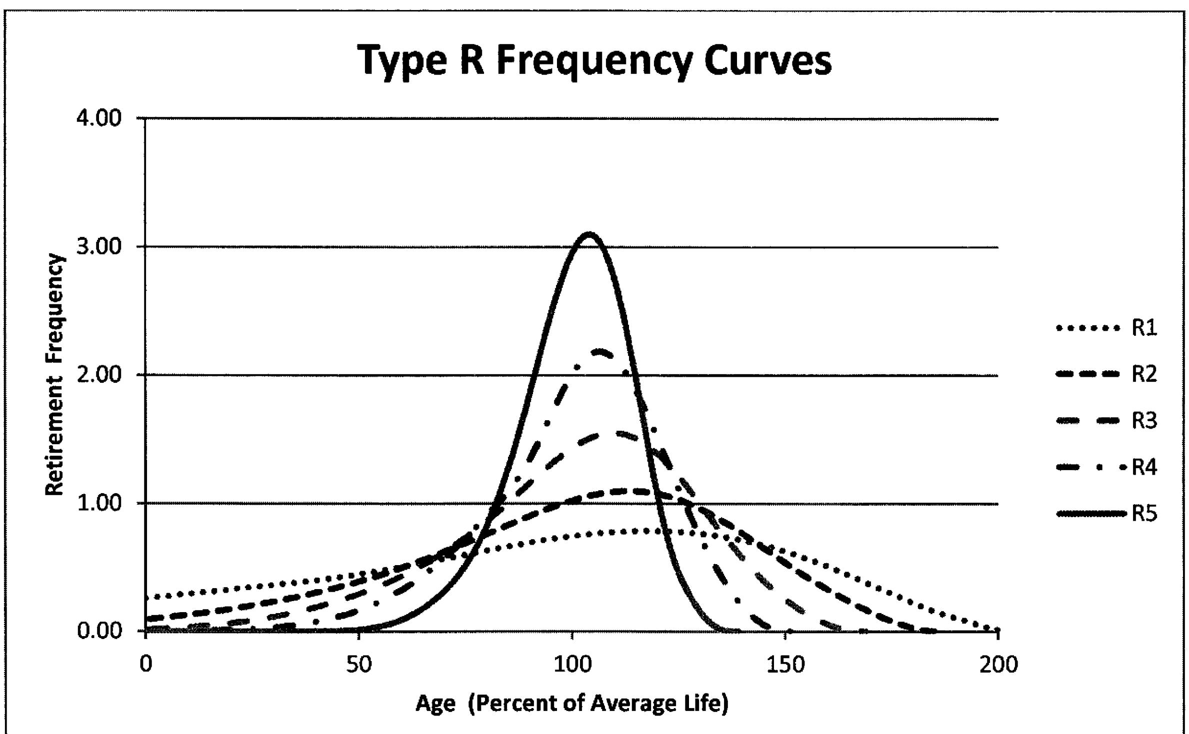


Figure 12:
Type R Survivor and Frequency Curves





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

3. <u>Types of Lives</u>

Several other important statistical analyses and types of lives may be derived from an Iowa curve. These include: 1) average life; 2) realized life; 3) remaining life; and 4) probable life. Figure 8 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.[59]

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:[60]

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"

[59] 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.

[60] *See* NARUC *supra* n. 7, at 71.

survivor 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.[61] 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.[62] Remaining life is sometimes referred to as "average remaining life" and "life expectancy." To calculate average remaining life at age x, the area under the estimated future potion of the survivor curve is divided by the percent surviving at age x (denoted S_X). Thus, the average remaining life formula is:

Equation 5:
Average Remaining Life

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

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

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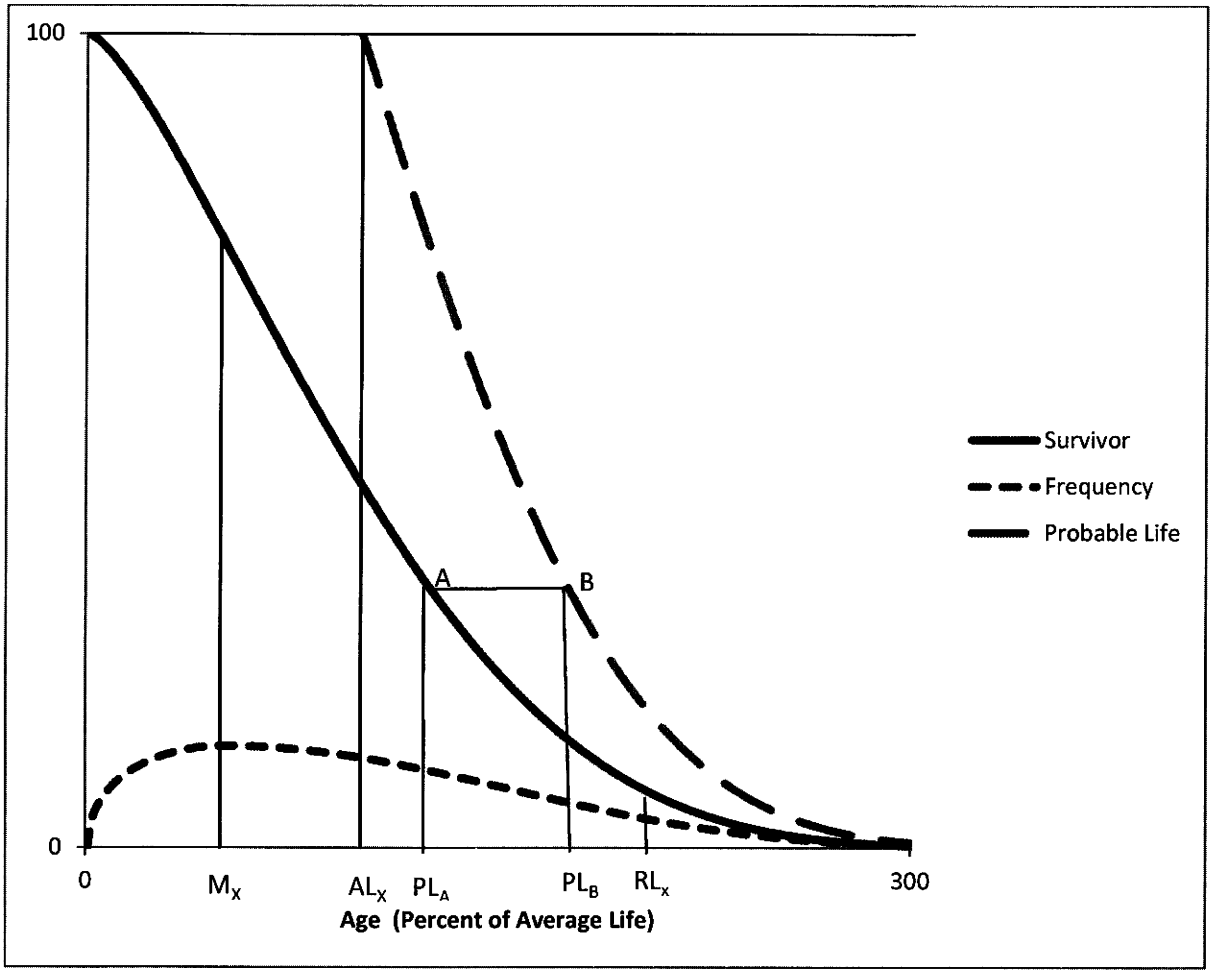
[61] *Id.* at 73.

[62] *Id.* at 74.

**Figure 13:
Iowa Curve Derivations**



Finally, the probable life may also be determined from the Iowa curve. The probable life of a property group is the total life expectancy of the property surviving at any age and is equal to the remaining life plus the current age.[63] 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

[63] Wolf *supra* n. 6, at 28.

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

APPENDIX C:
ACTUARIAL ANALYSIS

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

The study of human mortality is analogous to estimating service lives of industrial property groups. While some humans die solely from chance, most deaths are related to age; that is, death rates generally increase as age increases. Similarly, physical plant is also subject to forces of retirement. These forces include physical, functional, and contingent factors, as shown in the table below.[64]

Figure 14:
Forces of Retirement

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

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

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[64] NARUC *supra* n. 7, at 14-15.

Continuing Property Records ("CPR"). Generally, a CPR should contain 1) an inventory of property record units; 2) the association of costs with such units; and 3) the dates of installation and removal of plant. Since actuarial analysis includes the examination of historical data to forecast future retirements, the historical data used in the analysis should not contain events that are anomalous or unlikely to recur.[65] Historical data is used in the retirement rate actuarial method, which is discussed further below.

The Retirement Rate Method

There are several systematic actuarial methods that use historical data in order to calculating observed survivor curves for property groups. Of these methods, the retirement rate method is superior, and is widely employed by depreciation analysts.[66] The retirement rate method is ultimately used to develop an observed survivor curve, which can be fitted with an Iowa curve discussed in Appendix B in order to forecast average life. The observed survivor curve is calculated by using an observed life table ("OLT"). The figures below illustrate how the OLT is developed. First, historical property data are organized in a matrix format, with placement years on the left forming rows, and experience years on the top forming columns. The placement year (a.k.a. "vintage year" or "installation year") is the year of placement of a group of property. The experience year (a.k.a. "activity year") refers to the accounting data for a particular calendar year. The two matrices below use aged data – that is, data for which the dates of placements, retirements, transfers, and other transactions are known. Without aged data, the retirement rate actuarial method may not be employed.

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

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

The first matrix is the exposure matrix, which shows the exposures at the beginning of each year.[67] An exposure is simply the depreciable property subject to retirement during a period. The second matrix is the retirement matrix, which shows the annual retirements during each year. Each matrix covers placement years 2003–2015, and experience years 2008-2015. In the exposure matrix, the number in the 2009 experience column and the 2003 placement row is $192,000. This means at the beginning of 2012, there was $192,000 still exposed to retirement from the vintage group placed in 2003. Likewise, in the retirement matrix, $19,000 of the dollars invested in 2003 was retired during 2012.

Figure 15:
Exposure Matrix

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

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

Figure 16:
Retirement Matrix

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

These matrices help visualize how exposure and retirement data are calculated for each age interval. An age interval is typically one year. A common convention is to assume that any unit installed during the year is installed in the middle of the calendar year (i.e., July 1st). This convention is called the "half-year convention" and effectively assumes that all units are installed uniformly during the year.[68] 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).

[68] Wolf *supra* n. 6, at 22.

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

The totaled amounts for each age interval in both matrices are used to form the exposure and retirement columns in the OLT, as shown in Figure 12 below. This figure also shows the retirement ratio and the survivor ratio for each age interval. The retirement ratio for an age interval is the ratio of retirements during the interval to the property exposed to retirement at the beginning of the interval. The retirement ratio represents the probability that the property surviving at the beginning of an age interval will be retired during the interval. The survivor ratio is simply the complement to the retirement ratio (1 – retirement ratio). The survivor ratio represents the probability that the property surviving at the beginning of an age interval will survive to the next age interval.

Figure 17:
Observed Life Table

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

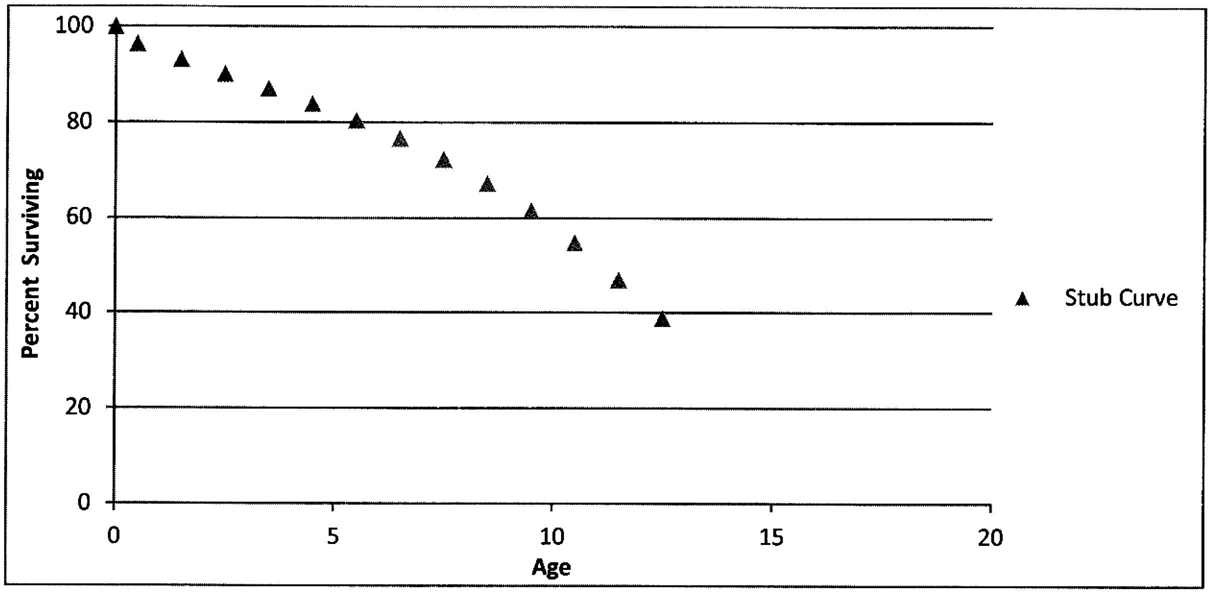
Column F on the right shows the percentages surviving at the beginning of each age interval. This column starts at 100% surviving. Each consecutive number below is calculated by multiplying the percent surviving from the previous age interval by the corresponding survivor ratio for that age interval. For example, the percent surviving at the start of age interval 1.5 is 93.21%, which was calculated by multiplying the percent surviving for age interval 0.5 (96.43%) by the survivor ratio for age interval 0.5 (0.967)[69].

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%

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

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

Figure 18:
Original "Stub" Survivor Curve



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

<u>Banding</u>

The forces of retirement and characteristics of industrial property are constantly changing. A depreciation analyst may examine the magnitude of these changes. Analysts often use a technique called "banding" to assist with this process. Banding refers to the merging of several years of data into a single data set for further analysis, and it is a common technique associated with the retirement rate method.[70] 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.[71]

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

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

[71] *Id.*

Figure 19:
Placement 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	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.[72] Placement bands allow analysts to isolate the effects of changes in technology and materials that occur in successive generations of plant. For example, if in 2005 an electric utility began placing transmission poles with a special chemical treatment that extended the service lives of the poles, an analyst could use placement bands to isolate and analyze the effect of that change in the property group's physical characteristics.

[72] Wolf *supra* n. 6, at 182.

While 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.[73]

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

**Figure 20:
Experience Bands**

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

[73] NARUC *supra* n. 7, at 114.

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.[74] Likewise, the use of experience bands allows analysis of the effects of an unusual environmental event. For example, if an unusually severe ice storm occurred in 2013, destruction from that storm would affect an electric utility's line transformers of all ages. That is, each of the line transformers from each placement year would be affected, including those recently installed in 2012, as well as those installed in 2003. Using experience bands, an analyst could isolate or even eliminate the 2013 experience year from the analysis. In contrast, a placement band would not effectively isolate the ice storm's effect on life characteristics. Rather, the placement band would show an unusually large rate of retirement during 2013, making it more difficult to accurately fit the data with a smooth Iowa curve. Experience bands tend to yield the most complete stub curves for recent bands because they have the greatest number of vintages included. Longer stub curves are better for forecasting. The experience bands, however, may also result in more erratic retirement dispersion making the curve fitting process more difficult.

Depreciation analysts must use professional judgment in determining the types of bands to use and the band widths. In practice, analysts may use various combinations of placement and experience bands in order to increase the data sample size, identify trends and changes in life characteristics, and isolate unusual events.

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[74] *Id.*

Regardless of which bands are used, observed survivor curves in depreciation analysis rarely reach zero percent. This is because, as seen in the OLT above, relatively newer vintage groups have not yet been fully retired at the time the property is studied. An analyst could confine the analysis to older, fully retired vintage groups in order to get complete survivor curves, but such analysis would ignore some the property currently in service and would arguably not provide an accurate description of life characteristics for current plant in service. Because a complete curve is necessary to calculate the average life of the property group, however, curve fitting techniques using Iowa curves or other standardized curves may be employed in order to complete the stub curve.

Curve Fitting

Depreciation analysts typically use the survivor curve rather than the frequency curve to fit the observed stub curves. The most commonly used generalized survivor curves used in the curve fitting process are the Iowa curves discussed above. As Wolf notes, if "the Iowa curves are adopted as a model, an underlying assumption is that the process describing the retirement pattern is one of the 22 [or more] processes described by the Iowa curves."[75]

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 from Figure 13 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.

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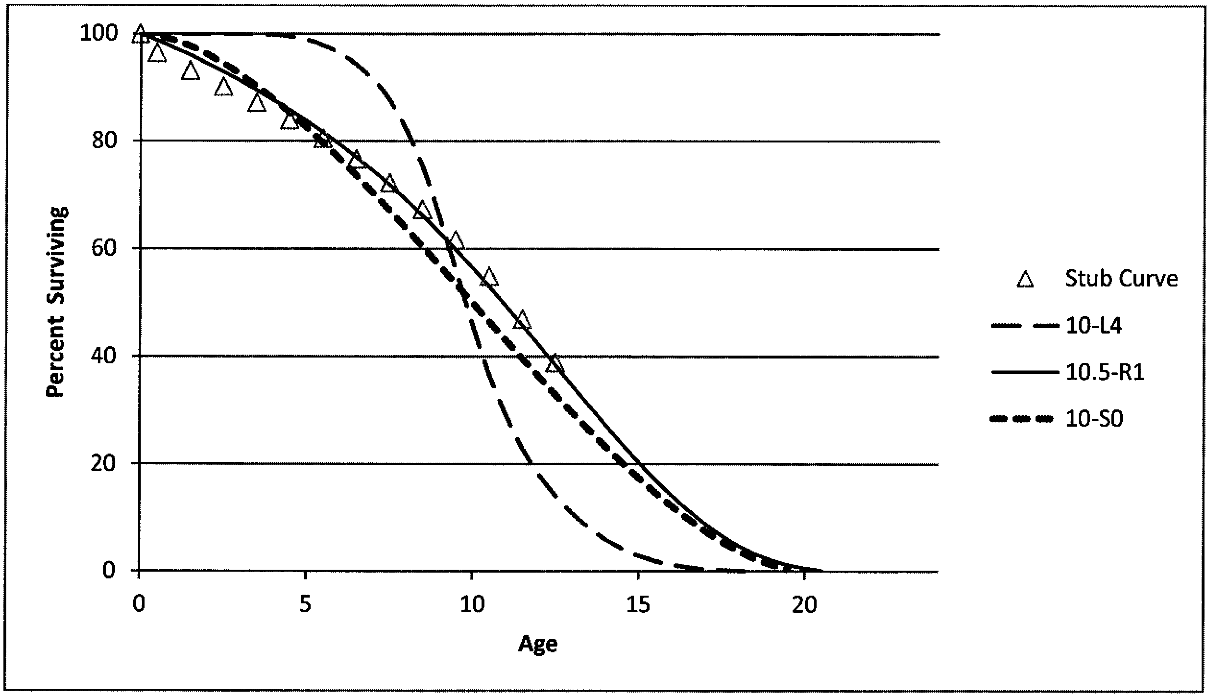
[75] Wolf *supra* n. 6, at 46 (22 curves includes Winfrey's 18 original curves plus Cowles's four "O" type curves).

**Figure 21:
Visual Curve Fitting**



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

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

> repeated for the remaining 21 Iowa type curves. The "best fit" is declared to be the type of curve that minimizes the sum of differences squared.[76]

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."[77]

In Figure 16 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 figure 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 figure shows the differences between the points on each Iowa curve and the stub curve. These differences are summed at the bottom. Curve 10.5-R1 is the best fit because the sum of the squared differences for this curve is less than the same sum of the other two curves. Curve 10-L4 is the worst fit, which was also confirmed visually.

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[76] Wolf *supra* n. 6, at 47.

[77] *Id.* at 48.

Figure 22:
Mathematical Fitting

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

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EDUCATION

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

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

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

PROFESSIONAL DESIGNATIONS

Society of Depreciation Professionals
Certified Depreciation Professional (CDP)

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

The Mediation Institute
Certified Civil / Commercial & Employment Mediator

WORK EXPERIENCE

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

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

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

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

TEACHING EXPERIENCE

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

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

PUBLICATIONS

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

VOLUNTEER EXPERIENCE

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

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

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

PROFESSIONAL ASSOCIATIONS

Oklahoma Bar Association — 2007 – Present

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

Society of Utility Regulatory Financial Analysts — 2014 – Present

SELECTED CONTINUING PROFESSIONAL EDUCATION

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

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

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

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

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

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

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

Utility Regulatory Proceedings

State	Regulatory Agency / Company-Applicant	Docket Number	Testimony / Analysis: Issues	Type	Date
WY	Wyoming Public Services Commission Powder River Energy Corporation	PUD 201700151	Risk and credit analysis	Prefiled	8/28/2017
OK	Oklahoma Corporation Commission Public Service Co. of Oklahoma	PUD 201700151	Depreciation rates, terminal salvage, risk analysis	Prefiled	9/21/2017
TX	Public Utility Commission of Texas Oncor Electric Delivery Company	PUC 46957	Depreciation rates, simulated plant record analysis	Pending	
NV	Nevada Public Utilities Commission Nevada Power Company	17-06004	Depreciation rates, net salvage	Prefiled	10/6/2017
TX	Public Utility Commission of Texas El Paso Electric Company	PUC 46831	Depreciation rates, interim retirements	Prefiled	6/23/2017
ID	Idaho Public Utilities Commission Idaho Power Company	IPC-E-16-24	Accelerated depreciation of North Valmy plant	Settled	5/31/2017
ID	Idaho Public Utilities Commission Idaho Power Company	IPC-E-16-23	Depreciation rates	Settled	5/31/2017
TX	Public Utility Commission of Texas Southwestern Electric Power Company	PUC 46449	Depreciation rates, decommissioning costs, terminal net salvage	Prefiled	4/25/2017
MA	Massachusetts Department of Public Utilities Eversource Energy	D.P.U. 17-05	Cost of capital, capital structure, and rate of return	Prefiled	4/28/2017
TX	Railroad Commission of Texas Atmos Pipeline - Texas	GUD 10580	Depreciation rates, depreciation grouping procedure	Prefiled	3/22/2017
TX	Public Utility Commission of Texas Sharyland Utility Co.	PUC 45414	Depreciation rates, simulated and actuarial analysis	Prefiled	2/28/2017
OK	Oklahoma Corporation Commission Empire District Electric Co.	PUD 201600468	Cost of capital, depreciation rates, terminal salvage, lifespans	Prefiled	3/13/2017

Utility Regulatory Proceedings

State	Regulatory Agency / Company-Applicant	Docket Number	Testimony / Analysis: Issues	Type	Date
TX	Railroad Commission of Texas CenterPoint Energy Texas Gas	GUD 10567	Depreciation rates, simulated and actuarial analysis	Prefiled	2/21/2017
AR	Arkansas Public Service Commission Oklahoma Gas & Electric Co.	160-159-GU	Cost of capital, depreciation rates, terminal salvage, lifespans	Prefiled	1/31/2017
FL	Florida Public Service Commission Peoples Gas	160-159-GU	Depreciation rates	Report	11/4/2016
AZ	Arizona Corporation Commission Arizona Public Service Co.	E-01345A-16-0036	Cost of capital, depreciation rates, terminal salvage, lifespans	Pre-filed	12/28/2016
NV	Nevada Public Utilities Commission Sierra Pacific Power Co.	16-06008	Depreciation rates, terminal salvage, lifespans, theoretical reserve	Pre-filed	9/23/2016
OK	Oklahoma Corporation Commission Oklahoma Gas & Electric Co.	PUD 201500273	Cost of capital, depreciation rates, terminal salvage, lifespans	Pre-filed Live	3/21/2016 5/3/2016
OK	Oklahoma Corporation Commission Public Service Co. of Oklahoma	PUD 201500208	Cost of capital, depreciation rates, terminal salvage, lifespans	Pre-filed Live	10/14/2015 12/8/2015
OK	Oklahoma Corporation Commission Oklahoma Natural Gas Co.	PUD 201500213	Cost of capital and depreciation rates	Pre-filed	10/19/2015
OK	Oklahoma Corporation Commission Oak Hills Water System	PUD 201500123	Cost of capital and depreciation rates	Pre-filed Live	7/8/2015 8/14/2015
OK	Oklahoma Corporation Commission CenterPoint Energy Oklahoma Gas	PUD 201400227	Fuel prudence review and fuel adjustment clause	Pre-filed Live	11/3/2014 2/10/2015
OK	Oklahoma Corporation Commission Public Service Co. of Oklahoma	PUD 201400233	Certificate of authority to issue new debt securities	Pre-filed Live	9/12/2014 9/25/2014
OK	Oklahoma Corporation Commission	PUD 201400226	Fuel prudence review and fuel adjustment	Pre-filed	12/9/2014

Utility Regulatory Proceedings

State	Regulatory Agency / Company-Applicant	Docket Number	Testimony / Analysis: Issues	Type	Date
	Empire District Electric Co.		clause	Live	1/22/2015
OK	Oklahoma Corporation Commission Fort Cobb Fuel Authority	PUD 201400219	Fuel prudence review and fuel adjustment clause	Pre-filed Live	 1/29/2015
OK	Oklahoma Corporation Commission Fort Cobb Fuel Authority	PUD 201400140	Outside services, legislative advocacy, payroll expense, and insurance expense	Pre-filed	12/16/2014
OK	Oklahoma Corporation Commission Public Service Co. of Oklahoma	PUD 201300201	Authorization of standby and supplemental tariff	Pre-filed Live	12/9/2013 12/19/2013
OK	Oklahoma Corporation Commission Fort Cobb Fuel Authority	PUD 201300134	Fuel prudence review and fuel adjustment clause	Pre-filed Live	10/23/2013 1/30/2014
OK	Oklahoma Corporation Commission Empire District Electric Co.	PUD 201300131	Fuel prudence review and fuel adjustment clause	Pre-filed Live	11/21/2013 12/19/2013
OK	Oklahoma Corporation Commission CenterPoint Energy Oklahoma Gas	PUD 201300127	Fuel prudence review and fuel adjustment clause	Pre-filed Live	10/21/2013 1/23/2014
OK	Oklahoma Corporation Commission Oklahoma Gas & Electric Co.	PUD 201200185	Gas transportation contract extension	Pre-filed Live	9/20/2012 10/9/2012
OK	Oklahoma Corporation Commission Empire District Electric Co.	PUD 201200170	Fuel prudence review and fuel adjustment clause	Pre-filed Live	10/31/2012 12/13/2012
OK	Oklahoma Corporation Commission Oklahoma Gas & Electric Co.	PUD 201200169	Fuel prudence review and fuel adjustment clause	Pre-filed Live	12/19/2012 4/4/2013

Summary Depreciation Rate Comparison

Plant Function	Original Cost	NPC's Proposal		BCP's Proposal		Difference	
		Rate	Accrual	Rate	Accrual	Rate	Accrual
Intangible Plant	$ 259,088,647	7.43%	$ 19,250,286	5.03%	$ 13,029,650	-2.40%	$ (6,220,636)
Transmission	1,268,796,654	1.75%	22,183,525	1.69%	21,405,206	-0.06%	(778,319)
Distribution	3,188,398,843	2.61%	83,064,549	2.26%	72,033,045	-0.35%	(11,031,504)
General	316,105,015	5.75%	18,167,198	5.75%	18,167,198	0.00%	-
Total Accounts Studied	$ 5,032,389,158	2.83%	$ 142,665,559	2.48%	$ 124,635,100	**-0.36%**	**$ (18,030,459)**

*Based on plant at 12-31-16. See testimony of James R. Dittmer for BCP's adjustment to depreciation expense

Detailed Depreciation Rate Comparison

		[1]	[2]		[3]		[4]		[5]		[6]	
			Current Parameters		NPC Proposal		BCP Proposal		BCP less Present Rates		BCP Adjustment	
Account No.	Description	Original Cost	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual	Rate	Annual Accrual
	Intangible Plant											
303.00	Software	259,088,647	8.33%	21,582,084	7.43%	19,250,286	5.03%	13,029,650	-3.30%	-8,552,434	-2.40%	-6,220,636
	Transmission Plant											
350.20	Land and Land Rights	119,407,909	1.55%	1,850,823	1.42%	1,691,935	1.42%	1,691,935	-0.13%	-158,888	0.00%	0
352.00	Structures and Improvements	2,424,768	0.99%	24,005	1.20%	28,982	1.20%	28,982	0.21%	4,977	0.00%	0
353.00	Station Equipment	668,644,884	1.67%	11,166,370	1.71%	11,406,942	1.71%	11,406,942	0.04%	240,572	0.00%	0
354.00	Towers and Fixtures	35,445,659	1.48%	524,596	1.49%	527,277	1.49%	527,277	0.01%	2,681	0.00%	0
355.00	Poles and Fixtures	247,877,672	2.52%	6,246,517	1.84%	4,556,594	1.75%	4,334,676	-0.77%	-1,911,841	-0.09%	-221,918
356.00	Overhead Conductors and Devices	154,047,070	2.26%	3,481,464	2.04%	3,147,788	1.68%	2,591,387	-0.58%	-890,077	-0.36%	-556,401
357.00	Underground Conduit	7,659,104	1.61%	123,312	1.61%	123,160	1.61%	123,160	0.00%	-152	0.00%	0
358.00	Underground Conductors and Devices	31,538,210	2.21%	696,994	2.13%	670,829	2.13%	670,829	-0.08%	-26,165	0.00%	0
359.00	Roads and Trails	1,751,379	1.74%	30,474	1.71%	30,018	1.71%	30,018	-0.03%	-456	0.00%	0
	Total Transmission Plant	1,268,796,654	1.90%	24,144,554	1.75%	22,183,525	1.69%	21,405,206	-0.22%	-2,739,348	-0.06%	-778,319
	Distribution Plant											
360.20	Land and Land Rights	50,632,935	1.40%	708,861	1.37%	691,343	1.37%	691,343	-0.03%	-17,518	0.00%	0
361.00	Structures and Improvements	43,882,372	2.06%	903,977	1.81%	794,708	1.81%	794,708	-0.25%	-109,269	0.00%	0
362.00	Station Equipment	530,367,759	1.56%	8,273,737	1.66%	8,784,824	1.55%	8,216,334	-0.01%	-57,403	-0.11%	-568,490
364.00	Poles, Towers and Fixtures	70,329,511	2.61%	1,835,600	2.94%	2,068,630	2.94%	2,068,630	0.33%	233,030	0.00%	0
365.00	Overhead Conductors and Devices	111,283,771	2.02%	2,247,932	2.14%	2,378,059	2.14%	2,378,059	0.12%	130,127	0.00%	0
366.00	Underground Conduit	168,785,336	1.80%	3,038,136	2.04%	3,436,837	1.45%	2,454,889	-0.35%	-583,247	-0.59%	-981,948
367.00	Underground Conductors and Devices	1,327,337,537	3.21%	42,607,535	2.82%	37,457,968	2.15%	28,568,498	-1.06%	-14,039,037	-0.67%	-8,889,470
368.00	Line Transformers	570,690,629	2.24%	12,783,470	2.91%	16,619,590	2.91%	16,619,590	0.67%	3,836,120	0.00%	0
369.00	Services	187,500,729	2.34%	4,387,517	2.40%	4,491,730	2.08%	3,900,134	-0.26%	-487,383	-0.32%	-591,596
370.00	Meters	13,775,063	2.75%	378,814	3.05%	420,049	3.05%	420,049	0.30%	41,235	0.00%	0
370.10	AMI Meters	109,337,936	5.07%	5,543,433	5.27%	5,764,414	5.27%	5,764,414	0.20%	220,981	0.00%	0
372.00	Leased Property on Customer Premises	3,430,830	4.89%	167,768	4.36%	149,505	4.36%	149,505	-0.53%	-18,263	0.00%	0
373.00	Street Lighting and Signal Systems	1,044,433	0.66%	6,893	0.66%	6,892	0.66%	6,892	0.00%	-1	0.00%	0
	Total Distribution Plant	3,188,398,843	2.60%	82,883,674	2.61%	83,064,549	2.26%	72,033,045	-0.34%	-10,850,629	-0.35%	-11,031,504
	General Plant											
389.20	Land Rights	422,546	0.05%	211	0.23%	964	0.23%	964	0.18%	753	0.00%	0
390.00	Structures and Improvements	116,922,743	2.17%	2,537,224	2.56%	2,997,613	2.56%	2,997,613	0.39%	460,389	0.00%	0
391.10	Office Furniture and Equipment	17,990,256	5.00%	899,513	5.00%	899,513	5.00%	899,513	0.00%	0	0.00%	0
391.20	Computer Equipment	31,264,616	20.00%	6,252,923	20.00%	6,252,923	20.00%	6,252,923	0.00%	0	0.00%	0
392.00	Transportation Equipment	11,879,463	29.65%	3,522,261	8.40%	997,625	8.40%	997,625	-21.25%	-2,524,636	0.00%	0
	Transportation Equipment - Reserve for Amortization		0.00%		0.00%	-1,530,837	0.00%	-1,530,837				
393.00	Stores Equipment	666,781	5.00%	33,339	5.00%	33,339	5.00%	33,339	0.00%	0	0.00%	0
394.00	Tools, Shop and Garage Equipment	5,669,046	4.00%	226,762	4.00%	226,762	4.00%	226,762	0.00%	0	0.00%	0
395.00	Laboratory Equipment	1,478,449	6.67%	98,613	6.67%	98,613	6.67%	98,613	0.00%	0	0.00%	0
396.00	Power Operated Equipment	1,612,551	48.09%	775,476	6.43%	103,661	6.43%	103,661	-41.66%	-671,815	0.00%	0
	Power Operated Equipment - Reserve for Amortization		0.00%		0.00%	-463,821	0.00%	-463,821				
397.00	Communication Equipment	124,981,619	6.67%	8,336,274	6.67%	8,336,274	6.67%	8,336,274	0.00%	0	0.00%	0
398.00	Miscellaneous Equipment	3,216,945	6.67%	214,570	6.67%	214,570	6.67%	214,570	0.00%	0	0.00%	0
	Total General Plant	316,105,015	7.24%	22,897,165	5.75%	18,167,198	5.75%	18,167,198	-1.50%	-2,735,309	0.00%	0
	TOTAL ACCOUNTS STUDIED	5,032,389,158	3.01%	151,507,478	2.83%	142,665,559	2.48%	124,635,100	-0.53%	-24,877,720	-0.36%	-18,030,459

[1], [3] From Company Depreciation Study
[2] See response to DR Staff 014 Attachment 04
[4] From Exhibit DJG 4 (some unadjusted rates and expenses may be hard coded to match Company's position due to rounding)
[5] = [4] - [2]
[6] = [4] - [3]

Depreciation Rate Development

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Account No.	Description	Original Cost	Iowa Curve Type - AL	Net Salvage	Depreciable Base	Book Reserve	Future Accruals	Remaining Life	Service Life Accrual	Service Life Rate	Net Salvage Accrual	Net Salvage Rate	Total Accrual	Total Rate
	Intangible Plant													
303.00	Software	259,088,647	SQ - 15	0%	259,088,647	117,837,776	141,250,871	10.84	13,029,650	5.03%	0	0.00%	13,029,650	5.03%
	Transmission Plant													
350.20	Land and Land Rights	119,407,909	R4 - 70	0%	119,407,909	19,002,488	100,405,421	59.30	1,693,177	1.42%	0	0.00%	1,693,177	1.42%
352.00	Structures and Improvements	2,424,768	R3 - 60	-5%	2,546,006	1,354,622	1,191,384	41.10	26,038	1.07%	2,950	0.12%	28,987	1.20%
353.00	Station Equipment	668,644,884	R2 - 60	-5%	702,077,129	158,318,891	543,758,238	47.70	10,698,658	1.60%	700,886	0.10%	11,399,544	1.70%
354.00	Towers and Fixtures	35,445,659	R4 - 65	-10%	38,990,224	12,413,921	26,576,303	50.40	456,979	1.29%	70,329	0.20%	527,308	1.49%
355.00	Poles and Fixtures	247,877,672	R2 - 58	-20%	297,453,206	111,235,524	186,217,682	42.96	3,180,683	1.28%	1,153,993	0.47%	4,334,676	1.75%
356.00	Overhead Conductors and Devices	154,047,070	R1.5 - 69	-30%	200,261,191	57,527,612	142,733,579	55.08	1,752,350	1.14%	839,036	0.54%	2,591,387	1.68%
357.00	Underground Conduit	7,659,104	R2 - 55	0%	7,659,104	2,599,078	5,060,025	41.10	123,115	1.61%	0	0.00%	123,115	1.61%
358.00	Underground Conductors and Devices	31,538,210	R3 - 45	0%	31,538,210	7,910,953	23,627,256	35.20	671,229	2.13%	0	0.00%	671,229	2.13%
359.00	Roads and Trails	1,751,379	R4 - 60	0%	1,751,379	533,036	1,218,343	40.60	30,008	1.71%	0	0.00%	30,008	1.71%
	Total Transmission Plant	1,268,796,654			1,401,684,357	370,896,126	1,030,788,232	48.17	18,632,238	1.47%	2,767,193	0.22%	21,399,431	1.69%
	Distribution Plant													
360.20	Land and Land Rights	50,632,935	R4 - 65	0%	50,632,935	14,993,291	35,639,644	51.60	690,691	1.36%	0	0.00%	690,691	1.36%
361.00	Structures and Improvements	43,882,372	R3 - 55	-5%	46,076,490	11,541,401	34,535,089	43.50	743,471	1.69%	50,440	0.11%	793,910	1.81%
362.00	Station Equipment	530,367,759	R3 - 64	-10%	583,404,535	183,186,903	400,217,632	48.71	7,127,507	1.34%	1,088,827	0.21%	8,216,334	1.55%
364.00	Poles, Towers and Fixtures	70,329,511	R1 - 50	-45%	101,977,791	28,436,721	73,541,070	35.60	1,176,764	1.67%	888,997	1.26%	2,065,760	2.94%
365.00	Overhead Conductors and Devices	111,283,771	R2 - 60	-25%	139,104,714	39,179,988	99,924,726	42.00	1,716,757	1.54%	662,403	0.60%	2,379,160	2.14%
366.00	Underground Conduit	168,785,336	S1 - 72	-20%	202,542,403	58,072,180	144,470,224	58.85	1,881,277	1.11%	573,612	0.34%	2,454,889	1.45%
367.00	Underground Conductors and Devices	1,327,337,537	R3 - 54	-20%	1,592,805,045	416,354,279	1,176,450,765	41.18	22,121,983	1.67%	6,446,515	0.49%	28,568,498	2.15%
368.00	Line Transformers	570,690,629	R2 - 40	-5%	599,225,160	140,190,102	459,035,058	27.60	15,597,845	2.73%	1,033,860	0.18%	16,631,705	2.91%
369.00	Services	187,500,729	R4 - 56	-50%	281,251,093	142,874,351	138,376,743	35.48	1,257,790	0.67%	2,642,344	1.41%	3,900,134	2.08%
370.00	Meters	13,775,063	R1 - 35	0%	13,775,063	556,048	13,219,016	31.50	419,651	3.05%	0	0.00%	419,651	3.05%
370.10	AMI Meters	109,337,936	R5 - 20	0%	109,337,936	23,129,566	86,208,370	15.00	5,747,225	5.26%	0	0.00%	5,747,225	5.26%
372.00	Leased Property on Customer Premises	3,430,830	R1 - 30	-5%	3,602,372	1,258,943	2,343,429	15.70	138,337	4.03%	10,926	0.32%	149,263	4.35%
373.00	Street Lighting and Signal Systems	1,044,433	R2 - 35	-5%	1,096,655	959,472	137,183	19.90	4,269	0.41%	2,624	0.25%	6,894	0.66%
	Total Distribution Plant	3,188,398,843			3,724,832,194	1,060,733,245	2,664,098,949	36.99	58,623,566	1.84%	13,400,549	0.42%	72,024,114	2.26%
	General Plant													
389.20	Land Rights	422,546	R4 - 65	0%	422,546	367,083	55,464	57.50					964	0.23%
390.00	Structures and Improvements	116,922,743	R2 - 45	-10%	128,615,017	22,554,731	106,060,286	35.40					2,997,613	2.56%
391.10	Office Furniture and Equipment	17,990,256	SQ - 20	0%	17,990,256	1,430,201	16,560,055	5.90					899,513	5.00%
391.20	Computer Equipment	31,264,616	SQ - 5	0%	31,264,616	12,749,354	18,515,262	2.80					6,252,923	20.00%
392.00	Transportation Equipment	11,879,463	L2 - 10	15%	10,097,544	2,650,837	7,446,707	7.50					997,625	8.40%
	Transportation Equipment - Reserve for Amortization					4,592,512	-4,592,512	3.00					-1,530,837	0.00%
393.00	Stores Equipment	666,781	SQ - 20	0%	666,781	209,323	457,457	8.50					33,339	5.00%
394.00	Tools, Shop and Garage Equipment	5,669,046	SQ - 25	0%	5,669,046	1,335,097	4,333,950	10.50					226,762	4.00%
395.00	Laboratory Equipment	1,478,449	SQ - 15	0%	1,478,449	-1,270,455	2,748,904	5.30					98,613	6.67%
396.00	Power Operated Equipment	1,612,551	L2.5 - 14	10%	1,451,296	732,404	718,892	6.90					103,661	6.43%
	Power Operated Equipment - Reserve for Amortization					1,391,463	-1,391,463	3.00					-463,821	0.00%
397.00	Communication Equipment	124,981,619	SQ - 15	0%	124,981,619	50,499,266	74,482,353	6.60					8,336,274	6.67%
398.00	Miscellaneous Equipment	3,216,945	SQ - 15	0%	3,216,945	1,189,798	2,027,147	7.70					214,570	6.67%
	Total General Plant	316,105,015			325,854,115	98,431,613	227,422,501	12.52					18,167,198	5.75%
	TOTAL ACCOUNTS STUDIED	5,032,389,158			5,711,459,313	1,647,898,760	4,063,560,553	32.61	90,285,454	1.79%	16,167,742	0.68%	124,620,394	2.48%

[1] Depreciation Study pp. VI-4 - VI-11
[2] Average life and Iowa curve shape developed through actuarial analysis and professional judgment
[3] Weighted net salvage for life span accounts from weighted net salvage exhibit; net salvage for mass accounts developed through statistical analysis and professional judgment
[4] = [1]*(1-[3])
[5] From Company accounting records
[6] = [4] - [5]
[7] Composite remaining life based on Iowa curve 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]. Any negative rates adjusted up to zero.

Account 303 - Software Rate Calculation

[1] Year	[2] Original Cost	[3] Future Accruals	[4] Remaining Life (Years)	[5] Annual Accrual
1997	$ 669,453			
1998	50,457			
2001	1,218,029			
2002	14,184,150			
2003	2,374,688			
2004	2,403,894			
2005	2,730,014	$ 64,965	3.5	$ 18,561
2006	13,713,451	1,490,389	4.5	331,198
2007	7,443,724	1,440,844	5.5	261,972
2008	16,333,493	4,548,212	6.5	699,725
2009	15,192,893	5,520,238	7.5	736,032
2010	49,404,330	22,144,383	8.5	2,605,222
2011	8,384,877	4,470,161	9.5	470,543
2012	19,923,674	12,312,951	10.5	1,172,662
2013	13,595,302	9,556,004	11.5	830,957
2014	35,223,128	27,748,236	12.5	2,219,859
2015	22,398,069	19,546,093	13.5	1,447,859
2016	33,845,023	32,408,398	14.5	2,235,062
Total	$ 259,088,647	$ 141,250,874		$ 13,029,650

Survivor Curve:	**SQ-15**	[6]
Net Salvage:	**0.0%**	[7]
Composite Remaining Life	**10.8**	[8]
Accrual Rate	**5.0%**	[9]

[1], [2], [3] From Depreciation Study
[4] Remaining life based on selected Iowa Curve at [6]
[5] = [3] / [4]
[6] Selected Iowa curve
[7] Selected net salvage percent
[8] = Sum of [3] / Sum of [5]
[9] = Sum of [5] / Sum of [2]

Account 355 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	Exposures (Dollars)	Observed Life Table (OLT)	NPC R2-55	BCP R2-58	NPC SSD	BCP SSD
0.0	309,840,752	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	308,507,602	99.86%	99.91%	99.92%	0.0000	0.0000
1.5	307,202,347	99.81%	99.73%	99.75%	0.0000	0.0000
2.5	306,654,603	99.73%	99.54%	99.57%	0.0000	0.0000
3.5	257,006,214	99.55%	99.34%	99.38%	0.0000	0.0000
4.5	257,938,032	99.45%	99.12%	99.17%	0.0000	0.0000
5.5	257,389,669	99.24%	98.89%	98.96%	0.0000	0.0000
6.5	256,863,742	99.07%	98.65%	98.73%	0.0000	0.0000
7.5	254,659,547	98.77%	98.39%	98.50%	0.0000	0.0000
8.5	243,539,937	98.22%	98.12%	98.24%	0.0000	0.0000
9.5	206,634,201	98.04%	97.83%	97.98%	0.0000	0.0000
10.5	197,967,925	97.68%	97.53%	97.70%	0.0000	0.0000
11.5	192,606,699	97.26%	97.21%	97.40%	0.0000	0.0000
12.5	188,637,754	96.37%	96.87%	97.09%	0.0000	0.0001
13.5	170,262,150	95.90%	96.52%	96.77%	0.0000	0.0001
14.5	149,342,024	95.56%	96.14%	96.42%	0.0000	0.0001
15.5	139,295,806	94.93%	95.75%	96.06%	0.0001	0.0001
16.5	129,906,463	94.08%	95.33%	95.69%	0.0002	0.0003
17.5	103,641,991	93.92%	94.89%	95.29%	0.0001	0.0002
18.5	76,826,381	93.57%	94.43%	94.87%	0.0001	0.0002
19.5	75,677,997	93.28%	93.95%	94.43%	0.0000	0.0001
20.5	69,272,901	92.64%	93.44%	93.98%	0.0001	0.0002
21.5	63,294,943	91.82%	92.91%	93.50%	0.0001	0.0003
22.5	60,180,627	91.70%	92.35%	93.00%	0.0000	0.0002
23.5	56,839,004	91.37%	91.76%	92.47%	0.0000	0.0001
24.5	53,711,996	90.92%	91.15%	91.92%	0.0000	0.0001
25.5	50,825,660	90.15%	90.50%	91.35%	0.0000	0.0001
26.5	27,955,376	89.74%	89.83%	90.74%	0.0000	0.0001
27.5	22,440,573	89.27%	89.13%	90.12%	0.0000	0.0001
28.5	15,999,235	88.96%	88.39%	89.46%	0.0000	0.0000
29.5	15,688,136	87.67%	87.62%	88.78%	0.0000	0.0001
30.5	15,427,809	87.35%	86.81%	88.07%	0.0000	0.0001
31.5	14,551,679	85.53%	85.97%	87.32%	0.0000	0.0003
32.5	13,736,634	85.16%	85.10%	86.55%	0.0000	0.0002
33.5	11,362,075	84.86%	84.18%	85.74%	0.0000	0.0001
34.5	9,556,599	83.26%	83.23%	84.90%	0.0000	0.0003
35.5	7,571,065	82.53%	82.24%	84.03%	0.0000	0.0002
36.5	7,018,576	81.62%	81.20%	83.12%	0.0000	0.0002
37.5	6,658,687	81.32%	80.13%	82.18%	0.0001	0.0001
38.5	5,609,284	80.77%	79.01%	81.19%	0.0003	0.0000
39.5	5,386,903	80.54%	77.85%	80.18%	0.0007	0.0000
40.5	5,160,735	79.71%	76.64%	79.12%	0.0009	0.0000
41.5	4,501,528	78.20%	75.39%	78.02%	0.0008	0.0000
42.5	4,416,800	78.09%	74.09%	76.88%	0.0016	0.0001
43.5	4,354,263	77.78%	72.75%	75.71%	0.0025	0.0004
44.5	4,038,986	77.75%	71.36%	74.49%	0.0041	0.0011
45.5	4,005,788	77.35%	69.92%	73.23%	0.0055	0.0017
46.5	3,641,134	71.21%	68.43%	71.92%	0.0008	0.0001
47.5	3,328,850	71.07%	66.90%	70.58%	0.0017	0.0000
48.5	2,282,940	71.07%	65.32%	69.19%	0.0033	0.0004
49.5	2,113,401	70.36%	63.70%	67.76%	0.0044	0.0007
50.5	2,059,778	70.30%	62.03%	66.29%	0.0068	0.0016

Account 355 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] NPC R2-55	[5] BCP R2-58	[6] NPC SSD	[7] BCP SSD
51.5	661,816	70.22%	60.32%	64.78%	0.0098	0.0030
52.5	414,159	70.12%	58.57%	63.23%	0.0133	0.0047
53.5	289,215	70.02%	56.78%	61.64%	0.0175	0.0070
54.5	273,381	68.53%	54.95%	60.01%	0.0184	0.0073
55.5	250,114	68.44%	53.09%	58.34%	0.0236	0.0102
56.5	240,941	66.06%	51.20%	56.64%	0.0221	0.0089
57.5	198,666	66.02%	49.28%	54.90%	0.0280	0.0124
58.5	198,408	65.94%	47.33%	53.14%	0.0346	0.0164
59.5	193,609	65.88%	45.37%	51.34%	0.0421	0.0211
60.5	77,179	65.65%	43.40%	49.53%	0.0495	0.0260
61.5	73,292	65.65%	41.41%	47.69%	0.0588	0.0323
62.5	72,718	65.14%	39.42%	45.83%	0.0661	0.0373
63.5	72,718	65.14%	37.43%	43.96%	0.0768	0.0449
64.5	72,718	65.14%	35.45%	42.08%	0.0881	0.0532
65.5	1,335	63.93%	33.49%	40.19%	0.0927	0.0563
66.5	1,335	63.93%	31.54%	38.31%	0.1049	0.0657
67.5	1,335	63.93%	29.62%	36.43%	0.1177	0.0756
68.5	1,335	63.93%	27.73%	34.55%	0.1310	0.0863
69.5	1,335	63.93%	25.88%	32.70%	0.1447	0.0976
70.5	1,335	63.93%	24.08%	30.86%	0.1588	0.1094
71.5	1,335	63.93%	22.32%	29.05%	0.1731	0.1217
72.5	1,256	60.18%	20.62%	27.27%	0.1565	0.1083
73.5	1,256	60.18%	18.98%	25.52%	0.1698	0.1201
74.5	1,256	60.18%	17.40%	23.82%	0.1830	0.1322
75.5	1,256	60.18%	15.88%	22.16%	0.1962	0.1446
76.5	1,207	60.18%	14.44%	20.55%	0.2092	0.1571
77.5	1,207	60.18%	13.07%	18.99%	0.2220	0.1697
78.5						
Sum of Squared Differences				[8]	2.6433	1.7391
Up to 1% of Beginning Exposures				[9]	0.0202	0.0074

[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] NPC R2-60	[5] BCP R1.5-69	[6] NPC SSD	[7] BCP SSD
0.0	193,458,696	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	193,140,866	99.93%	99.92%	99.87%	0.0000	0.0000
1.5	190,959,761	99.90%	99.76%	99.61%	0.0000	0.0000
2.5	190,519,781	99.81%	99.58%	99.34%	0.0000	0.0000
3.5	159,828,084	99.73%	99.40%	99.07%	0.0000	0.0000
4.5	159,193,396	99.53%	99.20%	98.79%	0.0000	0.0001
5.5	157,833,902	98.81%	99.00%	98.49%	0.0000	0.0000
6.5	155,063,580	98.17%	98.78%	98.20%	0.0000	0.0000
7.5	154,343,337	97.84%	98.56%	97.89%	0.0001	0.0000
8.5	148,503,024	97.70%	98.32%	97.57%	0.0000	0.0000
9.5	124,524,016	97.63%	98.06%	97.25%	0.0000	0.0000
10.5	115,887,990	96.77%	97.80%	96.92%	0.0001	0.0000
11.5	112,797,861	96.47%	97.52%	96.58%	0.0001	0.0000
12.5	109,124,597	95.97%	97.22%	96.23%	0.0002	0.0000
13.5	94,216,299	94.97%	96.92%	95.87%	0.0004	0.0001
14.5	80,006,509	94.78%	96.59%	95.50%	0.0003	0.0001
15.5	69,895,705	94.41%	96.25%	95.13%	0.0003	0.0001
16.5	62,728,267	94.11%	95.90%	94.74%	0.0003	0.0000
17.5	53,481,234	93.92%	95.52%	94.34%	0.0003	0.0000
18.5	46,280,967	93.64%	95.13%	93.94%	0.0002	0.0000
19.5	45,164,381	93.56%	94.72%	93.52%	0.0001	0.0000
20.5	43,375,957	93.08%	94.29%	93.10%	0.0001	0.0000
21.5	41,205,572	92.11%	93.84%	92.66%	0.0003	0.0000
22.5	40,294,468	91.84%	93.37%	92.21%	0.0002	0.0000
23.5	39,197,437	91.29%	92.88%	91.76%	0.0003	0.0000
24.5	38,296,790	91.28%	92.37%	91.29%	0.0001	0.0000
25.5	36,053,898	90.97%	91.83%	90.81%	0.0001	0.0000
26.5	22,677,399	90.91%	91.28%	90.31%	0.0000	0.0000
27.5	20,191,903	90.76%	90.69%	89.81%	0.0000	0.0001
28.5	17,992,577	89.78%	90.09%	89.29%	0.0000	0.0000
29.5	17,915,206	89.40%	89.45%	88.76%	0.0000	0.0000
30.5	17,795,649	88.80%	88.79%	88.22%	0.0000	0.0000
31.5	17,704,860	88.35%	88.10%	87.66%	0.0000	0.0000
32.5	17,591,517	88.00%	87.39%	87.09%	0.0000	0.0001
33.5	16,102,815	87.58%	86.64%	86.50%	0.0001	0.0001
34.5	15,034,003	86.80%	85.87%	85.90%	0.0001	0.0001
35.5	12,470,842	86.30%	85.06%	85.28%	0.0002	0.0001
36.5	11,200,839	85.60%	84.22%	84.64%	0.0002	0.0001
37.5	10,835,023	84.31%	83.35%	83.99%	0.0001	0.0000
38.5	10,404,653	83.96%	82.45%	83.33%	0.0002	0.0000
39.5	10,200,853	82.78%	81.51%	82.64%	0.0002	0.0000
40.5	7,839,820	80.88%	80.54%	81.94%	0.0000	0.0001
41.5	5,274,303	80.62%	79.53%	81.22%	0.0001	0.0000
42.5	3,477,926	79.74%	78.48%	80.48%	0.0002	0.0001
43.5	3,334,547	79.46%	77.40%	79.72%	0.0004	0.0000
44.5	3,239,596	79.46%	76.28%	78.94%	0.0010	0.0000
45.5	3,210,327	78.99%	75.12%	78.15%	0.0015	0.0001
46.5	2,261,731	78.70%	73.92%	77.33%	0.0023	0.0002
47.5	1,938,564	78.48%	72.69%	76.50%	0.0034	0.0004

Account 356 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] NPC R2-60	[5] BCP R1.5-69	[6] NPC SSD	[7] BCP SSD
48.5	1,375,767	78.39%	71.41%	75.64%	0.0049	0.0008
49.5	1,263,868	77.73%	70.10%	74.76%	0.0058	0.0009
50.5	1,181,735	77.65%	68.74%	73.86%	0.0079	0.0014
51.5	515,606	77.65%	67.35%	72.94%	0.0106	0.0022
52.5	398,110	72.17%	65.92%	72.00%	0.0039	0.0000
53.5	323,599	72.17%	64.45%	71.04%	0.0060	0.0001
54.5	298,196	68.08%	62.94%	70.06%	0.0026	0.0004
55.5	270,478	68.08%	61.39%	69.05%	0.0045	0.0001
56.5	269,877	68.08%	59.81%	68.02%	0.0068	0.0000
57.5	175,703	68.08%	58.20%	66.97%	0.0098	0.0001
58.5	175,703	68.08%	56.55%	65.90%	0.0133	0.0005
59.5	175,516	68.08%	54.87%	64.81%	0.0174	0.0011
60.5	108,437	68.08%	53.17%	63.70%	0.0222	0.0019
61.5	108,437	68.08%	51.43%	62.57%	0.0277	0.0030
62.5	108,437	68.08%	49.68%	61.41%	0.0339	0.0044
63.5	108,437	68.08%	47.90%	60.24%	0.0407	0.0061
64.5	108,437	68.08%	46.11%	59.05%	0.0483	0.0082
65.5						
Sum of Squared Differences				[8]	0.2799	0.0335
Up to 1% of Beginning Exposures				[9]	0.0136	0.0022

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

Account 362 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] NPC R3-60	[5] BCP R3-64	[6] NPC SSD	[7] BCP SSD
0.0	596,796,023	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	582,766,358	99.95%	99.99%	99.99%	0.0000	0.0000
1.5	571,709,055	99.84%	99.96%	99.96%	0.0000	0.0000
2.5	565,164,113	99.74%	99.93%	99.93%	0.0000	0.0000
3.5	556,684,515	99.55%	99.89%	99.90%	0.0000	0.0000
4.5	553,779,179	99.37%	99.85%	99.86%	0.0000	0.0000
5.5	532,662,162	98.90%	99.80%	99.81%	0.0001	0.0001
6.5	523,960,338	98.70%	99.74%	99.77%	0.0001	0.0001
7.5	497,808,512	98.46%	99.68%	99.71%	0.0001	0.0002
8.5	447,768,943	98.27%	99.61%	99.65%	0.0002	0.0002
9.5	406,488,774	98.05%	99.53%	99.58%	0.0002	0.0002
10.5	380,804,050	97.92%	99.45%	99.51%	0.0002	0.0003
11.5	352,058,747	97.75%	99.35%	99.42%	0.0003	0.0003
12.5	325,237,851	97.57%	99.24%	99.33%	0.0003	0.0003
13.5	295,705,694	97.45%	99.12%	99.23%	0.0003	0.0003
14.5	278,856,177	97.26%	98.99%	99.11%	0.0003	0.0003
15.5	256,872,147	97.00%	98.85%	98.99%	0.0003	0.0004
16.5	230,599,649	96.94%	98.68%	98.85%	0.0003	0.0004
17.5	200,107,425	96.77%	98.51%	98.70%	0.0003	0.0004
18.5	165,370,616	96.66%	98.31%	98.54%	0.0003	0.0004
19.5	142,612,708	96.40%	98.10%	98.36%	0.0003	0.0004
20.5	128,791,229	96.22%	97.87%	98.17%	0.0003	0.0004
21.5	121,428,973	96.06%	97.62%	97.95%	0.0002	0.0004
22.5	108,174,290	95.80%	97.35%	97.73%	0.0002	0.0004
23.5	93,861,674	95.29%	97.05%	97.48%	0.0003	0.0005
24.5	89,382,262	94.98%	96.73%	97.21%	0.0003	0.0005
25.5	77,027,192	94.83%	96.38%	96.92%	0.0002	0.0004
26.5	61,556,632	94.81%	96.01%	96.61%	0.0001	0.0003
27.5	48,185,240	94.54%	95.61%	96.28%	0.0001	0.0003
28.5	44,671,118	94.29%	95.17%	95.92%	0.0001	0.0003
29.5	39,822,457	94.12%	94.71%	95.54%	0.0000	0.0002
30.5	37,536,368	93.74%	94.21%	95.13%	0.0000	0.0002
31.5	33,456,240	93.48%	93.68%	94.69%	0.0000	0.0001
32.5	32,531,744	93.24%	93.11%	94.23%	0.0000	0.0001
33.5	30,719,340	93.22%	92.50%	93.73%	0.0001	0.0000
34.5	27,653,866	92.98%	91.85%	93.20%	0.0001	0.0000
35.5	24,306,750	92.85%	91.16%	92.64%	0.0003	0.0000
36.5	18,866,938	92.49%	90.42%	92.04%	0.0004	0.0000
37.5	16,270,404	92.32%	89.64%	91.40%	0.0007	0.0001
38.5	14,039,627	92.31%	88.81%	90.73%	0.0012	0.0003
39.5	12,953,594	91.78%	87.93%	90.01%	0.0015	0.0003
40.5	12,360,196	90.75%	87.00%	89.26%	0.0014	0.0002
41.5	10,463,217	90.31%	86.01%	88.46%	0.0019	0.0003
42.5	8,593,178	89.72%	84.96%	87.62%	0.0023	0.0004
43.5	7,565,715	89.24%	83.85%	86.73%	0.0029	0.0006
44.5	7,006,504	88.30%	82.68%	85.78%	0.0032	0.0006
45.5	6,345,550	88.25%	81.44%	84.79%	0.0046	0.0012
46.5	5,549,704	88.12%	80.12%	83.74%	0.0064	0.0019
47.5	4,695,432	88.01%	78.74%	82.64%	0.0086	0.0029
48.5	4,467,193	87.80%	77.29%	81.48%	0.0111	0.0040
49.5	3,926,584	87.60%	75.75%	80.25%	0.0140	0.0054
50.5	3,090,198	87.08%	74.14%	78.97%	0.0167	0.0066

Account 362 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**NPC R3-60**	**BCP R3-64**	**NPC SSD**	**BCP SSD**
51.5	2,528,384	87.08%	72.44%	77.61%	0.0214	0.0090
52.5	1,963,320	87.05%	70.66%	76.19%	0.0269	0.0118
53.5	1,661,201	86.45%	68.80%	74.70%	0.0311	0.0138
54.5	1,311,846	86.45%	66.86%	73.14%	0.0384	0.0177
55.5	1,161,868	85.90%	64.83%	71.51%	0.0444	0.0207
56.5	1,111,304	85.79%	62.72%	69.80%	0.0532	0.0256
57.5	1,007,545	84.92%	60.53%	68.02%	0.0595	0.0286
58.5	753,228	84.90%	58.26%	66.17%	0.0710	0.0351
59.5	441,747	72.85%	55.93%	64.24%	0.0286	0.0074
60.5	142,086	72.85%	53.53%	62.24%	0.0373	0.0112
61.5	48,582	72.85%	51.08%	60.18%	0.0474	0.0161
62.5	27,512	72.85%	48.58%	58.05%	0.0589	0.0219
63.5	17,719	54.97%	46.04%	55.86%	0.0080	0.0001
64.5	4,182	54.97%	43.48%	53.61%	0.0132	0.0002
65.5	4,182	54.97%	40.91%	51.31%	0.0198	0.0013
66.5	4,182	54.97%	38.33%	48.97%	0.0277	0.0036
67.5	4,182	54.97%	35.77%	46.60%	0.0369	0.0070
68.5	4,182	54.97%	33.24%	44.20%	0.0472	0.0116
69.5	3,935	51.71%	30.74%	41.79%	0.0440	0.0098
70.5	3,780	49.68%	28.31%	39.38%	0.0457	0.0106
71.5	3,780	49.68%	25.94%	36.97%	0.0564	0.0162
72.5	3,780	49.68%	23.65%	34.58%	0.0678	0.0228
73.5	3,780	49.68%	21.46%	32.22%	0.0797	0.0305
74.5	3,780	49.68%	19.36%	29.90%	0.0919	0.0391
75.5	3,714	49.68%	17.38%	27.63%	0.1044	0.0486
76.5	3,598	49.68%	15.51%	25.43%	0.1168	0.0588
77.5	3,598	49.68%	13.76%	23.30%	0.1290	0.0696
78.5						
Sum of Squared Differences				[8]	1.4894	0.5818
Up to 1% of Beginning Exposures				[9]	0.0262	0.0124

[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] NPC R3-55	[5] BCP S1-72	[6] NPC SSD	[7] BCP SSD
0.0	172,913,638	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	166,432,840	99.99%	99.99%	100.00%	0.0000	0.0000
1.5	151,097,224	99.96%	99.95%	100.00%	0.0000	0.0000
2.5	146,755,937	99.94%	99.92%	99.99%	0.0000	0.0000
3.5	136,696,942	99.92%	99.88%	99.98%	0.0000	0.0000
4.5	133,577,799	99.87%	99.83%	99.96%	0.0000	0.0000
5.5	127,913,374	99.43%	99.77%	99.92%	0.0000	0.0000
6.5	121,803,852	99.34%	99.71%	99.88%	0.0000	0.0000
7.5	114,547,021	99.26%	99.64%	99.82%	0.0000	0.0000
8.5	109,144,839	99.14%	99.55%	99.75%	0.0000	0.0000
9.5	102,231,725	99.08%	99.46%	99.66%	0.0000	0.0000
10.5	98,199,997	98.99%	99.36%	99.55%	0.0000	0.0000
11.5	94,532,846	98.84%	99.24%	99.43%	0.0000	0.0000
12.5	93,397,024	98.72%	99.11%	99.29%	0.0000	0.0000
13.5	92,832,000	98.57%	98.96%	99.12%	0.0000	0.0000
14.5	88,358,660	98.44%	98.80%	98.93%	0.0000	0.0000
15.5	84,055,328	98.39%	98.61%	98.73%	0.0000	0.0000
16.5	79,706,019	98.31%	98.41%	98.50%	0.0000	0.0000
17.5	78,297,809	98.22%	98.19%	98.24%	0.0000	0.0000
18.5	73,210,930	98.08%	97.95%	97.96%	0.0000	0.0000
19.5	60,129,276	97.98%	97.68%	97.66%	0.0000	0.0000
20.5	48,891,679	97.87%	97.39%	97.33%	0.0000	0.0000
21.5	38,358,278	97.74%	97.07%	96.98%	0.0000	0.0001
22.5	29,634,580	97.33%	96.72%	96.60%	0.0000	0.0001
23.5	25,149,357	97.05%	96.33%	96.20%	0.0001	0.0001
24.5	17,412,507	96.54%	95.92%	95.77%	0.0000	0.0001
25.5	10,533,673	95.73%	95.47%	95.31%	0.0000	0.0000
26.5	7,867,639	94.87%	94.99%	94.83%	0.0000	0.0000
27.5	6,269,132	94.38%	94.47%	94.32%	0.0000	0.0000
28.5	5,452,378	93.89%	93.90%	93.78%	0.0000	0.0000
29.5	5,042,824	92.78%	93.29%	93.22%	0.0000	0.0000
30.5	3,853,010	92.26%	92.64%	92.63%	0.0000	0.0000
31.5	3,663,115	91.32%	91.94%	92.01%	0.0000	0.0000
32.5	3,384,571	90.49%	91.19%	91.37%	0.0000	0.0001
33.5	3,203,872	90.29%	90.39%	90.70%	0.0000	0.0000
34.5	2,864,868	89.52%	89.53%	90.01%	0.0000	0.0000
35.5	2,399,934	89.32%	88.62%	89.29%	0.0000	0.0000
36.5	1,872,557	89.07%	87.64%	88.54%	0.0002	0.0000
37.5	1,593,193	88.76%	86.60%	87.77%	0.0005	0.0001
38.5	1,322,494	88.00%	85.49%	86.98%	0.0006	0.0001
39.5	1,163,151	87.58%	84.31%	86.16%	0.0011	0.0002
40.5	1,084,668	85.41%	83.06%	85.31%	0.0006	0.0000
41.5	972,101	84.83%	81.72%	84.45%	0.0010	0.0000
42.5	868,417	84.55%	80.31%	83.56%	0.0018	0.0001
43.5	658,318	82.45%	78.81%	82.64%	0.0013	0.0000
44.5	562,535	82.11%	77.22%	81.71%	0.0024	0.0000
45.5	489,956	81.81%	75.54%	80.75%	0.0039	0.0001
46.5	405,208	81.78%	73.76%	79.78%	0.0064	0.0004
47.5	168,627	81.66%	71.88%	78.78%	0.0096	0.0008

Account 366 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**NPC R3-55**	**BCP S1-72**	**NPC SSD**	**BCP SSD**
48.5						
Sum of Squared Differences				[8]	0.0299	0.0027
Up to 1% of Beginning Exposures				[9]	0.0007	0.0009

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

Account 367 Curve Fitting

[1] Age (Years)	[2] Exposures (Dollars)	[3] Observed Life Table (OLT)	[4] NPC R4-45	[5] BCP R3-54	[6] NPC SSD	[7] BCP SSD
0.0	1,403,870,636	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	1,366,597,038	99.97%	100.00%	99.99%	0.0000	0.0000
1.5	1,325,998,220	99.92%	100.00%	99.95%	0.0000	0.0000
2.5	1,302,474,492	99.85%	99.99%	99.92%	0.0000	0.0000
3.5	1,257,281,159	99.75%	99.99%	99.87%	0.0000	0.0000
4.5	1,225,646,324	99.52%	99.98%	99.82%	0.0000	0.0000
5.5	1,201,164,475	99.37%	99.97%	99.76%	0.0000	0.0000
6.5	1,159,607,197	99.24%	99.96%	99.70%	0.0001	0.0000
7.5	1,060,157,821	99.10%	99.95%	99.62%	0.0001	0.0000
8.5	988,766,147	98.99%	99.93%	99.54%	0.0001	0.0000
9.5	921,162,185	98.80%	99.91%	99.44%	0.0001	0.0000
10.5	823,547,825	98.61%	99.88%	99.33%	0.0002	0.0001
11.5	708,033,549	98.45%	99.84%	99.21%	0.0002	0.0001
12.5	636,090,481	98.39%	99.79%	99.07%	0.0002	0.0000
13.5	559,138,441	98.26%	99.73%	98.92%	0.0002	0.0000
14.5	509,282,138	98.15%	99.65%	98.75%	0.0002	0.0000
15.5	453,681,510	97.88%	99.56%	98.56%	0.0003	0.0000
16.5	424,695,355	97.77%	99.44%	98.35%	0.0003	0.0000
17.5	389,321,380	97.63%	99.30%	98.12%	0.0003	0.0000
18.5	320,137,757	97.52%	99.13%	97.86%	0.0003	0.0000
19.5	273,946,609	97.34%	98.93%	97.58%	0.0003	0.0000
20.5	220,441,858	97.26%	98.68%	97.27%	0.0002	0.0000
21.5	182,375,157	97.04%	98.39%	96.93%	0.0002	0.0000
22.5	150,450,831	96.78%	98.04%	96.56%	0.0002	0.0000
23.5	132,930,463	96.36%	97.63%	96.16%	0.0002	0.0000
24.5	111,074,484	95.65%	97.15%	95.72%	0.0002	0.0000
25.5	80,651,729	95.18%	96.59%	95.25%	0.0002	0.0000
26.5	68,956,102	94.91%	95.95%	94.74%	0.0001	0.0000
27.5	54,464,412	94.58%	95.21%	94.18%	0.0000	0.0000
28.5	46,483,866	93.83%	94.36%	93.59%	0.0000	0.0000
29.5	41,171,553	93.16%	93.39%	92.94%	0.0000	0.0000
30.5	33,485,983	92.84%	92.30%	92.25%	0.0000	0.0000
31.5	29,778,225	92.28%	91.07%	91.51%	0.0001	0.0001
32.5	26,494,806	90.63%	89.69%	90.72%	0.0001	0.0000
33.5	23,400,981	89.87%	88.16%	89.87%	0.0003	0.0000
34.5	19,575,312	88.61%	86.46%	88.95%	0.0005	0.0000
35.5	17,007,532	88.12%	84.60%	87.98%	0.0012	0.0000
36.5	12,014,829	84.35%	82.56%	86.94%	0.0003	0.0007
37.5	8,714,475	83.08%	80.34%	85.84%	0.0008	0.0008
38.5	6,392,012	82.24%	77.93%	84.66%	0.0019	0.0006
39.5	5,048,984	79.08%	75.30%	83.40%	0.0014	0.0019
40.5	3,708,231	76.05%	72.42%	82.07%	0.0013	0.0036
41.5	3,397,611	75.11%	69.22%	80.64%	0.0035	0.0031
42.5	2,088,163	70.33%	65.68%	79.13%	0.0022	0.0078
43.5	1,362,277	67.98%	61.80%	77.53%	0.0038	0.0091
44.5	5,339	63.31%	57.59%	75.84%	0.0033	0.0157
45.5	1,746	20.70%	53.10%	74.05%	0.1050	0.2846
46.5						

Account 367 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**NPC R4-45**	**BCP R3-54**	**NPC SSD**	**BCP SSD**
Sum of Squared Differences				[8]	0.1297	0.3284
Up to 1% of Beginning Exposures				[9]	0.0063	0.0007

[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] NPC R4-50	[5] BCP R4-56	[6] NPC SSD	[7] BCP SSD
0.0	141,689,978	100.00%	100.00%	100.00%	0.0000	0.0000
0.5	135,528,563	100.00%	100.00%	100.00%	0.0000	0.0000
1.5	135,365,626	99.99%	100.00%	100.00%	0.0000	0.0000
2.5	135,305,560	99.99%	99.99%	100.00%	0.0000	0.0000
3.5	134,930,519	99.98%	99.99%	99.99%	0.0000	0.0000
4.5	132,377,088	99.98%	99.99%	99.99%	0.0000	0.0000
5.5	131,726,994	99.98%	99.98%	99.98%	0.0000	0.0000
6.5	131,739,359	99.97%	99.97%	99.98%	0.0000	0.0000
7.5	128,068,373	99.97%	99.96%	99.97%	0.0000	0.0000
8.5	128,073,035	99.97%	99.95%	99.96%	0.0000	0.0000
9.5	128,067,173	99.97%	99.93%	99.95%	0.0000	0.0000
10.5	127,902,148	99.97%	99.91%	99.93%	0.0000	0.0000
11.5	174,648,364	99.96%	99.88%	99.91%	0.0000	0.0000
12.5	174,657,313	99.96%	99.85%	99.89%	0.0000	0.0000
13.5	174,654,959	99.95%	99.81%	99.87%	0.0000	0.0000
14.5	174,434,132	99.86%	99.76%	99.83%	0.0000	0.0000
15.5	174,171,086	99.81%	99.70%	99.79%	0.0000	0.0000
16.5	172,871,834	99.79%	99.62%	99.75%	0.0000	0.0000
17.5	172,455,446	99.78%	99.53%	99.69%	0.0000	0.0000
18.5	84,479,956	99.76%	99.42%	99.62%	0.0000	0.0000
19.5	76,037,411	99.64%	99.30%	99.54%	0.0000	0.0000
20.5	65,580,077	99.60%	99.14%	99.45%	0.0000	0.0000
21.5	57,196,461	99.59%	98.96%	99.34%	0.0000	0.0000
22.5	50,236,235	99.54%	98.75%	99.21%	0.0001	0.0000
23.5	44,338,299	99.39%	98.50%	99.06%	0.0001	0.0000
24.5	38,706,267	99.34%	98.20%	98.88%	0.0001	0.0000
25.5	31,873,340	99.30%	97.86%	98.68%	0.0002	0.0000
26.5	28,078,815	99.24%	97.47%	98.45%	0.0003	0.0001
27.5	23,787,822	99.20%	97.02%	98.19%	0.0005	0.0001
28.5	20,958,009	99.19%	96.51%	97.88%	0.0007	0.0002
29.5	19,074,269	99.18%	95.92%	97.54%	0.0011	0.0003
30.5	16,314,844	99.16%	95.25%	97.15%	0.0015	0.0004
31.5	14,708,868	99.00%	94.50%	96.71%	0.0020	0.0005
32.5	13,339,186	98.98%	93.65%	96.21%	0.0028	0.0008
33.5	12,033,434	98.96%	92.70%	95.65%	0.0039	0.0011
34.5	10,873,395	98.93%	91.65%	95.03%	0.0053	0.0015
35.5	9,452,379	98.90%	90.47%	94.34%	0.0071	0.0021
36.5	8,190,231	98.87%	89.18%	93.57%	0.0094	0.0028
37.5	6,692,882	98.82%	87.76%	92.72%	0.0122	0.0037
38.5	5,642,999	98.79%	86.20%	91.78%	0.0159	0.0049
39.5	4,439,421	98.76%	84.50%	90.75%	0.0203	0.0064
40.5	3,850,884	98.75%	82.67%	89.63%	0.0259	0.0083
41.5	3,425,589	98.71%	80.68%	88.41%	0.0325	0.0106
42.5	3,058,011	98.03%	78.55%	87.08%	0.0379	0.0120
43.5	2,576,508	98.01%	76.25%	85.64%	0.0473	0.0153
44.5	2,125,742	97.98%	73.75%	84.09%	0.0587	0.0193
45.5	1,787,595	97.93%	71.02%	82.42%	0.0724	0.0240
46.5	1,604,340	97.92%	68.02%	80.65%	0.0894	0.0298
47.5	1,417,800	97.90%	64.75%	78.75%	0.1099	0.0367

Account 369 Curve Fitting

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Age (Years)	**Exposures (Dollars)**	**Observed Life Table (OLT)**	**NPC R4-50**	**BCP R4-56**	**NPC SSD**	**BCP SSD**
48.5	1,265,969	97.90%	61.19%	76.71%	0.1347	0.0449
49.5	1,143,576	97.17%	57.37%	74.53%	0.1584	0.0513
50.5	1,025,682	97.14%	53.33%	72.17%	0.1919	0.0624
51.5	879,227	97.09%	49.11%	69.61%	0.2302	0.0755
52.5	684,333	97.09%	44.79%	66.82%	0.2735	0.0916
53.5	384,228	96.79%	40.43%	63.81%	0.3177	0.1087
54.5	205,601	96.79%	36.10%	60.59%	0.3683	0.1311
55.5	96,302	96.79%	31.88%	57.16%	0.4213	0.1571
56.5	5,215	96.79%	27.83%	53.55%	0.4755	0.1870
57.5						
Sum of Squared Differences				[8]	3.1293	1.0906
Up to 1% of Beginning Exposures				[9]	0.5577	0.1811

[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.
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[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.

NPC
Electric Division
355.00 Poles and Fixtures

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1935 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$259,899,985.07	$436,537.61	0.00168	100.00
0.5 - 1.5	$258,167,590.40	$152,771.64	0.00059	99.83
1.5 - 2.5	$257,500,194.16	$232,447.09	0.00090	99.77
2.5 - 3.5	$258,399,160.06	$534,334.86	0.00207	99.68
3.5 - 4.5	$257,535,141.36	$233,498.30	0.00091	99.48
4.5 - 5.5	$257,027,571.52	$540,128.43	0.00210	99.39
5.5 - 6.5	$256,491,421.09	$432,831.50	0.00169	99.18
6.5 - 7.5	$256,209,310.33	$742,681.94	0.00290	99.01
7.5 - 8.5	$254,056,540.39	$1,427,559.36	0.00562	98.72
8.5 - 9.5	$243,005,977.85	$426,441.43	0.00175	98.17
9.5 - 10.5	$206,337,080.09	$749,160.30	0.00363	98.00
10.5 - 11.5	$197,735,963.20	$849,991.16	0.00430	97.64
11.5 - 12.5	$192,379,871.04	$1,726,713.63	0.00898	97.22
12.5 - 13.5	$188,458,740.41	$902,549.11	0.00479	96.35
13.5 - 14.5	$170,098,406.35	$576,675.26	0.00339	95.89
14.5 - 15.5	$149,278,207.60	$985,282.48	0.00660	95.56
15.5 - 16.5	$139,233,670.12	$1,246,542.49	0.00895	94.93
16.5 - 17.5	$129,861,693.63	$229,769.12	0.00177	94.08
17.5 - 18.5	$103,607,024.51	$383,900.57	0.00371	93.91
18.5 - 19.5	$76,799,104.94	$231,422.34	0.00301	93.57
19.5 - 20.5	$75,664,583.60	$519,634.23	0.00687	93.28
20.5 - 21.5	$69,259,633.37	$614,070.31	0.00887	92.64
21.5 - 22.5	$63,282,803.06	$83,777.96	0.00132	91.82
22.5 - 23.5	$60,174,490.10	$215,226.08	0.00358	91.70
23.5 - 24.5	$56,833,331.02	$277,043.96	0.00487	91.37
24.5 - 25.5	$53,707,125.06	$458,303.43	0.00853	90.93
25.5 - 26.5	$50,821,842.73	$230,594.69	0.00454	90.15
26.5 - 27.5	$27,951,586.04	$145,806.76	0.00522	89.74
27.5 - 28.5	$22,440,577.14	$78,079.62	0.00348	89.27
28.5 - 29.5	$15,999,238.52	$231,256.38	0.01445	88.96
29.5 - 30.5	$15,688,140.14	$58,333.43	0.00372	87.68
30.5 - 31.5	$15,427,812.71	$321,272.01	0.02082	87.35
31.5 - 32.5	$14,551,682.70	$62,536.36	0.00430	85.53
32.5 - 33.5	$13,736,637.34	$48,296.03	0.00352	85.17
33.5 - 34.5	$11,362,078.31	$213,996.49	0.01883	84.87
34.5 - 35.5	$9,556,601.82	$83,912.69	0.00878	83.27
35.5 - 36.5	$7,571,068.13	$84,067.11	0.01110	82.54

NPC
Electric Division
355.00 Poles and Fixtures

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1935 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$7,018,578.02	$25,628.24	0.00365	81.62
37.5 - 38.5	$6,658,688.78	$45,309.52	0.00680	81.32
38.5 - 39.5	$5,609,286.26	$16,023.57	0.00286	80.77
39.5 - 40.5	$5,386,905.69	$55,204.35	0.01025	80.54
40.5 - 41.5	$5,160,737.34	$97,855.02	0.01896	79.71
41.5 - 42.5	$4,501,530.32	$6,447.24	0.00143	78.20
42.5 - 43.5	$4,416,801.08	$17,526.31	0.00397	78.09
43.5 - 44.5	$4,354,264.77	$1,328.42	0.00031	77.78
44.5 - 45.5	$4,038,987.35	$21,090.00	0.00522	77.76
45.5 - 46.5	$4,005,789.35	$317,988.40	0.07938	77.35
46.5 - 47.5	$3,641,134.95	$6,929.94	0.00190	71.21
47.5 - 48.5	$3,328,851.01	$0.00	0.00000	71.07
48.5 - 49.5	$2,282,941.01	$22,700.93	0.00994	71.07
49.5 - 50.5	$2,113,402.08	$2,031.21	0.00096	70.37
50.5 - 51.5	$2,059,779.87	$2,145.00	0.00104	70.30
51.5 - 52.5	$661,817.87	$982.17	0.00148	70.23
52.5 - 53.5	$414,159.70	$591.85	0.00143	70.12
53.5 - 54.5	$289,215.85	$6,170.55	0.02134	70.02
54.5 - 55.5	$273,381.30	$342.60	0.00125	68.53
55.5 - 56.5	$250,114.70	$8,714.32	0.03484	68.44
56.5 - 57.5	$240,941.38	$112.15	0.00047	66.06
57.5 - 58.5	$198,666.23	$258.56	0.00130	66.03
58.5 - 59.5	$198,407.67	$183.97	0.00093	65.94
59.5 - 60.5	$193,608.70	$661.95	0.00342	65.88
60.5 - 61.5	$77,178.75	$0.00	0.00000	65.65
61.5 - 62.5	$73,291.75	$574.32	0.00784	65.65
62.5 - 63.5	$72,717.43	$0.00	0.00000	65.14
63.5 - 64.5	$72,717.43	$0.00	0.00000	65.14
64.5 - 65.5	$72,717.43	$1,345.78	0.01851	65.14
65.5 - 66.5	$1,334.65	$0.00	0.00000	63.93
66.5 - 67.5	$1,334.65	$0.00	0.00000	63.93
67.5 - 68.5	$1,334.65	$0.00	0.00000	63.93
68.5 - 69.5	$1,334.65	$0.00	0.00000	63.93
69.5 - 70.5	$1,334.65	$0.00	0.00000	63.93
70.5 - 71.5	$1,334.65	$0.00	0.00000	63.93
71.5 - 72.5	$1,334.65	$78.39	0.05873	63.93
72.5 - 73.5	$1,256.26	$0.00	0.00000	60.18

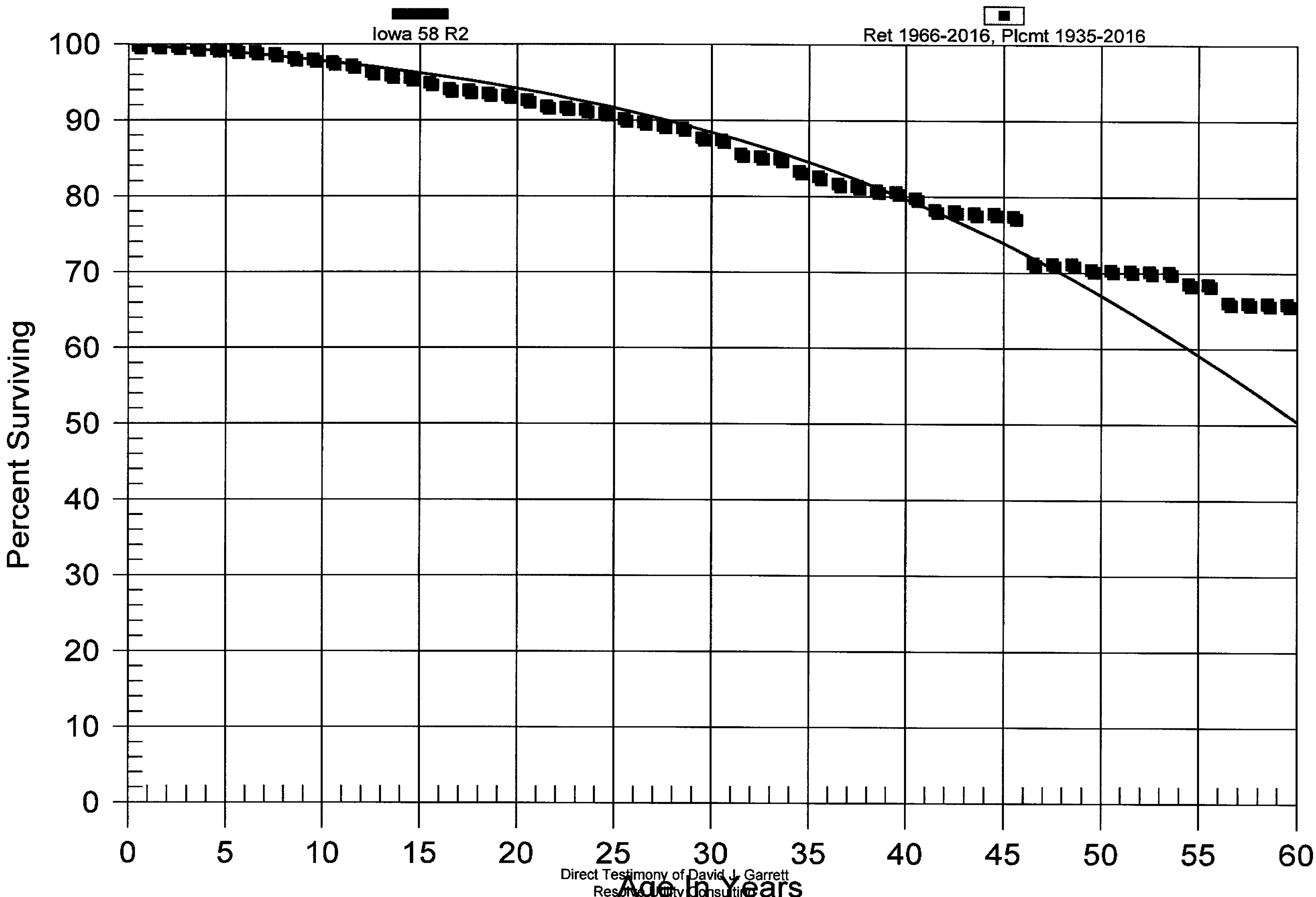
NPC
Electric Division
355.00 Poles and Fixtures

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1935 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$1,256.26	$0.00	0.00000	60.18
74.5 - 75.5	$1,256.26	$0.00	0.00000	60.18
75.5 - 76.5	$1,256.26	$0.00	0.00000	60.18
76.5 - 77.5	$1,207.26	$0.00	0.00000	60.18

NPC

Electric Division
355.00 Poles and Fixtures
Original And Smooth Survivor Curves



NPC
Electric Division
356.00 Overhead Conductors and Devices
Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1940 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$162,574,788.87	$133,610.50	0.00082	100.00
0.5 - 1.5	$161,803,467.21	$42,545.93	0.00026	99.92
1.5 - 2.5	$159,883,411.02	$171,001.02	0.00107	99.89
2.5 - 3.5	$159,448,116.00	$158,808.42	0.00100	99.78
3.5 - 4.5	$158,453,569.95	$276,954.20	0.00175	99.69
4.5 - 5.5	$158,032,588.48	$1,139,376.83	0.00721	99.51
5.5 - 6.5	$156,689,356.65	$1,016,681.07	0.00649	98.79
6.5 - 7.5	$154,238,064.33	$520,983.48	0.00338	98.15
7.5 - 8.5	$153,533,330.85	$208,764.05	0.00136	97.82
8.5 - 9.5	$147,844,803.18	$89,018.74	0.00060	97.69
9.5 - 10.5	$124,117,204.44	$1,056,435.53	0.00851	97.63
10.5 - 11.5	$115,574,380.13	$361,829.61	0.00313	96.80
11.5 - 12.5	$112,492,413.52	$578,455.21	0.00514	96.50
12.5 - 13.5	$108,867,425.25	$1,097,569.85	0.01008	96.00
13.5 - 14.5	$94,009,116.79	$170,915.28	0.00182	95.03
14.5 - 15.5	$79,949,211.07	$301,887.19	0.00378	94.86
15.5 - 16.5	$69,856,148.51	$208,578.94	0.00299	94.50
16.5 - 17.5	$62,726,396.36	$124,631.07	0.00199	94.22
17.5 - 18.5	$53,487,617.29	$159,986.48	0.00299	94.03
18.5 - 19.5	$46,235,475.81	$40,007.61	0.00087	93.75
19.5 - 20.5	$44,707,568.63	$232,450.29	0.00520	93.67
20.5 - 21.5	$42,919,145.34	$449,350.37	0.01047	93.18
21.5 - 22.5	$41,178,666.97	$122,200.52	0.00297	92.21
22.5 - 23.5	$40,267,562.45	$240,529.68	0.00597	91.93
23.5 - 24.5	$39,170,531.77	$6,181.91	0.00016	91.38
24.5 - 25.5	$38,269,884.86	$126,458.78	0.00330	91.37
25.5 - 26.5	$36,053,899.08	$27,446.04	0.00076	91.07
26.5 - 27.5	$22,677,400.04	$35,928.27	0.00158	91.00
27.5 - 28.5	$20,191,903.77	$217,903.58	0.01079	90.85
28.5 - 29.5	$17,992,578.19	$77,370.60	0.00430	89.87
29.5 - 30.5	$17,915,207.59	$119,557.20	0.00667	89.49
30.5 - 31.5	$17,795,650.39	$89,445.08	0.00503	88.89
31.5 - 32.5	$17,704,862.31	$71,187.71	0.00402	88.44
32.5 - 33.5	$17,591,519.60	$82,681.98	0.00470	88.09
33.5 - 34.5	$16,102,816.62	$145,066.41	0.00901	87.67
34.5 - 35.5	$15,034,005.21	$85,393.81	0.00568	86.88
35.5 - 36.5	$12,470,843.40	$101,322.88	0.00812	86.39

NPC

Electric Division

356.00 Overhead Conductors and Devices

Observed Life Table

Retirement Expr. 1966 TO 2016
Placement Years 1940 TO 2016

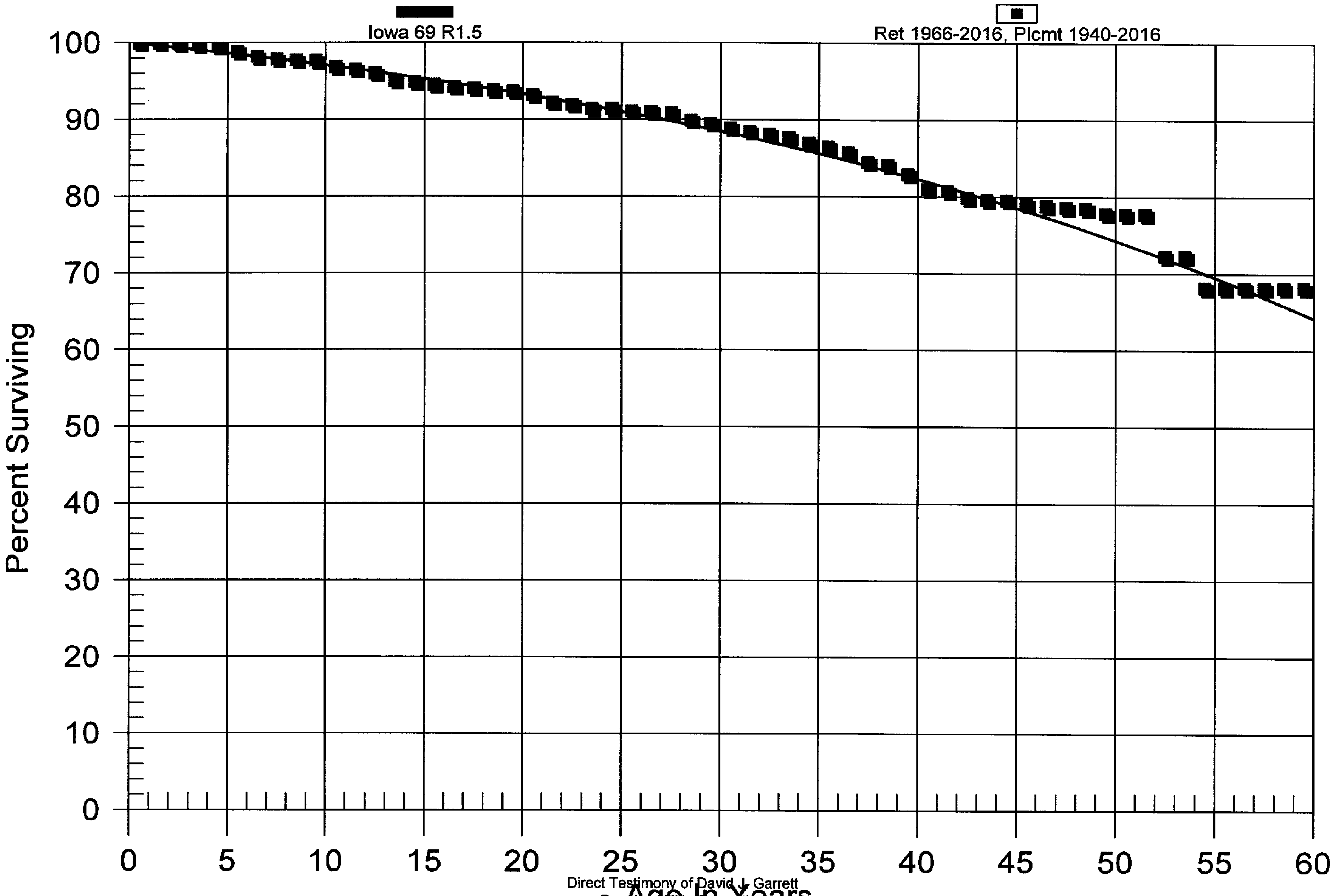
Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
36.5 - 37.5	$11,200,840.52	$169,291.63	0.01511	85.69
37.5 - 38.5	$10,835,023.89	$44,894.61	0.00414	84.39
38.5 - 39.5	$10,404,654.28	$146,247.37	0.01406	84.04
39.5 - 40.5	$10,200,853.91	$234,125.97	0.02295	82.86
40.5 - 41.5	$7,839,820.94	$24,833.93	0.00317	80.96
41.5 - 42.5	$5,274,304.01	$57,581.54	0.01092	80.70
42.5 - 43.5	$3,477,926.47	$12,152.20	0.00349	79.82
43.5 - 44.5	$3,334,547.27	$144.28	0.00004	79.54
44.5 - 45.5	$3,239,596.99	$18,998.22	0.00586	79.54
45.5 - 46.5	$3,210,327.77	$11,893.09	0.00370	79.07
46.5 - 47.5	$2,261,731.68	$6,432.58	0.00284	78.78
47.5 - 48.5	$1,938,564.10	$2,030.00	0.00105	78.56
48.5 - 49.5	$1,375,767.10	$11,613.42	0.00844	78.47
49.5 - 50.5	$1,263,867.68	$1,292.81	0.00102	77.81
50.5 - 51.5	$1,181,734.87	$0.00	0.00000	77.73
51.5 - 52.5	$515,605.87	$36,385.38	0.07057	77.73
52.5 - 53.5	$398,110.49	$0.00	0.00000	72.25
53.5 - 54.5	$323,599.49	$18,372.38	0.05678	72.25
54.5 - 55.5	$298,196.11	$0.00	0.00000	68.14
55.5 - 56.5	$270,478.11	$0.00	0.00000	68.14
56.5 - 57.5	$269,877.11	$0.00	0.00000	68.14
57.5 - 58.5	$175,703.11	$0.00	0.00000	68.14
58.5 - 59.5	$175,703.11	$0.00	0.00000	68.14
59.5 - 60.5	$175,516.11	$0.00	0.00000	68.14
60.5 - 61.5	$108,437.11	$0.00	0.00000	68.14
61.5 - 62.5	$108,437.11	$0.00	0.00000	68.14
62.5 - 63.5	$108,437.11	$0.00	0.00000	68.14
63.5 - 64.5	$108,437.11	$0.00	0.00000	68.14
64.5 - 65.5	$108,437.11	$6,492.11	0.05987	68.14
65.5 - 66.5	$0.00	$0.00	0.00000	64.07
66.5 - 67.5	$0.00	$0.00	0.00000	64.07
67.5 - 68.5	$0.00	$0.00	0.00000	64.07
68.5 - 69.5	$0.00	$0.00	0.00000	64.07
69.5 - 70.5	$0.00	$0.00	0.00000	64.07
70.5 - 71.5	$0.00	$0.00	0.00000	64.07
71.5 - 72.5	$0.00	$0.00	0.00000	64.07
72.5 - 73.5	$0.00	$0.00	0.00000	64.07

NPC
Electric Division
356.00 Overhead Conductors and Devices
Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1940 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$0.00	$0.00	0.00000	64.07
74.5 - 75.5	$0.00	$0.00	0.00000	64.07
75.5 - 76.5	$0.00	$0.00	0.00000	64.07

NPC

Electric Division
356.00 Overhead Conductors and Devices
Original And Smooth Survivor Curves



NPC
Electric Division
362.00 Station Equipment

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1938 TO 2016

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0.0 - 0.5	$595,411,406.00	$143,223.81	0.00024	100.00
0.5 - 1.5	$582,493,102.79	$671,300.28	0.00115	99.98
1.5 - 2.5	$573,995,303.49	$406,313.84	0.00071	99.86
2.5 - 3.5	$568,336,441.25	$869,586.50	0.00153	99.79
3.5 - 4.5	$563,448,602.95	$891,185.49	0.00158	99.64
4.5 - 5.5	$562,364,112.55	$2,598,428.98	0.00462	99.48
5.5 - 6.5	$543,308,297.00	$1,053,718.88	0.00194	99.02
6.5 - 7.5	$532,647,913.53	$970,330.98	0.00182	98.83
7.5 - 8.5	$497,294,240.43	$377,365.46	0.00076	98.65
8.5 - 9.5	$441,003,925.91	$734,233.26	0.00166	98.57
9.5 - 10.5	$408,471,263.28	$486,395.23	0.00119	98.41
10.5 - 11.5	$386,033,201.89	$597,165.98	0.00155	98.29
11.5 - 12.5	$352,562,072.78	$546,350.26	0.00155	98.14
12.5 - 13.5	$328,621,690.14	$391,320.01	0.00119	97.99
13.5 - 14.5	$290,877,657.38	$568,374.97	0.00195	97.87
14.5 - 15.5	$274,166,641.09	$743,884.76	0.00271	97.68
15.5 - 16.5	$253,104,416.80	$164,017.06	0.00065	97.41
16.5 - 17.5	$228,057,518.35	$393,231.35	0.00172	97.35
17.5 - 18.5	$199,427,365.80	$239,822.93	0.00120	97.18
18.5 - 19.5	$165,359,408.87	$434,458.40	0.00263	97.07
19.5 - 20.5	$142,608,254.63	$271,679.68	0.00191	96.81
20.5 - 21.5	$128,786,775.95	$209,209.10	0.00162	96.63
21.5 - 22.5	$121,424,519.85	$334,268.30	0.00275	96.47
22.5 - 23.5	$108,169,837.55	$578,817.15	0.00535	96.20
23.5 - 24.5	$93,857,220.40	$305,800.96	0.00326	95.69
24.5 - 25.5	$89,377,875.44	$142,393.94	0.00159	95.38
25.5 - 26.5	$77,022,921.50	$13,773.76	0.00018	95.23
26.5 - 27.5	$61,552,608.50	$171,151.17	0.00278	95.21
27.5 - 28.5	$48,185,239.88	$131,111.14	0.00272	94.94
28.5 - 29.5	$44,671,117.74	$80,798.07	0.00181	94.69
29.5 - 30.5	$39,822,456.67	$158,832.73	0.00399	94.52
30.5 - 31.5	$37,536,367.94	$105,143.61	0.00280	94.14
31.5 - 32.5	$33,456,239.33	$84,049.18	0.00251	93.87
32.5 - 33.5	$32,531,743.15	$7,057.80	0.00022	93.64
33.5 - 34.5	$30,780,029.66	$80,465.39	0.00261	93.62
34.5 - 35.5	$27,714,555.27	$39,133.47	0.00141	93.37
35.5 - 36.5	$24,356,666.09	$93,066.72	0.00382	93.24

NPC
Electric Division
362.00 Station Equipment
Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1938 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$18,916,854.37	$36,160.04	0.00191	92.89
37.5 - 38.5	$16,288,815.24	$898.85	0.00006	92.71
38.5 - 39.5	$14,058,037.39	$80,038.29	0.00569	92.70
39.5 - 40.5	$12,953,594.10	$145,532.28	0.01123	92.17
40.5 - 41.5	$12,360,195.82	$60,244.02	0.00487	91.14
41.5 - 42.5	$10,463,216.80	$68,846.06	0.00658	90.70
42.5 - 43.5	$8,593,177.74	$45,592.85	0.00531	90.10
43.5 - 44.5	$7,565,714.89	$79,487.79	0.01051	89.62
44.5 - 45.5	$7,006,505.10	$4,317.40	0.00062	88.68
45.5 - 46.5	$6,345,550.70	$9,020.07	0.00142	88.62
46.5 - 47.5	$5,617,072.09	$7,344.06	0.00131	88.50
47.5 - 48.5	$4,790,607.77	$11,250.70	0.00235	88.38
48.5 - 49.5	$4,495,000.07	$9,737.08	0.00217	88.17
49.5 - 50.5	$3,926,582.99	$23,703.21	0.00604	87.98
50.5 - 51.5	$3,090,196.78	$0.00	0.00000	87.45
51.5 - 52.5	$2,528,382.78	$829.39	0.00033	87.45
52.5 - 53.5	$1,963,319.39	$13,392.82	0.00682	87.42
53.5 - 54.5	$1,661,199.57	$0.00	0.00000	86.83
54.5 - 55.5	$1,311,844.57	$8,398.81	0.00640	86.83
55.5 - 56.5	$1,161,866.76	$1,518.21	0.00131	86.27
56.5 - 57.5	$1,111,302.55	$11,172.45	0.01005	86.16
57.5 - 58.5	$1,007,544.10	$270.40	0.00027	85.29
58.5 - 59.5	$753,226.70	$106,906.77	0.14193	85.27
59.5 - 60.5	$455,934.20	$0.00	0.00000	73.17
60.5 - 61.5	$156,273.20	$0.00	0.00000	73.17
61.5 - 62.5	$53,641.07	$0.00	0.00000	73.17
62.5 - 63.5	$32,571.07	$6,754.16	0.20737	73.17
63.5 - 64.5	$17,717.91	$0.00	0.00000	57.99
64.5 - 65.5	$4,181.91	$0.00	0.00000	57.99
65.5 - 66.5	$4,181.91	$0.00	0.00000	57.99
66.5 - 67.5	$4,181.91	$0.00	0.00000	57.99
67.5 - 68.5	$4,181.91	$0.00	0.00000	57.99
68.5 - 69.5	$4,181.91	$247.76	0.05925	57.99
69.5 - 70.5	$3,934.15	$154.15	0.03918	54.56
70.5 - 71.5	$3,780.00	$0.00	0.00000	52.42
71.5 - 72.5	$3,780.00	$0.00	0.00000	52.42
72.5 - 73.5	$3,780.00	$0.00	0.00000	52.42

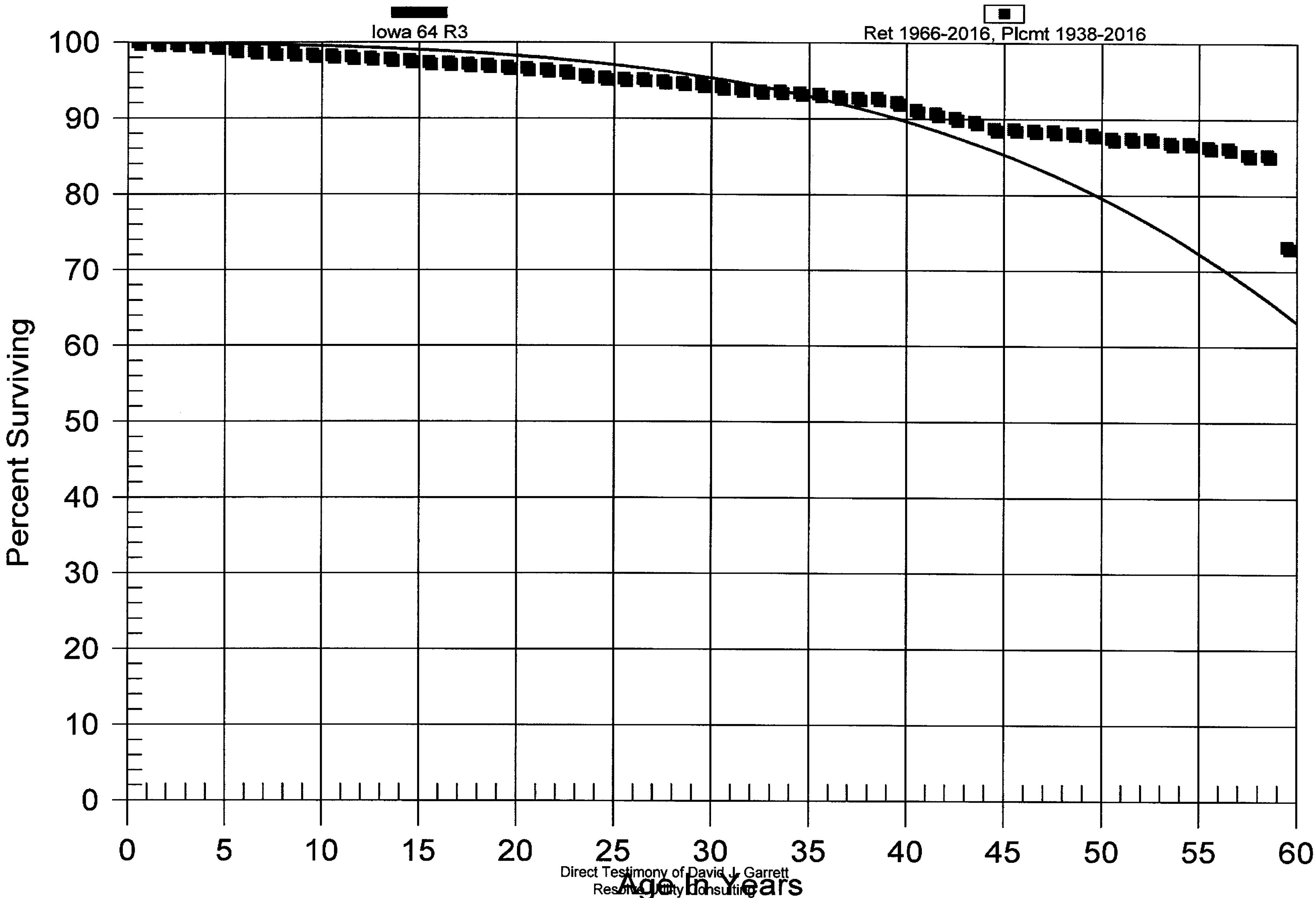
NPC
Electric Division
362.00 Station Equipment

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1938 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$3,780.00	$0.00	0.00000	52.42
74.5 - 75.5	$3,780.00	$0.00	0.00000	52.42
75.5 - 76.5	$3,714.00	$0.00	0.00000	52.42
76.5 - 77.5	$3,598.00	$0.00	0.00000	52.42
77.5 - 78.5	$3,598.00	$0.00	0.00000	52.42

NPC

Electric Division
362.00 Station Equipment
Original And Smooth Survivor Curves



NPC
Electric Division
366.00 Underground Conduit
Observed Life Table
Retirement Expr. 1968 TO 2016
Placement Years 1968 TO 2016

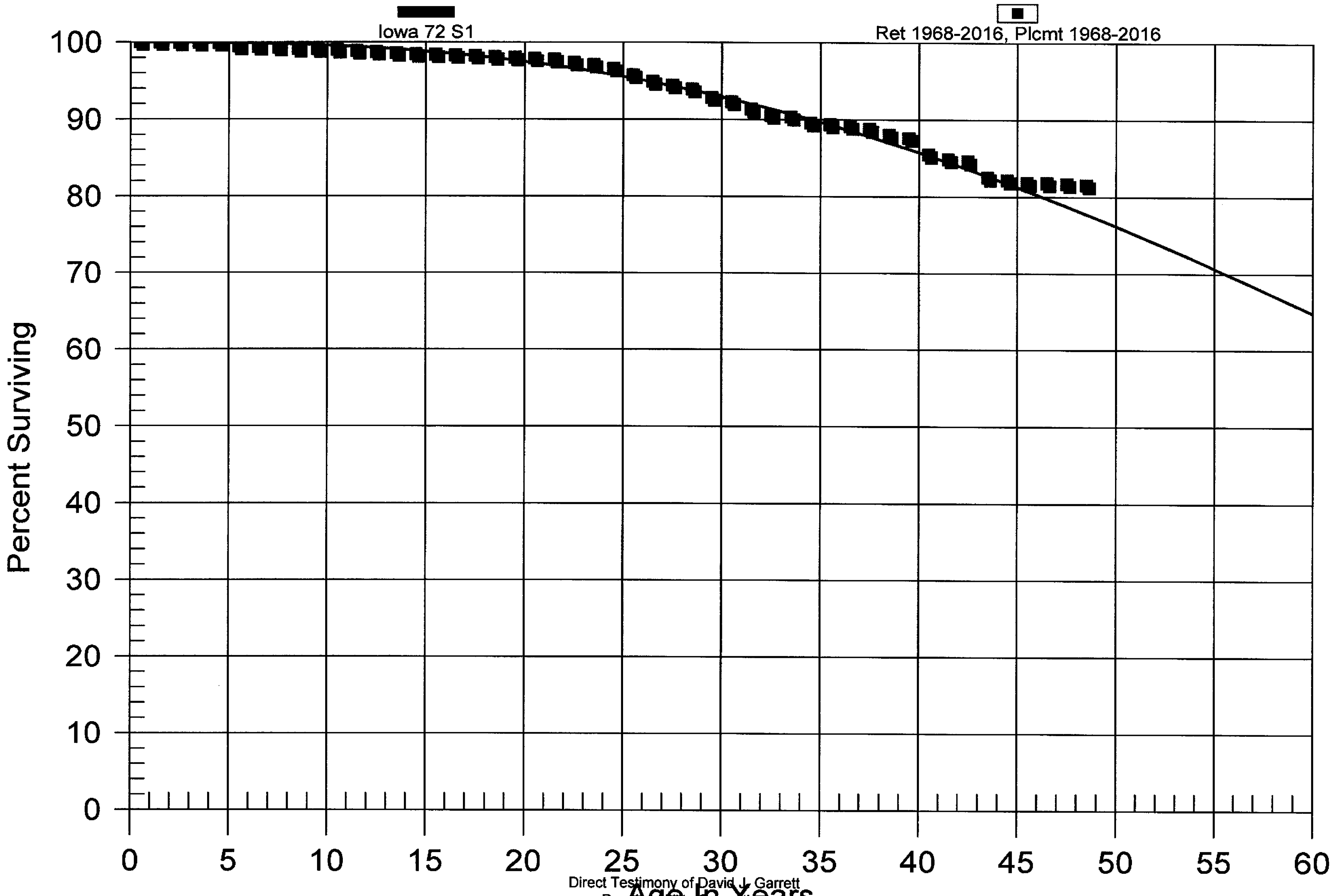
Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$172,913,637.25	$24,187.10	0.00014	100.00
0.5 - 1.5	$166,432,838.15	$44,281.05	0.00027	99.99
1.5 - 2.5	$151,097,223.10	$35,492.44	0.00023	99.96
2.5 - 3.5	$146,755,935.66	$29,001.96	0.00020	99.94
3.5 - 4.5	$136,696,940.70	$62,191.02	0.00045	99.92
4.5 - 5.5	$133,577,797.68	$594,146.65	0.00445	99.87
5.5 - 6.5	$127,256,342.22	$111,992.76	0.00088	99.43
6.5 - 7.5	$120,854,299.25	$97,366.01	0.00081	99.34
7.5 - 8.5	$114,633,842.38	$142,795.06	0.00125	99.26
8.5 - 9.5	$109,354,213.19	$65,129.37	0.00060	99.14
9.5 - 10.5	$102,065,067.60	$86,832.81	0.00085	99.08
10.5 - 11.5	$98,203,307.79	$151,933.33	0.00155	98.99
11.5 - 12.5	$94,532,845.46	$114,224.38	0.00121	98.84
12.5 - 13.5	$93,402,768.76	$145,983.48	0.00156	98.72
13.5 - 14.5	$92,459,118.14	$121,755.87	0.00132	98.57
14.5 - 15.5	$88,288,441.95	$40,773.34	0.00046	98.44
15.5 - 16.5	$84,368,864.88	$71,750.56	0.00085	98.39
16.5 - 17.5	$79,706,935.30	$70,027.96	0.00088	98.31
17.5 - 18.5	$78,293,598.34	$115,756.70	0.00148	98.22
18.5 - 19.5	$73,210,928.64	$70,006.52	0.00096	98.07
19.5 - 20.5	$60,129,274.12	$65,730.80	0.00109	97.98
20.5 - 21.5	$48,891,677.32	$66,736.45	0.00136	97.87
21.5 - 22.5	$38,358,276.87	$162,602.35	0.00424	97.74
22.5 - 23.5	$29,634,578.52	$83,930.16	0.00283	97.33
23.5 - 24.5	$25,149,355.36	$132,120.70	0.00525	97.05
24.5 - 25.5	$17,412,505.66	$147,256.86	0.00846	96.54
25.5 - 26.5	$10,533,671.80	$94,298.35	0.00895	95.72
26.5 - 27.5	$7,867,637.45	$40,246.56	0.00512	94.87
27.5 - 28.5	$6,269,130.89	$33,048.15	0.00527	94.38
28.5 - 29.5	$5,452,376.74	$64,261.91	0.01179	93.88
29.5 - 30.5	$5,042,821.83	$28,440.68	0.00564	92.78
30.5 - 31.5	$3,853,008.15	$38,950.44	0.01011	92.25
31.5 - 32.5	$3,663,113.71	$33,288.33	0.00909	91.32
32.5 - 33.5	$3,384,569.38	$7,675.94	0.00227	90.49
33.5 - 34.5	$3,203,870.44	$27,371.14	0.00854	90.29
34.5 - 35.5	$2,864,865.30	$6,404.10	0.00224	89.52
35.5 - 36.5	$2,399,932.20	$6,681.52	0.00278	89.32

NPC
Electric Division
366.00 Underground Conduit

Observed Life Table
Retirement Expr. 1968 TO 2016
Placement Years 1968 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$1,872,554.68	$6,532.55	0.00349	89.07
37.5 - 38.5	$1,593,191.13	$13,617.40	0.00855	88.76
38.5 - 39.5	$1,322,492.73	$6,291.95	0.00476	88.00
39.5 - 40.5	$1,163,149.78	$28,789.36	0.02475	87.58
40.5 - 41.5	$1,084,667.42	$7,422.73	0.00684	85.41
41.5 - 42.5	$972,099.69	$3,193.78	0.00329	84.83
42.5 - 43.5	$868,415.91	$21,566.09	0.02483	84.55
43.5 - 44.5	$658,316.82	$2,729.60	0.00415	82.45
44.5 - 45.5	$562,534.22	$2,027.50	0.00360	82.11
45.5 - 46.5	$489,954.72	$178.55	0.00036	81.81
46.5 - 47.5	$405,207.17	$592.84	0.00146	81.78
47.5 - 48.5	$168,626.33	$269.33	0.00160	81.66

NPC
Electric Division
366.00 Underground Conduit
Original And Smooth Survivor Curves



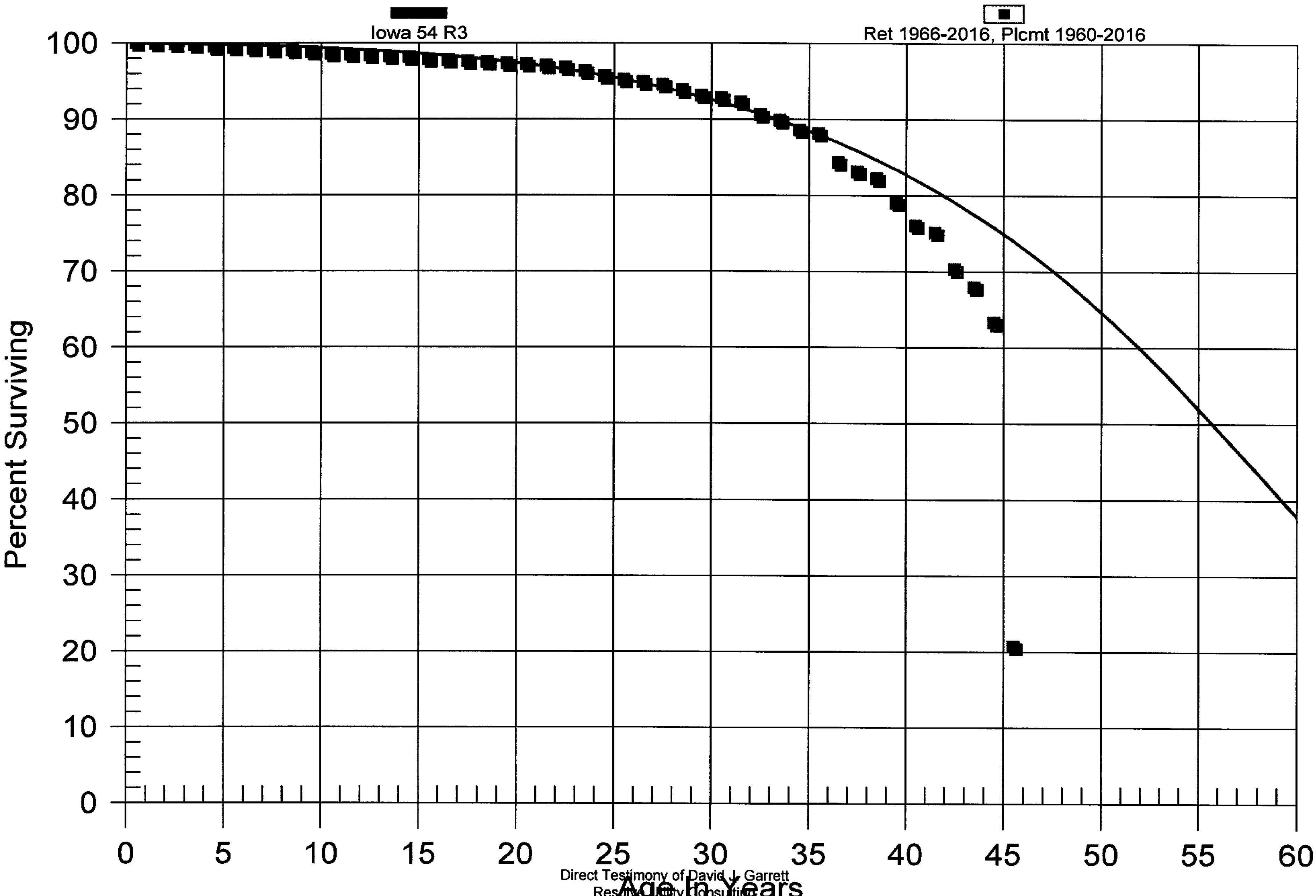
NPC
Electric Division
367.00 Underground Conductors and Devices
Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1960 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
0.0 - 0.5	$1,403,767,601.99	$376,531.68	0.00027	100.00
0.5 - 1.5	$1,366,515,431.02	$793,090.30	0.00058	99.97
1.5 - 2.5	$1,326,332,420.04	$873,594.11	0.00066	99.92
2.5 - 3.5	$1,302,854,090.59	$1,334,186.32	0.00102	99.85
3.5 - 4.5	$1,257,281,844.27	$2,881,536.91	0.00229	99.75
4.5 - 5.5	$1,225,645,465.66	$1,812,958.88	0.00148	99.52
5.5 - 6.5	$1,201,188,262.07	$1,602,355.82	0.00133	99.37
6.5 - 7.5	$1,160,347,375.54	$1,578,613.35	0.00136	99.24
7.5 - 8.5	$1,060,874,215.08	$1,227,927.24	0.00116	99.10
8.5 - 9.5	$988,749,762.99	$1,873,635.34	0.00189	98.99
9.5 - 10.5	$874,433,561.86	$1,802,503.60	0.00206	98.80
10.5 - 11.5	$776,788,818.23	$1,278,631.08	0.00165	98.60
11.5 - 12.5	$707,986,781.15	$492,795.83	0.00070	98.44
12.5 - 13.5	$636,090,481.32	$786,026.16	0.00124	98.37
13.5 - 14.5	$559,202,913.16	$625,315.00	0.00112	98.25
14.5 - 15.5	$509,346,609.16	$1,412,807.28	0.00277	98.14
15.5 - 16.5	$453,681,510.88	$541,604.28	0.00119	97.86
16.5 - 17.5	$424,695,355.99	$569,494.33	0.00134	97.75
17.5 - 18.5	$389,321,381.66	$467,132.22	0.00120	97.62
18.5 - 19.5	$320,137,758.44	$588,539.11	0.00184	97.50
19.5 - 20.5	$273,946,610.33	$220,152.45	0.00080	97.32
20.5 - 21.5	$220,441,859.88	$502,878.45	0.00228	97.24
21.5 - 22.5	$182,375,158.43	$475,046.00	0.00260	97.02
22.5 - 23.5	$150,450,832.43	$663,230.47	0.00441	96.77
23.5 - 24.5	$132,930,463.96	$973,093.73	0.00732	96.34
24.5 - 25.5	$111,074,485.23	$549,581.40	0.00495	95.63
25.5 - 26.5	$80,651,730.83	$229,980.60	0.00285	95.16
26.5 - 27.5	$68,956,104.23	$239,016.33	0.00347	94.89
27.5 - 28.5	$54,464,413.95	$432,624.98	0.00794	94.56
28.5 - 29.5	$46,483,867.97	$329,727.45	0.00709	93.81
29.5 - 30.5	$41,171,555.52	$142,523.53	0.00346	93.14
30.5 - 31.5	$33,485,984.99	$201,189.97	0.00601	92.82
31.5 - 32.5	$29,778,226.02	$533,105.40	0.01790	92.26
32.5 - 33.5	$26,494,807.62	$223,201.01	0.00842	90.61
33.5 - 34.5	$23,400,982.61	$327,202.94	0.01398	89.85
34.5 - 35.5	$19,575,312.67	$109,093.68	0.00557	88.59
35.5 - 36.5	$17,007,531.99	$727,853.65	0.04280	88.10

NPC
Electric Division
367.00 Underground Conductors and Devices
Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1960 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$12,014,829.34	$180,194.34	0.01500	84.33
37.5 - 38.5	$8,714,475.00	$88,284.94	0.01013	83.06
38.5 - 39.5	$6,392,012.06	$245,749.60	0.03845	82.22
39.5 - 40.5	$5,048,983.46	$193,488.58	0.03832	79.06
40.5 - 41.5	$3,708,230.88	$45,797.37	0.01235	76.03
41.5 - 42.5	$3,397,610.51	$216,215.92	0.06364	75.09
42.5 - 43.5	$2,088,162.59	$69,784.20	0.03342	70.31
43.5 - 44.5	$1,362,276.39	$93,473.91	0.06862	67.96
44.5 - 45.5	$5,339.48	$3,593.40	0.67299	63.30

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



NPC
Electric Division
369.00 Services
Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1940 TO 2016

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0.0 - 0.5	$140,245,148.00	$5,494.00	0.00004	100.00
0.5 - 1.5	$134,193,998.00	$9,787.00	0.00007	100.00
1.5 - 2.5	$133,815,718.00	$1,711.00	0.00001	99.99
2.5 - 3.5	$134,028,903.00	$15,174.00	0.00011	99.99
3.5 - 4.5	$134,193,676.00	$304.00	0.00000	99.98
4.5 - 5.5	$131,735,227.00	$656.00	0.00000	99.98
5.5 - 6.5	$131,172,566.00	$5,946.00	0.00005	99.98
6.5 - 7.5	$131,248,145.00	$321.00	0.00000	99.97
7.5 - 8.5	$127,617,148.00	$1,196.00	0.00001	99.97
8.5 - 9.5	$127,665,631.00	$2,935.00	0.00002	99.97
9.5 - 10.5	$174,461,006.00	$2,469.00	0.00001	99.97
10.5 - 11.5	$174,366,520.00	$4,002.00	0.00002	99.97
11.5 - 12.5	$174,462,923.00	$422.00	0.00000	99.96
12.5 - 13.5	$174,498,214.00	$17,810.00	0.00010	99.96
13.5 - 14.5	$174,477,152.00	$98,893.00	0.00057	99.95
14.5 - 15.5	$174,312,331.00	$37,410.00	0.00021	99.90
15.5 - 16.5	$174,100,706.00	$14,600.00	0.00008	99.88
16.5 - 17.5	$172,816,498.00	$668.00	0.00000	99.87
17.5 - 18.5	$172,414,031.00	$22,509.00	0.00013	99.87
18.5 - 19.5	$84,445,300.00	$86,403.00	0.00102	99.85
19.5 - 20.5	$76,023,022.00	$15,852.00	0.00021	99.75
20.5 - 21.5	$65,580,084.00	$6,473.00	0.00010	99.73
21.5 - 22.5	$57,196,468.00	$28,097.00	0.00049	99.72
22.5 - 23.5	$50,236,242.00	$75,189.00	0.00150	99.67
23.5 - 24.5	$44,338,307.00	$21,529.00	0.00049	99.52
24.5 - 25.5	$38,706,274.00	$14,637.00	0.00038	99.47
25.5 - 26.5	$31,873,347.00	$22,387.00	0.00070	99.44
26.5 - 27.5	$28,078,822.00	$9,462.00	0.00034	99.37
27.5 - 28.5	$23,787,828.00	$2,979.00	0.00013	99.33
28.5 - 29.5	$20,958,015.00	$2,834.00	0.00014	99.32
29.5 - 30.5	$19,074,276.00	$3,831.00	0.00020	99.31
30.5 - 31.5	$16,314,851.00	$25,115.00	0.00154	99.29
31.5 - 32.5	$14,708,875.00	$3,423.00	0.00023	99.13
32.5 - 33.5	$13,339,193.00	$3,048.00	0.00023	99.11
33.5 - 34.5	$12,033,441.00	$3,701.00	0.00031	99.09
34.5 - 35.5	$10,873,402.00	$3,262.00	0.00030	99.06
35.5 - 36.5	$9,452,387.00	$2,694.00	0.00029	99.03

NPC
Electric Division
369.00 Services

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1940 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
36.5 - 37.5	$8,190,238.00	$4,449.00	0.00054	99.00
37.5 - 38.5	$6,692,888.00	$2,058.00	0.00031	98.95
38.5 - 39.5	$5,643,003.00	$1,586.00	0.00028	98.92
39.5 - 40.5	$4,439,425.00	$456.00	0.00010	98.89
40.5 - 41.5	$3,850,887.00	$1,464.00	0.00038	98.88
41.5 - 42.5	$3,425,592.00	$23,763.00	0.00694	98.84
42.5 - 43.5	$3,058,013.00	$614.00	0.00020	98.15
43.5 - 44.5	$2,576,509.00	$686.00	0.00027	98.14
44.5 - 45.5	$2,125,744.00	$969.00	0.00046	98.11
45.5 - 46.5	$1,787,596.00	$333.00	0.00019	98.06
46.5 - 47.5	$1,604,340.00	$341.00	0.00021	98.05
47.5 - 48.5	$1,417,800.00	$9.00	0.00001	98.03
48.5 - 49.5	$1,265,969.00	$9,352.00	0.00739	98.02
49.5 - 50.5	$1,143,576.00	$427.00	0.00037	97.30
50.5 - 51.5	$1,025,682.00	$479.00	0.00047	97.26
51.5 - 52.5	$879,227.00	$0.00	0.00000	97.22
52.5 - 53.5	$684,333.00	$2,103.00	0.00307	97.22
53.5 - 54.5	$384,228.00	$0.00	0.00000	96.92
54.5 - 55.5	$205,601.00	$0.00	0.00000	96.92
55.5 - 56.5	$96,302.00	$0.00	0.00000	96.92
56.5 - 57.5	$5,215.00	$0.00	0.00000	96.92
57.5 - 58.5	$0.00	$0.00	0.00000	96.92
58.5 - 59.5	$0.00	$0.00	0.00000	96.92
59.5 - 60.5	$0.00	$0.00	0.00000	96.92
60.5 - 61.5	$0.00	$0.00	0.00000	96.92
61.5 - 62.5	$0.00	$0.00	0.00000	96.92
62.5 - 63.5	$0.00	$0.00	0.00000	96.92
63.5 - 64.5	$0.00	$0.00	0.00000	96.92
64.5 - 65.5	$0.00	$0.00	0.00000	96.92
65.5 - 66.5	$0.00	$0.00	0.00000	96.92
66.5 - 67.5	$0.00	$0.00	0.00000	96.92
67.5 - 68.5	$0.00	$0.00	0.00000	96.92
68.5 - 69.5	$0.00	$0.00	0.00000	96.92
69.5 - 70.5	$0.00	$0.00	0.00000	96.92
70.5 - 71.5	$0.00	$0.00	0.00000	96.92
71.5 - 72.5	$0.00	$0.00	0.00000	96.92
72.5 - 73.5	$0.00	$0.00	0.00000	96.92

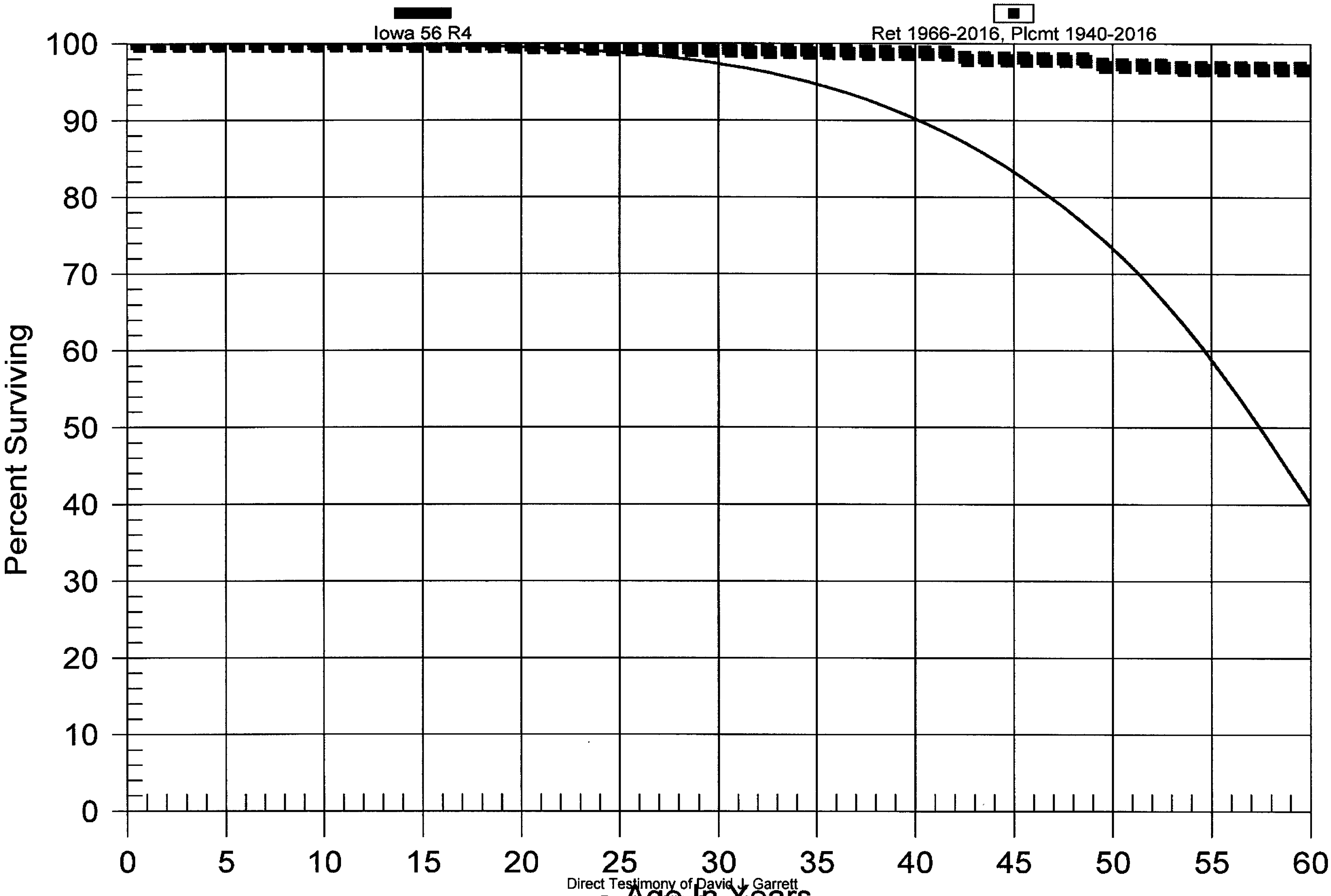
NPC
Electric Division
369.00 Services

Observed Life Table
Retirement Expr. 1966 TO 2016
Placement Years 1940 TO 2016

Age Interval	$ Surviving At Beginning of Age Interval	$ Retired During The Age Interval	Retirement Ratio	% Surviving At Beginning of Age Interval
73.5 - 74.5	$0.00	$0.00	0.00000	96.92
74.5 - 75.5	$0.00	$0.00	0.00000	96.92
75.5 - 76.5	$0.00	$0.00	0.00000	96.92

NPC

Electric Division
369.00 Services
Original And Smooth Survivor Curves



NPC
Electric Division
355.00 Poles and Fixtures

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

Average Service Life: 58 *Survivor Curve:* R2

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1940	49.00	58.00	0.84	8.86	7.48
1951	70,037.00	58.00	1,207.53	12.76	15,412.77
1955	3,887.00	58.00	67.02	14.44	968.03
1956	115,768.00	58.00	1,995.99	14.89	29,719.76
1957	4,615.00	58.00	79.57	15.34	1,220.89
1959	42,163.00	58.00	726.95	16.29	11,838.79
1960	459.00	58.00	7.91	16.77	132.73
1961	22,924.00	58.00	395.24	17.27	6,824.52
1962	9,664.00	58.00	166.62	17.77	2,961.48
1963	124,352.00	58.00	2,143.99	18.29	39,215.71
1964	246,676.00	58.00	4,253.02	18.82	80,025.58
1965	1,395,817.00	58.00	24,065.74	19.35	465,773.54
1966	51,591.00	58.00	889.50	19.90	17,702.85
1967	146,838.00	58.00	2,531.68	20.46	51,797.34
1968	1,045,910.00	58.00	18,032.88	21.03	379,145.93
1969	305,354.00	58.00	5,264.71	21.60	113,734.56
1970	46,666.00	58.00	804.58	22.19	17,854.14
1971	12,108.00	58.00	208.76	22.79	4,757.00
1972	313,949.00	58.00	5,412.90	23.39	126,617.18
1973	45,010.00	58.00	776.03	24.01	18,630.87
1974	78,282.00	58.00	1,349.69	24.63	33,246.61
1975	561,352.00	58.00	9,678.45	25.26	244,523.25
1976	170,964.00	58.00	2,947.65	25.91	76,368.84
1977	206,357.00	58.00	3,557.87	26.56	94,499.15
1978	1,004,093.00	58.00	17,311.90	27.22	471,250.04
1979	334,261.00	58.00	5,763.10	27.89	160,724.59
1980	468,423.00	58.00	8,076.24	28.57	230,711.47

NPC

Electric Division

355.00 Poles and Fixtures

Original Cost Of Utility Plant In Service

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

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 58 *Survivor Curve: R2*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1981	1,901,621.00	58.00	32,786.47	29.25	959,096.96
1982	1,591,480.00	58.00	27,439.23	29.95	821,716.51
1983	2,326,263.00	58.00	40,107.87	30.65	1,229,206.21
1984	752,509.00	58.00	12,974.26	31.36	406,846.03
1985	554,858.00	58.00	9,566.49	32.08	306,853.10
1986	201,994.00	58.00	3,482.65	32.80	114,228.98
1987	79,842.00	58.00	1,376.58	33.53	46,161.02
1988	6,363,259.00	58.00	109,711.04	34.27	3,760,202.86
1989	5,368,850.00	58.00	92,566.11	35.02	3,241,785.97
1990	22,639,689.00	58.00	390,338.34	35.77	13,964,238.07
1991	2,428,033.00	58.00	41,862.52	36.54	1,529,529.87
1992	2,849,179.00	58.00	49,123.63	37.31	1,832,600.43
1993	3,126,055.00	58.00	53,897.34	38.08	2,052,395.00
1994	3,029,523.00	58.00	52,233.00	38.86	2,029,908.77
1995	5,363,804.00	58.00	92,479.11	39.65	3,666,956.29
1996	5,885,462.00	58.00	101,473.19	40.45	4,104,295.07
1997	916,280.00	58.00	15,797.89	41.25	651,621.76
1998	26,431,035.00	58.00	455,706.18	42.06	19,165,096.58
1999	26,034,130.00	58.00	448,863.01	42.87	19,242,809.31
2000	8,142,648.00	58.00	140,390.08	43.69	6,133,674.07
2001	9,060,245.00	58.00	156,210.67	44.52	6,953,763.56
2002	20,328,651.00	58.00	350,492.97	45.35	15,894,003.57
2003	17,458,811.00	58.00	301,013.11	46.19	13,902,394.57
2004	2,194,417.00	58.00	37,834.67	47.03	1,779,264.63
2005	4,509,949.00	58.00	77,757.52	47.88	3,722,770.47
2006	7,906,473.00	58.00	136,318.11	48.73	6,642,938.93
2007	36,474,737.00	58.00	628,872.95	49.59	31,186,282.38

NPC
Electric Division
355.00 Poles and Fixtures

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

Average Service Life: *58* *Survivor Curve:* *R2*

Year (1)	*Original Cost* (2)	*Avg. Service Life* (3)	*Avg. Annual Accrual* (4)	*Avg. Remaining Life* (5)	*Future Annual Accruals* (6)
2008	9,744,907.00	58.00	168,015.15	50.45	8,477,131.56
2009	1,444,891.00	58.00	24,911.84	51.32	1,278,595.40
2010	81,201.00	58.00	1,400.01	52.20	73,080.47
2012	370,678.00	58.00	6,390.98	53.96	344,879.36
2013	423,303.00	58.00	7,298.31	54.85	400,333.55
2014	588,880.00	58.00	10,153.07	55.75	566,001.67
2015	1,144,442.00	58.00	19,731.70	56.64	1,117,686.61
2016	3,332,009.00	58.00	57,448.26	57.55	3,305,984.66
Total	247,877,677.00	58.00	4,273,740.67	42.96	183,599,999.36

Composite Average Remaining Life ... *42.96* *Years*

NPC

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, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 69 *Survivor Curve:* R1.5

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1951	101,945.00	69.00	1,477.45	23.87	35,268.91
1956	67,079.00	69.00	972.15	26.45	25,709.63
1957	187.00	69.00	2.71	26.98	73.13
1959	94,174.00	69.00	1,364.83	28.08	38,326.92
1960	601.00	69.00	8.71	28.64	249.46
1961	27,718.00	69.00	401.71	29.21	11,732.92
1962	7,031.00	69.00	101.90	29.78	3,034.58
1963	74,511.00	69.00	1,079.86	30.36	32,784.28
1964	81,110.00	69.00	1,175.49	30.95	36,380.32
1965	666,129.00	69.00	9,653.94	31.54	304,504.24
1966	80,840.00	69.00	1,171.58	32.14	37,659.80
1967	100,286.00	69.00	1,453.41	32.75	47,600.47
1968	560,767.00	69.00	8,126.97	33.37	271,167.66
1969	316,735.00	69.00	4,590.31	33.99	156,007.28
1970	936,703.00	69.00	13,575.26	34.61	469,895.77
1971	10,271.00	69.00	148.85	35.25	5,246.60
1972	94,806.00	69.00	1,373.99	35.89	49,307.97
1973	131,227.00	69.00	1,901.82	36.53	69,477.01
1974	1,738,796.00	69.00	25,199.68	37.18	936,974.24
1975	2,540,683.00	69.00	36,821.11	37.84	1,393,336.48
1976	2,126,907.00	69.00	30,824.42	38.50	1,186,820.68
1977	57,553.00	69.00	834.09	39.17	32,673.41
1978	385,475.00	69.00	5,586.54	39.85	222,599.03
1979	196,525.00	69.00	2,848.16	40.53	115,424.54
1980	1,168,680.00	69.00	16,937.21	41.21	697,984.60
1981	2,477,768.00	69.00	35,909.31	41.90	1,504,624.96
1982	923,745.00	69.00	13,387.47	42.60	570,241.65

NPC

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, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 69 *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)
1983	1,406,021.00	69.00	20,376.90	43.29	882,195.03
1984	42,155.00	69.00	610.94	44.00	26,881.12
1985	1,343.00	69.00	19.46	44.71	870.18
1988	1,981,422.00	69.00	28,715.96	46.86	1,345,762.20
1989	2,449,568.00	69.00	35,500.61	47.59	1,689,509.10
1990	13,349,053.00	69.00	193,462.51	48.32	9,348,637.91
1991	2,116,434.00	69.00	30,672.64	49.06	1,504,720.15
1992	894,465.00	69.00	12,963.13	49.80	645,504.12
1993	856,501.00	69.00	12,412.93	50.54	627,343.03
1994	788,904.00	69.00	11,433.27	51.29	586,357.71
1995	1,291,128.00	69.00	18,711.80	52.04	973,695.90
1996	1,555,973.00	69.00	22,550.10	52.79	1,190,409.83
1997	1,076,579.00	69.00	15,602.43	53.55	835,474.53
1998	7,094,227.00	69.00	102,813.81	54.31	5,583,610.14
1999	9,114,148.00	69.00	132,087.72	55.07	7,274,456.67
2000	6,975,865.00	69.00	101,098.44	55.84	5,645,362.48
2001	9,807,744.00	69.00	142,139.73	56.61	8,046,808.56
2002	14,063,622.00	69.00	203,818.48	57.39	11,696,392.62
2003	13,770,650.00	69.00	199,572.55	58.16	11,607,859.64
2004	3,093,634.00	69.00	44,834.81	58.95	2,642,837.90
2005	2,727,327.00	69.00	39,526.07	59.73	2,360,906.49
2006	7,540,731.00	69.00	109,284.81	60.52	6,613,867.69
2007	23,875,254.00	69.00	346,014.56	61.31	21,214,405.42
2008	5,624,516.00	69.00	81,513.87	62.11	5,062,544.54
2009	183,750.00	69.00	2,663.02	62.90	167,516.00
2010	1,750,849.00	69.00	25,374.36	63.71	1,616,524.87
2011	207,328.00	69.00	3,004.72	64.51	193,840.53

NPC

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, 2016

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: *69* *Survivor Curve:* *R1.5*

Year	*Original Cost*	*Avg. Service Life*	*Avg. Annual Accrual*	*Avg. Remaining Life*	*Future Annual Accruals*
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
2012	319,087.00	69.00	4,624.40	65.32	302,064.79
2013	976,637.00	69.00	14,154.01	66.13	936,042.96
2014	350,032.00	69.00	5,072.87	66.95	339,615.26
2015	2,129,914.00	69.00	30,868.00	67.77	2,091,823.39
2016	1,663,961.00	69.00	24,115.12	68.59	1,654,010.54
Total	154,047,074.00	69.00	2,232,542.96	55.08	122,962,957.85

Composite Average Remaining Life ... 55.08 Years

NPC
Electric Division
362.00 Station Equipment

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

Average Service Life: 64 *Survivor Curve: R3*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1938	3,598.00	64.00	56.22	7.54	423.76
1940	116.00	64.00	1.81	8.13	14.74
1941	66.00	64.00	1.03	8.44	8.71
1952	13,536.00	64.00	211.50	12.68	2,681.72
1953	8,099.00	64.00	126.55	13.15	1,664.12
1954	21,070.00	64.00	329.22	13.63	4,488.27
1955	107,692.00	64.00	1,682.69	14.13	23,783.40
1956	299,661.00	64.00	4,682.20	14.65	68,575.87
1957	204,574.00	64.00	3,196.47	15.18	48,513.86
1958	254,047.00	64.00	3,969.48	15.72	62,407.82
1959	92,586.00	64.00	1,446.66	16.28	23,549.22
1960	49,046.00	64.00	766.34	16.85	12,914.34
1961	141,579.00	64.00	2,212.17	17.44	38,571.03
1962	349,355.00	64.00	5,458.67	18.04	98,459.06
1963	288,727.00	64.00	4,511.36	18.65	84,125.18
1964	564,234.00	64.00	8,816.15	19.28	169,934.29
1965	561,814.00	64.00	8,778.34	19.91	174,814.44
1966	812,683.00	64.00	12,698.17	20.56	261,117.96
1967	558,680.00	64.00	8,729.37	21.23	185,296.76
1968	284,357.00	64.00	4,443.08	21.90	97,298.40
1969	846,928.00	64.00	13,233.25	22.59	298,876.29
1970	786,827.00	64.00	12,294.17	23.28	286,195.21
1971	656,637.00	64.00	10,259.95	23.99	246,105.23
1972	479,722.00	64.00	7,495.65	24.70	185,150.63
1973	981,870.00	64.00	15,341.72	25.43	390,132.83
1974	1,801,193.00	64.00	28,143.64	26.17	736,417.57
1975	1,836,735.00	64.00	28,698.98	26.91	772,308.83

NPC
Electric Division
362.00 Station Equipment

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

Average Service Life: 64 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1976	447,866.00	64.00	6,997.90	27.67	193,607.25
1977	1,024,405.00	64.00	16,006.33	28.43	455,037.78
1978	2,229,879.00	64.00	34,841.85	29.20	1,017,468.77
1979	2,610,290.00	64.00	40,785.77	29.98	1,222,831.37
1980	5,346,745.00	64.00	83,542.87	30.77	2,570,866.59
1981	3,368,672.00	64.00	52,635.49	31.57	1,661,780.19
1982	2,985,009.00	64.00	46,640.76	32.38	1,510,074.54
1983	1,805,346.00	64.00	28,208.53	33.19	936,286.55
1984	840,447.00	64.00	13,131.98	34.01	446,651.55
1985	3,974,985.00	64.00	62,109.13	34.84	2,164,086.06
1986	2,127,256.00	64.00	33,238.37	35.68	1,185,922.11
1987	4,767,863.00	64.00	74,497.85	36.53	2,721,065.52
1988	3,383,011.00	64.00	52,859.54	37.38	1,975,683.09
1989	13,200,240.00	64.00	206,253.71	38.24	7,886,514.82
1990	15,456,787.00	64.00	241,512.25	39.10	9,444,102.66
1991	12,212,676.00	64.00	190,823.03	39.98	7,628,473.03
1992	4,173,610.00	64.00	65,212.64	40.86	2,664,433.32
1993	13,733,800.00	64.00	214,590.58	41.74	8,957,748.08
1994	12,920,414.00	64.00	201,881.43	42.64	8,607,726.89
1995	7,153,047.00	64.00	111,766.34	43.54	4,865,843.46
1996	13,549,799.00	64.00	211,715.57	44.44	9,409,146.51
1997	22,323,450.00	64.00	348,803.84	45.35	15,819,688.85
1998	33,828,134.00	64.00	528,564.49	46.27	24,457,030.35
1999	28,246,269.00	64.00	441,347.87	47.19	20,828,817.38
2000	24,220,301.00	64.00	378,442.13	48.12	18,210,933.31
2001	18,465,616.00	64.00	288,525.19	49.05	14,153,370.40
2002	14,254,461.00	64.00	222,725.91	49.99	11,134,315.96

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

Average Service Life: 64 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2003	21,943,358.00	64.00	342,864.90	50.93	17,463,501.55
2004	21,393,980.00	64.00	334,280.87	51.88	17,342,469.34
2005	25,720,215.00	64.00	401,878.28	52.83	21,231,844.74
2006	17,362,119.00	64.00	271,283.06	53.79	14,591,403.79
2007	30,333,308.00	64.00	473,957.85	54.74	25,946,759.20
2008	48,478,087.00	64.00	757,469.96	55.71	42,196,638.45
2009	25,008,475.00	64.00	390,757.35	56.67	22,145,151.25
2010	9,123,046.00	64.00	142,547.57	57.64	8,216,636.15
2011	16,771,336.00	64.00	262,052.07	58.61	15,359,506.63
2012	1,888,355.00	64.00	29,505.54	59.59	1,758,149.23
2013	3,109,513.00	64.00	48,586.13	60.56	2,942,570.52
2014	5,996,610.00	64.00	93,697.01	61.54	5,766,390.56
2015	8,826,129.00	64.00	137,908.24	62.52	8,622,634.29
2016	13,757,419.00	64.00	214,959.63	63.51	13,651,555.85
Total	530,367,760.00	64.00	8,286,994.66	48.71	403,638,547.50

Composite Average Remaining Life ... 48.71 Years

NPC

Electric Division

366.00 Underground Conduit

Original Cost Of Utility Plant In Service

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

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 72 *Survivor Curve:* S1

Year	*Original Cost*	*Avg. Service Life*	*Avg. Annual Accrual*	*Avg. Remaining Life*	*Future Annual Accruals*
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
1968	168,357.00	72.00	2,338.29	34.31	80,223.55
1969	235,988.00	72.00	3,277.61	34.86	114,253.59
1970	84,569.00	72.00	1,174.57	35.42	41,598.07
1971	70,552.00	72.00	979.89	35.98	35,259.24
1972	93,053.00	72.00	1,292.40	36.56	47,243.97
1973	188,533.00	72.00	2,618.51	37.14	97,244.71
1974	100,490.00	72.00	1,395.69	37.73	52,653.72
1975	105,145.00	72.00	1,460.35	38.32	55,962.89
1976	49,693.00	72.00	690.18	38.93	26,868.05
1977	153,051.00	72.00	2,125.71	39.54	84,054.96
1978	257,081.00	72.00	3,570.57	40.17	143,415.55
1979	272,831.00	72.00	3,789.32	40.80	154,593.40
1980	520,696.00	72.00	7,231.89	41.44	299,663.55
1981	458,529.00	72.00	6,368.46	42.09	268,037.20
1982	311,634.00	72.00	4,328.25	42.75	185,018.30
1983	173,023.00	72.00	2,403.10	43.41	104,327.45
1984	245,256.00	72.00	3,406.33	44.10	150,202.81
1985	150,944.00	72.00	2,096.44	44.78	93,884.01
1986	1,161,373.00	72.00	16,130.18	45.48	733,652.12
1987	345,293.00	72.00	4,795.74	46.19	221,522.38
1988	783,706.00	72.00	10,884.81	46.91	510,598.76
1989	1,558,260.00	72.00	21,642.50	47.64	1,031,097.57
1990	2,571,736.00	72.00	35,718.56	48.38	1,728,136.98
1991	6,731,577.00	72.00	93,494.14	49.14	4,593,912.38
1992	7,604,729.00	72.00	105,621.25	49.90	5,270,316.49
1993	4,401,293.00	72.00	61,129.08	50.67	3,097,462.72
1994	8,561,096.00	72.00	118,904.13	51.46	6,118,695.18

NPC

Electric Division

366.00 Underground Conduit

Original Cost Of Utility Plant In Service

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

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 72 *Survivor Curve: S1*

Year (1)	*Original Cost* (2)	*Avg. Service Life* (3)	*Avg. Annual Accrual* (4)	*Avg. Remaining Life* (5)	*Future Annual Accruals* (6)
1995	10,466,664.00	72.00	145,370.35	52.26	7,596,333.13
1996	11,171,866.00	72.00	155,164.83	53.07	8,233,858.04
1997	13,011,648.00	72.00	180,717.36	53.88	9,737,943.70
1998	4,966,913.00	72.00	68,984.91	54.72	3,774,525.59
1999	1,343,309.00	72.00	18,657.07	55.56	1,036,606.34
2000	4,585,969.00	72.00	63,694.02	56.42	3,593,315.11
2001	3,883,932.00	72.00	53,943.51	57.28	3,089,889.31
2002	4,357,330.00	72.00	60,518.48	58.16	3,519,838.94
2003	419,041.00	72.00	5,820.01	59.05	343,670.90
2004	1,021,598.00	72.00	14,188.86	59.95	850,661.78
2005	3,518,529.00	72.00	48,868.46	60.86	2,974,338.91
2006	3,774,927.00	72.00	52,429.55	61.79	3,239,387.83
2007	7,227,328.00	72.00	100,379.57	62.72	6,295,941.13
2008	4,966,866.00	72.00	68,984.26	63.66	4,391,807.17
2009	6,502,434.00	72.00	90,311.60	64.62	5,835,794.42
2010	5,997,529.00	72.00	83,299.02	65.58	5,462,771.69
2011	5,070,278.00	72.00	70,420.54	66.55	4,686,482.84
2012	3,056,952.00	72.00	42,457.67	67.53	2,867,160.63
2013	10,029,993.00	72.00	139,305.48	68.51	9,544,449.57
2014	4,305,795.00	72.00	59,802.72	69.51	4,156,654.97
2015	15,291,334.00	72.00	212,379.67	70.50	14,973,076.42
2016	6,456,612.00	72.00	89,675.18	71.50	6,411,760.87
Total	168,785,335.00	72.00	2,344,241.07	58.85	137,956,168.89

Composite Average Remaining Life ... 58.85 Years

NPC

Electric Division

367.00 Underground Conductors and Devices

Original Cost Of Utility Plant In Service

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

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 54 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1972	1,263,463.00	54.00	23,397.46	16.14	377,554.69
1973	656,102.00	54.00	12,150.03	16.77	203,759.07
1974	1,093,232.00	54.00	20,245.03	17.42	352,707.88
1975	264,823.00	54.00	4,904.13	18.09	88,703.10
1976	1,147,264.00	54.00	21,245.62	18.77	398,700.33
1977	1,097,279.00	54.00	20,319.98	19.46	395,383.85
1978	2,234,178.00	54.00	41,373.65	20.16	834,174.56
1979	3,120,160.00	54.00	57,780.72	20.88	1,206,350.51
1980	4,264,849.00	54.00	78,978.66	21.60	1,706,240.53
1981	2,458,687.00	54.00	45,531.23	22.34	1,017,337.68
1982	3,498,467.00	54.00	64,786.41	23.09	1,496,212.43
1983	2,870,624.00	54.00	53,159.69	23.86	1,268,175.53
1984	2,750,313.00	54.00	50,931.71	24.63	1,254,332.60
1985	3,506,569.00	54.00	64,936.44	25.41	1,650,010.63
1986	7,543,047.00	54.00	139,686.01	26.20	3,659,971.54
1987	4,982,585.00	54.00	92,270.06	27.00	2,491,422.53
1988	7,547,921.00	54.00	139,776.27	27.81	3,887,613.06
1989	14,252,674.00	54.00	263,938.33	28.63	7,557,628.80
1990	11,465,646.00	54.00	212,326.71	29.46	6,256,021.22
1991	29,873,173.00	54.00	553,206.74	30.30	16,763,880.73
1992	20,882,885.00	54.00	386,719.98	31.15	12,046,645.13
1993	16,857,138.00	54.00	312,169.13	32.01	9,991,121.86
1994	31,449,280.00	54.00	582,393.90	32.87	19,143,703.64
1995	37,563,823.00	54.00	695,626.14	33.74	23,473,254.70
1996	53,284,598.00	54.00	986,751.51	34.63	34,166,582.13
1997	45,602,609.00	54.00	844,492.50	35.51	29,991,513.17
1998	68,716,491.00	54.00	1,272,527.22	36.41	46,333,498.74

NPC

Electric Division

367.00 Underground Conductors and Devices

Original Cost Of Utility Plant In Service

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

Based Upon Broad Group/Remaining Life Procedure and Technique

Average Service Life: 54 *Survivor Curve:* R3

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1999	34,804,480.00	54.00	644,527.21	37.31	24,050,009.39
2000	28,444,551.00	54.00	526,750.78	38.22	20,134,303.99
2001	54,252,291.00	54.00	1,004,671.75	39.14	39,324,088.14
2002	49,230,989.00	54.00	911,684.70	40.07	36,526,851.27
2003	76,166,013.00	54.00	1,410,481.29	41.00	57,823,085.28
2004	71,403,504.00	54.00	1,322,286.71	41.93	55,444,987.20
2005	67,523,406.00	54.00	1,250,433.06	42.87	53,609,174.16
2006	95,795,472.00	54.00	1,773,989.68	43.82	77,734,513.73
2007	65,730,327.00	54.00	1,217,227.91	44.77	54,495,074.95
2008	70,880,138.00	54.00	1,312,594.75	45.73	60,019,942.44
2009	97,894,548.00	54.00	1,812,861.45	46.69	84,636,723.96
2010	39,954,922.00	54.00	739,905.74	47.65	35,257,575.59
2011	22,668,890.00	54.00	419,794.13	48.62	20,410,294.26
2012	28,753,299.00	54.00	532,468.34	49.59	26,405,921.50
2013	44,238,060.00	54.00	819,223.08	50.57	41,425,214.74
2014	22,646,544.00	54.00	419,380.32	51.54	21,616,526.34
2015	39,805,156.00	54.00	737,132.29	52.52	38,717,593.87
2016	36,897,067.00	54.00	683,278.81	53.51	36,560,655.23
Total	1,327,337,537.00	54.00	24,580,317.29	41.18	1,012,205,036.69

Composite Average Remaining Life ... 41.18 Years

NPC
Electric Division
369.00 Services

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

Average Service Life: 56 *Survivor Curve:* R4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1959	5,215.00	56.00	93.12	7.53	701.42
1960	91,087.00	56.00	1,626.54	7.97	12,963.46
1961	109,299.00	56.00	1,951.76	8.44	16,464.31
1962	178,627.00	56.00	3,189.75	8.93	28,484.44
1963	298,002.00	56.00	5,321.44	9.45	50,281.33
1964	194,894.00	56.00	3,480.23	10.00	34,813.54
1965	145,976.00	56.00	2,606.70	10.59	27,592.41
1966	117,467.00	56.00	2,097.61	11.19	23,477.51
1967	113,041.00	56.00	2,018.58	11.82	23,864.16
1968	151,822.00	56.00	2,711.09	12.47	33,802.49
1969	186,199.00	56.00	3,324.96	13.14	43,674.41
1970	182,923.00	56.00	3,266.46	13.82	45,126.72
1971	337,179.00	56.00	6,021.02	14.51	87,344.98
1972	450,079.00	56.00	8,037.08	15.21	122,243.88
1973	480,890.00	56.00	8,587.27	15.92	136,739.94
1974	343,816.00	56.00	6,139.54	16.65	102,243.95
1975	423,831.00	56.00	7,568.37	17.40	131,660.13
1976	588,082.00	56.00	10,501.41	18.15	190,621.09
1977	1,201,992.00	56.00	21,464.03	18.92	406,059.82
1978	1,047,827.00	56.00	18,711.09	19.70	368,646.10
1979	1,492,901.00	56.00	26,658.80	20.50	546,475.94
1980	1,259,455.00	56.00	22,490.14	21.31	479,235.45
1981	1,417,753.00	56.00	25,316.88	22.13	560,292.29
1982	1,156,338.00	56.00	20,648.78	22.96	474,178.84
1983	1,302,704.00	56.00	23,262.44	23.81	553,933.13
1984	1,366,259.00	56.00	24,397.35	24.67	601,937.28
1985	1,580,861.00	56.00	28,229.51	25.54	721,075.15

NPC
Electric Division
369.00 Services

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

Average Service Life: 56 *Survivor Curve: R4*

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
1986	2,755,594.00	56.00	49,206.77	26.43	1,300,294.62
1987	1,880,905.00	56.00	33,587.41	27.32	917,469.47
1988	2,826,834.00	56.00	50,478.90	28.22	1,424,446.09
1989	4,281,532.00	56.00	76,455.51	29.13	2,227,185.27
1990	3,772,138.00	56.00	67,359.24	30.05	2,024,202.95
1991	6,818,290.00	56.00	121,754.51	30.98	3,771,694.84
1992	5,610,504.00	56.00	100,187.02	31.91	3,197,420.44
1993	5,822,746.00	56.00	103,977.04	32.86	3,416,476.02
1994	6,932,129.00	56.00	123,787.34	33.81	4,184,971.83
1995	8,377,143.00	56.00	149,591.02	34.76	5,200,279.37
1996	10,427,086.00	56.00	186,196.95	35.72	6,651,597.70
1997	8,335,889.00	56.00	148,854.35	36.69	5,461,409.09
1998	87,946,222.00	56.00	1,570,459.67	37.66	59,143,620.86
1999	401,799.00	56.00	7,174.94	38.63	277,199.52
2000	1,269,651.00	56.00	22,672.22	39.61	898,095.74
2001	174,218.00	56.00	3,111.02	40.59	126,284.74
2002	65,928.00	56.00	1,177.28	41.58	48,947.29
2003	23,755.00	56.00	424.19	42.56	18,054.92
2005	5,479.00	56.00	97.84	44.54	4,357.84
2006	167,235.00	56.00	2,986.32	45.53	135,976.22
2007	6,428.00	56.00	114.79	46.53	5,340.52
2009	3,682,685.00	56.00	65,761.87	48.52	3,190,500.76
2010	11.00	56.00	0.20	49.51	9.73
2011	662,504.00	56.00	11,830.36	50.51	597,540.09
2012	2,567,597.00	56.00	45,849.70	51.51	2,361,559.96
2013	1,268.00	56.00	22.64	52.50	1,188.85
2014	84,538.00	56.00	1,509.60	53.50	80,768.04

NPC
Electric Division
369.00 Services

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

Average Service Life: 56 *Survivor Curve:* R4

Year (1)	Original Cost (2)	Avg. Service Life (3)	Avg. Annual Accrual (4)	Avg. Remaining Life (5)	Future Annual Accruals (6)
2015	184,473.00	56.00	3,294.14	54.50	179,536.32
2016	6,191,632.00	56.00	110,564.25	55.50	6,136,394.53
Total	187,500,732.00	56.00	3,348,209.06	35.48	118,806,757.81

Composite Average Remaining Life ... 35.48 *Years*

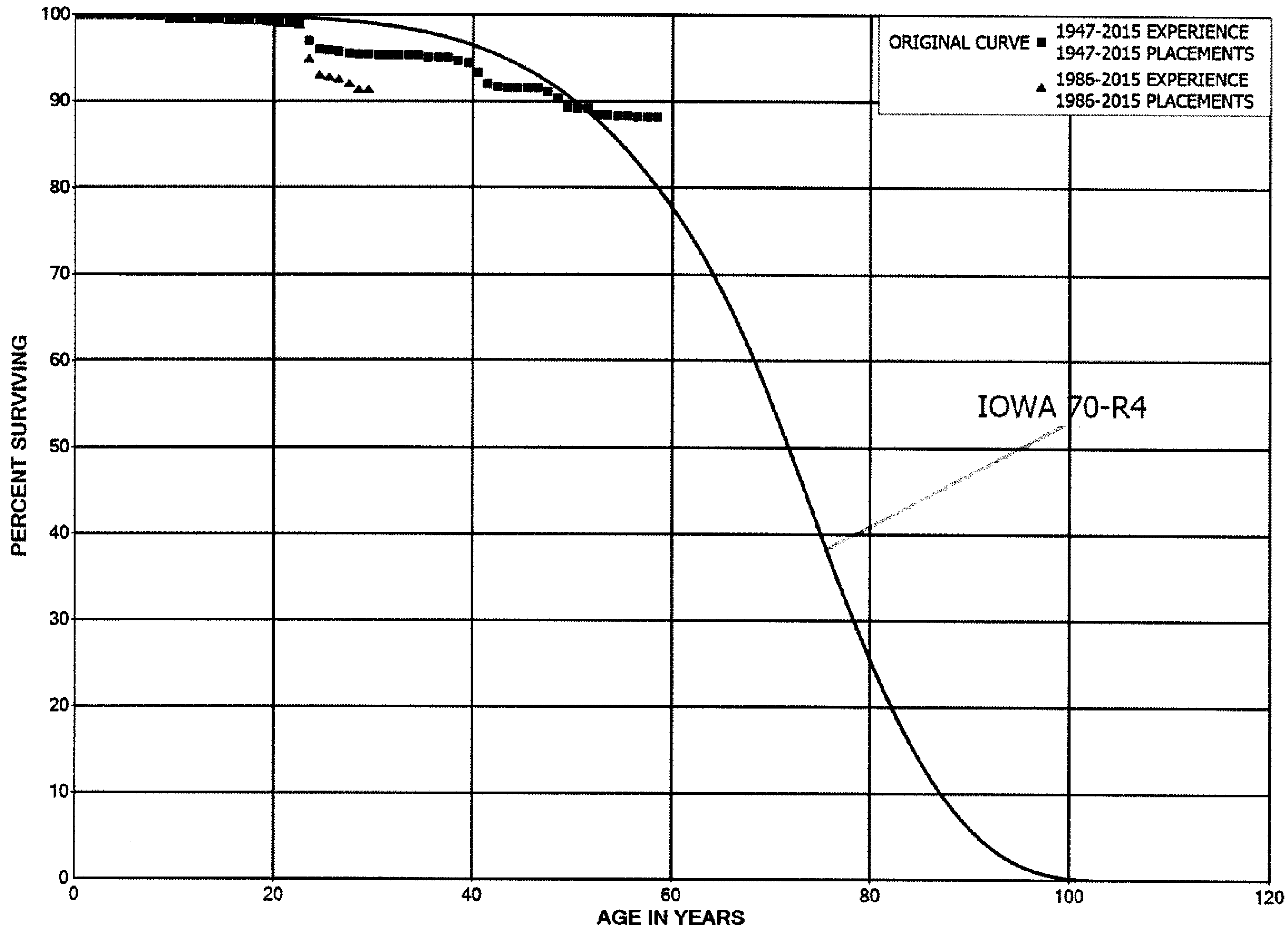
NPC
Electric Division
369.00 Services

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

Average Service Life: 56 *Survivor Curve: R4*

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

SIERRA PACIFIC POWER COMPANY
ELECTRIC PLANT
ACCOUNT 366 UNDERGROUND CONDUIT
ORIGINAL AND SMOOTH SURVIVOR CURVES



SIERRA PACIFIC POWER COMPANY
ELECTRIC PLANT

ACCOUNT 366 UNDERGROUND CONDUIT

ORIGINAL LIFE TABLE

PLACEMENT BAND 1947-2015 EXPERIENCE BAND 1947-2015

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	93,678,159	31,382	0.0003	0.9997	100.00
0.5	91,500,096		0.0000	1.0000	99.97
1.5	89,560,228	17,596	0.0002	0.9998	99.97
2.5	87,546,388	17,954	0.0002	0.9998	99.95
3.5	85,077,382	4,400	0.0001	0.9999	99.93
4.5	84,110,519	9,705	0.0001	0.9999	99.92
5.5	81,386,198	52,918	0.0007	0.9993	99.91
6.5	79,003,886	24,398	0.0003	0.9997	99.84
7.5	77,907,165	19,783	0.0003	0.9997	99.81
8.5	75,587,861	197,135	0.0026	0.9974	99.79
9.5	74,791,061	21,340	0.0003	0.9997	99.53
10.5	73,935,278	22,344	0.0003	0.9997	99.50
11.5	72,841,964	13,576	0.0002	0.9998	99.47
12.5	72,026,598	35,795	0.0005	0.9995	99.45
13.5	71,247,699	31,830	0.0004	0.9996	99.40
14.5	70,009,860	26,100	0.0004	0.9996	99.36
15.5	69,467,803	18,309	0.0003	0.9997	99.32
16.5	64,826,687	1,027	0.0000	1.0000	99.29
17.5	60,015,254	13,125	0.0002	0.9998	99.29
18.5	55,610,634	18,431	0.0003	0.9997	99.27
19.5	52,428,212	45,462	0.0009	0.9991	99.24
20.5	49,158,832	23,168	0.0005	0.9995	99.15
21.5	45,424,959	36,107	0.0008	0.9992	99.11
22.5	42,767,686	922,070	0.0216	0.9784	99.03
23.5	38,469,402	389,980	0.0101	0.9899	96.89
24.5	33,922,620	44,266	0.0013	0.9987	95.91
25.5	31,103,275	27,951	0.0009	0.9991	95.78
26.5	27,597,776	43,377	0.0016	0.9984	95.70
27.5	24,697,082	47,055	0.0019	0.9981	95.55
28.5	21,794,518	5,707	0.0003	0.9997	95.37
29.5	18,882,096	5,328	0.0003	0.9997	95.34
30.5	17,713,282	1,243	0.0001	0.9999	95.31
31.5	16,400,104	523	0.0000	1.0000	95.31
32.5	14,696,829	2,160	0.0001	0.9999	95.30
33.5	13,491,674	3,984	0.0003	0.9997	95.29
34.5	11,830,649	18,781	0.0016	0.9984	95.26
35.5	10,011,734	7,053	0.0007	0.9993	95.11
36.5	8,905,955	744	0.0001	0.9999	95.04
37.5	7,714,711	37,579	0.0049	0.9951	95.04
38.5	6,872,529	14,867	0.0022	0.9978	94.57

SIERRA PACIFIC POWER COMPANY
ELECTRIC PLANT

ACCOUNT 366 UNDERGROUND CONDUIT

ORIGINAL LIFE TABLE, CONT.

PLACEMENT BAND 1947-2015 EXPERIENCE BAND 1947-2015

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
39.5	6,257,680	74,343	0.0119	0.9881	94.37
40.5	5,542,917	74,911	0.0135	0.9865	93.25
41.5	4,521,825	19,406	0.0043	0.9957	91.99
42.5	4,059,529	2,397	0.0006	0.9994	91.59
43.5	2,798,544	1,550	0.0006	0.9994	91.54
44.5	2,290,209		0.0000	1.0000	91.49
45.5	1,729,827		0.0000	1.0000	91.49
46.5	1,230,764	5,687	0.0046	0.9954	91.49
47.5	936,412	7,824	0.0084	0.9916	91.06
48.5	858,690	10,177	0.0119	0.9881	90.30
49.5	703,579	590	0.0008	0.9992	89.23
50.5	517,871		0.0000	1.0000	89.16
51.5	478,492	3,837	0.0080	0.9920	89.16
52.5	342,788	236	0.0007	0.9993	88.44
53.5	339,574	277	0.0008	0.9992	88.38
54.5	249,440	167	0.0007	0.9993	88.31
55.5	239,996	339	0.0014	0.9986	88.25
56.5	219,459		0.0000	1.0000	88.13
57.5	196,446		0.0000	1.0000	88.13
58.5	97,920		0.0000	1.0000	88.13
59.5	66,697		0.0000	1.0000	88.13
60.5	66,697		0.0000	1.0000	88.13
61.5	66,697		0.0000	1.0000	88.13
62.5	66,697		0.0000	1.0000	88.13
63.5	66,479		0.0000	1.0000	88.13
64.5	65,845		0.0000	1.0000	88.13
65.5	54,054	609	0.0113	0.9887	88.13
66.5	11,916	598	0.0502	0.9498	87.13
67.5	11,318		0.0000	1.0000	82.76
68.5					82.76

EL PASO ELECTRIC COMPANY

TABLE 1. ESTIMATED SURVIVOR CURVE, NET SALVAGE PERCENT, ORIGINAL COST, BOOK DEPRECIATION RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2014

DEPRECIABLE GROUP (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AT DECEMBER 31, 2014 (4)	BOOK DEPRECIATION RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL AMOUNT (7)	CALCULATED ANNUAL ACCRUAL RATE (8)	COMPOSITE REMAINING LIFE (9)
345.00 ACCESSORY ELECTRIC EQUIPMENT								
COPPER POWER STATION	45-S1.5 *	0	987,809.00	451,417	536,392	35,596	3.60	15.1
RIO GRANDE UNIT 9	45-S1.5 *	0	4,765,573.00	331,751	4,433,822	118,883	2.49	37.3
SOLAR FACILITIES	40-R2.5 *	0	167,360.00	16,736	150,624	7,856	4.69	19.2
TOTAL ACCOUNT 345			5,920,742.00	799,904	5,120,838	162,335	2.74	31.5
346.00 MISCELLANEOUS POWER PLANT EQUIPMENT								
COPPER POWER STATION	45-S3 *	0	4,033,083.38	4,033,082	1	0	-	-
RIO GRANDE UNIT 9	45-S3 *	0	347,016.00	18,060	328,956	8,370	2.41	39.3
TOTAL ACCOUNT 346			4,380,099.38	4,051,142	328,957	8,370	0.19	39.3
TOTAL GAS TURBINE PLANT			**111,624,197.31**	**14,408,297**	**97,215,900**	**2,884,737**	**2.58**	**33.7**
TRANSMISSION PLANT								
350.10 LAND RIGHTS	75-R3	0	12,194,085.41	5,294,165	6,899,920	120,741	0.99	57.1
352.00 STRUCTURES AND IMPROVEMENTS	65-R4	(5)	8,542,216.53	3,399,933	5,569,394	113,756	1.33	49.0
353.00 STATION EQUIPMENT	48-R4	(2)	140,109,294.83	78,932,091	63,979,390	1,714,655	1.22	37.3
354.00 STEEL TOWERS AND FIXTURES	70-R4	(10)	25,606,948.66	12,899,841	15,267,803	330,965	1.29	46.1
355.00 WOOD AND STEEL POLES	50-S3	(25)	111,507,247.39	52,598,405	86,785,654	2,459,095	2.21	35.3
356.00 OVERHEAD CONDUCTORS AND DEVICES	60-R5	(10)	83,521,066.81	48,519,972	43,353,201	1,132,598	1.36	38.3
359.00 ROADS AND TRAILS	65-R3	0	1,095,500.33	534,335	561,165	11,466	1.05	48.9
TOTAL TRANSMISSION PLANT			**382,576,359.96**	**202,178,742**	**222,416,527**	**5,883,276**	**1.54**	**37.8**
DISTRIBUTION PLANT								
360.10 LAND RIGHTS	70-R4	0	2,262,348.63	485,688	1,776,661	29,143	1.29	61.0
361.00 STRUCTURES AND IMPROVEMENTS	65-R3	(5)	8,179,960.81	1,831,952	6,757,007	126,903	1.55	53.2
362.00 STATION EQUIPMENT	60-R2	(2)	185,030,141.79	58,836,385	129,894,360	2,533,853	1.37	51.3
364.00 POLES, TOWERS AND FIXTURES	45-R3	(20)	145,055,947.57	53,149,009	120,918,128	3,667,600	2.53	33.0
365.00 OVERHEAD CONDUCTORS AND DEVICES	48-R2.5	(15)	83,721,622.23	30,638,965	65,640,901	1,788,645	2.14	36.7
366.00 UNDERGROUND CONDUIT	57-R4	(10)	113,500,223.70	30,446,447	94,403,799	2,131,441	1.88	44.3
367.00 UNDERGROUND CONDUCTORS AND DEVICES	40-R3	(15)	128,058,660.56	36,856,203	110,411,257	3,638,498	2.84	30.3
368.00 LINE TRANSFORMERS	55-R3	(5)	218,096,569.80	54,046,615	174,954,783	3,992,358	1.83	43.8
369.00 SERVICES	60-S3	(15)	41,731,507.16	22,776,683	25,214,550	596,764	1.43	42.3
370.00 METERS	31-R2	(10)	46,278,741.81	20,768,378	30,138,238	1,274,036	2.75	23.7
371.00 INSTALLATIONS ON CUSTOMERS' PREMISES	36-R2	(15)	12,369,883.38	4,672,569	9,552,797	368,800	2.98	25.9
373.00 STREET LIGHTING AND SIGNAL SYSTEMS	50-R3	(15)	10,244,760.35	4,973,372	6,808,102	240,038	2.34	28.4
TOTAL DISTRIBUTION PLANT			**994,530,387.79**	**319,482,266**	**776,470,583**	**20,388,079**	**2.05**	**38.1**
GENERAL PLANT								
390.00 STRUCTURES AND IMPROVEMENTS								
SYSTEMS OPERATIONS BUILDING	80-R2.5 *	0	7,434,501.03	2,270,300	5,164,201	200,123	2.69	25.8
STANTON TOWER	80-R2.5 *	0	27,742,668.25	2,845,519	24,897,149	598,018	2.16	41.6
OTHER STRUCTURES	40-S0.5	0	15,695,846.77	7,699,732	7,996,115	246,508	1.57	32.4
TOTAL ACCOUNT 390			50,873,016.05	12,815,551	38,057,465	1,044,649	2.05	36.4

NSTAR ELECTRIC COMPANY

TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AS OF JUNE 30, 2016

	ACCOUNT (1)	PROBABLE RETIREMENT YEAR (2)	SURVIVOR CURVE (3)	NET SALVAGE (4)	ORIGINAL COST (5)	BOOK RESERVE (6)	FUTURE ACCRUALS (7)	CALCULATED ANNUAL ACCRUAL AMOUNT (8)	CALCULATED ANNUAL ACCRUAL RATE (9)=(8)/(5)	COMPOSITE REMAINING LIFE (10)=(7)/(8)
	ELECTRIC PLANT									
	MISCELLANEOUS INTANGIBLE PLANT									
303.2	MISCELLANEOUS INTANGIBLE PLANT - 10 YEAR		10-SQ	0	23,012,006.34	13,656,346	9,355,660	1,404,926	*	
303.3	MISCELLANEOUS INTANGIBLE PLANT - 15 YEAR		15-SQ	0	19,465,032.04	3,073,199	16,391,833	1,182,836	*	
	TOTAL MISCELLANEOUS INTANGIBLE PLANT				42,477,038.38	16,729,545	25,747,493	2,587,762		
	DISTRIBUTION PLANT									
361	STRUCTURES AND IMPROVEMENTS		70-R3	(15)	96,196,616.50	38,163,149	72,462,960	1,413,060	1.47	51.3
362	STATION EQUIPMENT		60-R2.5	(25)	746,186,586.40	243,316,698	689,416,535	14,341,683	1.92	48.1
364	POLES, TOWERS AND FIXTURES		58-S0.5	(75)	360,418,875.67	118,031,528	512,701,504	11,260,659	3.12	45.5
365	OVERHEAD CONDUCTORS AND DEVICES		48-R0.5	(40)	666,549,305.35	161,082,588	772,086,439	20,550,498	3.08	37.6
366	UNDERGROUND CONDUIT		75-R3	(60)	616,466,881.77	204,229,947	782,117,064	12,821,738	2.08	61.0
367	UNDERGROUND CONDUCTORS AND DEVICES		45-R0.5	(40)	1,362,580,636.47	455,820,994	1,451,791,897	39,951,272	2.93	36.3
368	LINE TRANSFORMERS		36-R1	(15)	540,284,360.76	158,709,449	462,617,566	17,173,547	3.18	26.9
369.1	SERVICES - OVERHEAD		55-R1.5	(40)	90,659,808.73	41,151,342	85,772,390	2,136,472	2.36	40.1
369.2	SERVICES - UNDERGROUND		60-R2	(75)	223,576,107.18	85,213,158	306,045,030	6,527,205	2.92	46.9
370	METERS		23-R1.5	(2)	203,693,435.30	62,575,991	145,191,313	11,004,571	5.40	13.2
373	STREET LIGHTING AND SIGNAL SYSTEMS									
	ACTON		20-L0	(10)	89,325.47	60,688	37,570	2,515	2.82	14.9
	ACUSHNET		20-L0	(10)	212,533.08	174,591	59,195	4,791	2.25	12.4
	AQUINNAH		20-L0	(10)	1,343.74	832	646	44	3.27	14.7
	ARLINGTON		20-L0	(10)	133,385.26	120,105	26,619	1,866	1.40	14.3
	ASHLAND		20-L0	(10)	26,186.83	23,893	4,913	381	1.45	12.9
	BARNSTABLE		20-L0	(10)	752,615.64	582,892	244,985	18,998	2.52	12.9
	BEDFORD		20-L0	(10)	33,966.28	26,206	11,157	831	2.45	13.4
	BELLINGHAM		20-L0	(10)	52,675.59	50,038	7,905	582	1.10	13.6
	BOSTON		20-L0	(10)	3,911,177.64	3,074,418	1,227,877	80,196	2.05	15.3
	BOURNE		20-L0	(10)	172,765.88	113,196	76,846	5,375	3.11	14.3
	BREWSTER		20-L0	(10)	27,711.88	22,737	7,746	644	2.32	12.0
	BROOKLINE		20-L0	(10)	764,303.73	840,734	0	0	-	-
	BURLINGTON		20-L0	(10)	73,471.54	49,263	31,556	2,117	2.88	14.9
	CAMBRIDGE		20-L0	(10)	773,459.00	612,359	238,446	19,274	2.49	12.4
	CANTON		20-L0	(10)	106,325.73	81,938	35,020	2,683	2.52	13.1
	CARLISLE		20-L0	(10)	6,229.11	4,511	2,341	130	2.09	18.0
	CARVER		20-L0	(10)	37,782.27	18,452	23,108	1,496	3.96	15.4
	CHATHAM		20-L0	(10)	24,338.12	19,843	6,929	551	2.26	12.6
	CHELSEA		20-L0	(10)	260,324.56	219,286	67,071	4,399	1.69	15.2
	CHILMARK		20-L0	(10)	524.08	357	219	18	3.43	12.2
	DARTMOUTH		20-L0	(10)	129,565.56	85,371	57,151	4,228	3.26	13.5
	DEDHAM		20-L0	(10)	126,319.95	122,575	16,377	1,140	0.90	14.4
	DENNIS		20-L0	(10)	93,833.21	60,630	42,587	3,138	3.34	13.6
	DOVER		20-L0	(10)	3,016.85	2,527	792	56	1.86	14.1
	DUXBURY		20-L0	(10)	118,416.11	80,289	49,969	3,607	3.05	13.9
	EASTHAM		20-L0	(10)	42,093.16	27,382	18,920	1,340	3.18	14.1
	EDGARTOWN		20-L0	(10)	4,312.78	2,892	1,852	120	2.78	15.4
	EVERETT		20-L0	(10)	655.51	571	150	15	2.29	10.0
	FAIRHAVEN		20-L0	(10)	61,407.35	34,925	32,623	2,219	3.61	14.7
	FALMOUTH		20-L0	(10)	259,914.33	185,087	100,819	7,542	2.90	13.4
	FOXBORO		20-L0	(10)	22,303.40	18,928	5,606	541	2.43	10.4
	FRAMINGHAM		20-L0	(10)	162,664.01	128,506	50,424	3,676	2.26	13.7
	FRANKLIN		20-L0	(10)	1,690.58	1,649	211	23	1.36	9.2
	FREETOWN		20-L0	(10)	108,260.87	71,871	47,216	3,341	3.09	14.1
	HARWICH		20-L0	(10)	53,947.95	32,132	27,211	1,957	3.63	13.9
	HOLLISTON		20-L0	(10)	611,607.21	398,066	274,702	19,943	3.26	13.8
	HOPKINTON		20-L0	(10)	28,861.47	25,393	6,355	389	1.35	16.3
	KINGSTON		20-L0	(10)	178,736.44	117,988	78,622	5,724	3.20	13.7
	LAKEVILLE		20-L0	(10)	4,743.74	3,589	1,629	133	2.80	12.2
	LEXINGTON		20-L0	(10)	294,535.36	279,662	44,327	3,282	1.11	13.5
	LINCOLN		20-L0	(10)	46,318.61	45,009	5,941	359	0.78	16.5
	MANSFIELD		20-L0	(10)	933.80	965	62	7	0.75	8.9

CERTIFICATE OF SERVICE

Docket Nos. 17-06003 and 17-06004

I certify that I am an employee of the Bureau of Consumer Protection and that on this day I have served the foregoing document upon all parties of record in this proceeding by emailing or mailing a true copy thereof, properly addressed with postage prepaid or forwarded as indicated below to the following:

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Dated: October 20, 2017

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