BEFORE THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS

In the Matter of the Application of Black Hills/Kansas Gas Utility Company, LLC, d/b/a Black Hills Energy, for Approval of the Commission to Make Certain Changes in its Rates for Natural Gas Service	**)** **)** **)** **)** **)**	**Docket No. 21-BHCG-418-RTS**

DIRECT TESTIMONY OF JOHN J. SPANOS

ON BEHALF OF

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC, d/b/a BLACK HILLS ENERGY

TABLE OF CONTENTS

EXHIBITS

KSG Direct Exhibit JJS-1	**Statement of Qualifications**
KSG Direct Exhibit JJS-2	**Depreciation Study**
KSG Direct Exhibit JJS-3	**Comparison of Current vs Proposed Depreciation Expense as of September 30, 2020** **Depreciation Expense Comparison**

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND ADDRESS.

A. My name is John J. Spanos. My business address is 207 Senate Avenue, Camp Hill, Pennsylvania, 17011.

Q. ARE YOU ASSOCIATED WITH ANY FIRM?

A. Yes. I am associated with the firm of Gannett Fleming Valuation and Rate Consultants, LLC ("Gannett Fleming").

Q. HOW LONG HAVE YOU BEEN ASSOCIATED WITH GANNETT FLEMING?

A. I have been associated with the firm since my college graduation in June 1986.

Q. WHAT IS YOUR POSITION WITH THE FIRM?

A. I am President.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of Black Hills/Kansas Gas Utility Company, LLC d/b/a Black Hills Energy ("Black Hills" or the "Company").

Q. PLEASE STATE YOUR QUALIFICATIONS.

A. I have 34 years of depreciation experience, which includes expert testimony in over 350 cases before 41 regulatory commissions. These cases have included depreciation studies in the electric, gas, water, wastewater and pipeline industries. In addition to cases where I have submitted testimony, I have also supervised over 700 other depreciation or valuation assignments. Please refer to KSG Direct Exhibit JJS-1 for my qualifications statement, which includes further information with respect to my work history, case experience, and leadership in the Society of Depreciation Professionals.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony will support and explain the Depreciation Study performed for Black Hills attached hereto as KSG Direct Exhibit JJS-2 ("Depreciation Study"). The Depreciation Study sets forth the calculated annual depreciation accrual rates by account as of September 30, 2020.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR DEPRECIATION STUDY.

A. The depreciation rates as of September 30, 2020, appropriately reflect the rates at which the value of Black Hills' assets has been consumed over their useful lives to date. These rates are based on the most commonly used methods and procedures for determining depreciation rates. The life and salvage parameters are based on widely used techniques and the depreciation rates are based on the average service life procedure and remaining life method.

Q. ARE THE RECOMMENDED DEPRECIATION ACCRUAL RATES PRESENTED IN YOUR STUDY REASONABLE AND APPLICABLE TO THE PLANT IN SERVICE AS OF SEPTEMBER 30, 2020?

A. Yes, they are. Based on the Depreciation Study, I am recommending depreciation rates using the September 30, 2020, plant and reserve balances for approval.

Q. WHAT IS THE EFFECT OF THE RECOMMENDED DEPRECIATION ACCRUAL RATES ON THE COMPANY'S COST OF SERVICE?

A. As explained in more detail later in my testimony, the Depreciation Study results is an increase of approximately $409,000 in depreciation expense as of September 30, 2020. This increase is primarily the result of changes in some life parameters and net salvage accruals as well as the complete recovery of general plant assets. It should also be noted that the current rates have been consolidated by subaccount to reflect a more reasonable comparison to the proposed asset class groups.

III. DEPRECIATION STUDY

Q. PLEASE DEFINE THE CONCEPT OF DEPRECIATION.

A. Depreciation refers to the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of utility plant in the course of service from causes which are known to be in current operation, against which the Company is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand, and the requirements of public authorities.

Q. DID YOU PREPARE THE DEPRECIATION STUDY FILED BY BLACK HILLS IN THIS PROCEEDING?

A. Yes. I prepared the Depreciation Study, and KSG Direct Exhibit JJS-2 is a true and accurate copy of my report. My report is entitled: "2020 Depreciation Study – Calculated Annual Depreciation Accruals Related to Gas Plant as of September 30, 2020." This report sets forth the results of my Depreciation

Study for Black Hills.

Q. IN PREPARING THE DEPRECIATION STUDY, DID YOU FOLLOW GENERALLY ACCEPTED PRACTICES IN THE FIELD OF DEPRECIATION VALUATION?

A. Yes.

Q. WHAT IS THE PURPOSE OF THE DEPRECIATION STUDY?

A. The purpose of my Deprecation Study was to estimate the annual depreciation accruals for Black Hills' plant in service for financial and ratemaking purposes and to determine appropriate average service lives and net salvage percentages for each plant account.

Q. ARE THE METHODS AND PROCEDURES OF THIS DEPRECIATION STUDY CONSISTENT WITH BLACK HILLS' PAST PRACTICES?

A. The methods and procedures of this study are the same as those utilized in the past by this Company as well as other companies appearing before this Commission. Both the existing rates and the rates determined in the Depreciation Study are based on the average service life procedure and the remaining life method.

Q. PLEASE DESCRIBE THE CONTENTS OF THE DEPRECIATION STUDY.

A. The Depreciation Study is presented in nine parts: Part I, Introduction, presents the scope and basis for the Depreciation Study. Part II, Estimation of Survivor Curves, includes descriptions of the methodology of estimating survivor curves. Parts III and IV set forth the analysis for determining service life and net salvage estimates. Part V, Calculation of Annual and Accrued Depreciation, includes

the concepts of depreciation and amortization using the remaining life. Part VI, Results of Study, presents a description of the results of my analysis and a summary of the depreciation calculations. Parts VII, VIII, and IX include graphs and tables that relate to the service life and net salvage analyses, and the detailed depreciation calculations by account.

Table 1 on pages VI-5 through VI-7 of the Depreciation Study presents the estimated survivor curve, the net salvage percent, the original cost as of September 30, 2020, the book depreciation reserve, and the calculated annual depreciation accrual and rate for each account or subaccount. The section beginning on page VII-2 presents the results of the retirement rate analyses prepared as the historical bases for the service life estimates. The section beginning on page VIII-2 presents the results of the salvage analysis. The section beginning on page IX-2 presents the depreciation calculations related to surviving original cost as of September 30, 2020.

Q. PLEASE EXPLAIN HOW YOU PERFORMED YOUR DEPRECIATION STUDY.

A. I used the straight line remaining life method of depreciation, with the average service life procedure. The annual depreciation is based on a method of depreciation accounting that seeks to distribute the unrecovered cost of fixed capital assets over the estimated remaining useful life of each unit, or group of assets, in a systematic and rational manner.

For General Plant Accounts 391.01, 391.03, 391.07, 393.0, 394.0, 395.0, 397.0, and 398.0, I used the straight line remaining life method of

amortization.[1] The annual amortization is based on amortization accounting that distributes the unrecovered cost of fixed capital assets over the remaining amortization period selected for each account and vintage.

Q. HOW DID YOU DETERMINE THE RECOMMENDED ANNUAL DEPRECIATION ACCRUAL RATES?

A. I did this in two phases. In the first phase, I estimated the service life and net salvage characteristics for each depreciable group, that is, each plant account or subaccount identified as having similar characteristics. In the second phase, I calculated the composite remaining lives and annual depreciation accrual rates based on the service life and net salvage estimates determined in the first phase.

Q. PLEASE DESCRIBE THE FIRST PHASE OF THE DEPRECIATION STUDY, IN WHICH YOU ESTIMATED THE SERVICE LIFE AND NET SALVAGE CHARACTERISTICS FOR EACH DEPRECIABLE GROUP.

A. The service life and net salvage study consisted of compiling historical data from records related to Black Hills' plant; analyzing these data to obtain historical trends of survivor characteristics; obtaining supplementary information from Black Hills' management and operating personnel concerning practices and plans as they relate to plant operations; and interpreting the data and the estimates used by other gas utilities to form judgments of average service life and net salvage characteristics.

[1] The account numbers identified throughout my testimony represent those in effect as of September 30, 2020.

Q. WHAT HISTORICAL DATA DID YOU ANALYZE FOR THE PURPOSE OF ESTIMATING SERVICE LIFE CHARACTERISTICS?

A. I analyzed the Company's accounting entries that record plant transactions during the period 2006 through 2020 to the extent available. The transactions I analyzed included additions, retirements, transfers, sales, and the related balances.

Q. WHAT METHOD DID YOU USE TO ANALYZE THESE SERVICE LIFE DATA?

A. I used the retirement rate method for most plant accounts. This is the most appropriate method when retirement data covering a long period of time is available because this method determines the average rates of retirement actually experienced by the Company during the period of time covered by the Depreciation Study.

Q. PLEASE DESCRIBE HOW YOU USED THE RETIREMENT RATE METHOD TO ANALYZE BLACK HILLS' SERVICE LIFE DATA.

A. I applied the retirement rate analysis to each different group of property in the study. For each property group, I used the retirement rate data to form a life table which, when plotted, shows an original survivor curve for that property group. Each original survivor curve represents the average survivor pattern experienced by the several vintage groups during the experience band studied. The survivor patterns do not necessarily describe the life characteristics of the property group; therefore, interpretation of the original survivor curves is required in order to use them as valid considerations in estimating service life. The "Iowa-type survivor curves" were used to perform these interpretations.

Q. WHAT ARE "IOWA-TYPE SURVIVOR CURVES" AND HOW DID YOU USE SUCH CURVES TO ESTIMATE THE SERVICE LIFE CHARACTERISTICS FOR EACH PROPERTY GROUP?

A. Iowa-type survivor curves are a widely-used group of survivor curves that contain the range of survivor characteristics usually experienced by utilities and other industrial companies. These curves were developed at the Iowa State College Engineering Experiment Station through an extensive process of observing and classifying the ages at which various types of property used by utilities and other industrial companies had been retired.

Iowa-type survivor curves are used to smooth and extrapolate original survivor curves determined by the retirement rate method. The Iowa curves and truncated Iowa curves were used in the Black Hills Depreciation Study to describe the forecasted rates of retirement based on the observed rates of retirement and the outlook for future retirements. The estimated survivor curve designations for each depreciable property group indicate the average service life, the family within the Iowa system to which the property group belongs, and the relative height of the mode. For example, the Iowa 70-R1 indicates an average service life of 70 years; a right-moded, or R, type curve (the mode occurs after average life for right-moded curves); and a low height, 1, for the mode (possible modes for R type curves range from 0.5 to 5).

Q. DID YOU PHYSICALLY OBSERVE BLACK HILLS' PLANT AND EQUIPMENT AS PART OF YOUR DEPRECIATION STUDY?

A. Not for this study due to travel restrictions, however, I did select facilities to have photos taken with a site overview by Company personnel. I had previously conducted field visits in a prior study during 2013. Field reviews are conducted to become familiar with Company operations and obtain an understanding of the function of the plant and information with respect to the reasons for past retirements and the expected future causes of retirements. This knowledge was incorporated in the interpretation and extrapolation of the statistical analyses.

Q. HOW DID YOUR EXPERIENCE IN DEVELOPMENT OF OTHER DEPRECIATION STUDIES AFFECT YOUR WORK IN THIS CASE FOR BLACK HILLS?

A. Because I customarily conduct field reviews for my depreciation studies, I have had the opportunity to visit scores of similar facilities and meet with operations personnel at many other companies. The knowledge I have accumulated from those visits and meetings provides me with useful information to draw upon to confirm or challenge my numerical analyses concerning asset condition and remaining life estimates.

Q. PLEASE EXPLAIN THE CONCEPT OF "NET SALVAGE".

A. Net salvage is a component of the service value of capital assets that is recovered through depreciation rates. The service value of an asset is its original cost less its net salvage. Net salvage is the salvage value received for the asset upon retirement less the cost to retire the asset. When the cost to retire the asset exceeds the salvage value, the result is negative net salvage.

Because depreciation expense is the loss in service value of an asset during a defined period (*e.g.*, one year), it must include a ratable portion of both the original cost of the asset and the net salvage. That is, the net salvage related to an asset should be incorporated in the cost of service during the same period as its original cost, so that customers receiving service from the asset pay rates that include a portion of both elements of the asset's service value, the original cost, and the net salvage value.

For example, the full recovery of the service value of a $500 regulator will include not only the $500 of original cost, but also, on average $75 to remove the regulator at the end of its life and $25 in salvage value. In this example, the net salvage component is negative $50 ($25 - $75), and the net salvage percent is negative 10% (($25 - $75)/$500).

Q. PLEASE DESCRIBE HOW YOU ESTIMATED NET SALVAGE PERCENTAGES.

A. The net salvage percentages estimated in the Depreciation Study were based on informed judgment that incorporated factors such as the statistical analyses of historical net salvage data; information provided to me by the Company's operating personnel, general knowledge and experience of industry practices; and trends in the industry in general. The statistical net salvage analyses incorporate the Company's actual historical data for the period 2006 through 2020 and considered the cost of removal and gross salvage ratios of the associated retirements during the 15-year period. Trends of these data are also measured based on three-year moving averages and the most recent five-year indications.

Q. PLEASE DESCRIBE THE SECOND PHASE OF THE PROCESS THAT YOU USED IN THE DEPRECIATION STUDY IN WHICH YOU CALCULATED COMPOSITE REMAINING LIVES AND ANNUAL DEPRECIATION ACCRUAL RATES.

A. After I estimated the service life and net salvage characteristics for each depreciable property group, I calculated the annual depreciation accrual rates for each group using the straight line remaining life method, and using remaining lives weighted consistent with the average service life procedure. The calculation of annual depreciation accrual rates was developed as of September 30, 2020.

Q. PLEASE DESCRIBE THE STRAIGHT LINE REMAINING LIFE METHOD OF DEPRECIATION.

A. The straight line remaining life method of depreciation allocates the original cost of the property, less accumulated depreciation, less future net salvage, in equal amounts to each year of remaining service life.

Q. PLEASE DESCRIBE THE AVERAGE SERVICE LIFE PROCEDURE FOR CALCULATING REMAINING LIFE ACCRUAL RATES.

A. The average service life procedure defines the group or account for which the remaining life annual accrual is determined. Under this procedure, the annual accrual rate is determined for the entire group or account based on its average remaining life and the rate is then applied to the surviving balance of the group's cost. The average remaining life of the group is calculated by first dividing the future book accruals (original cost less allocated book reserve less future net salvage) by the average remaining life for each vintage. The average remaining

life for each vintage is derived from the area under the survivor curve between the attained age of the vintage and the maximum age. The sum of the future book accruals is then divided by the sum of the annual accruals to determine the average remaining life of the entire group for use in calculating the annual depreciation accrual rate.

Q. PLEASE DESCRIBE AMORTIZATION ACCOUNTING IN CONTRAST TO DEPRECIATION ACCOUNTING.

A. Amortization accounting is used for accounts with a large number of units, but small asset values. In amortization accounting, units of property are capitalized in the same manner as they are in depreciation accounting. However, depreciation accounting is difficult for these types of assets because depreciation accounting requires periodic inventories to properly reflect plant in service. Consequently, amortization accounting is used for these types of assets, such that retirements are recorded when a vintage is fully amortized rather than as the units are removed from service. That is, there is no dispersion of retirement in amortization accounting. All units are retired when the age of the vintage reaches the amortization period. Each plant account or group of assets is assigned a fixed period that represents an anticipated life during which the asset will render full benefit. For example, in amortization accounting, assets that have a 15-year amortization period will be fully recovered after 15 years of service and taken off the Company's books at that time, but not necessarily removed from service. In contrast, assets that are taken out of service before 15 years remain on the books until the amortization period for that vintage has expired.

Q. IS AMORTIZATION ACCOUNTING BEING UTILIZED FOR CERTAIN PLANT ACCOUNTS?

A. Yes. However, amortization accounting is only appropriate for certain General Plant accounts. These accounts are 391.01, 391.03, 391.07, 393.0, 394.0, 395.0, 397.0 and 398.0, which represent less than two percent of Black Hills' depreciable plant.

Q. PLEASE USE AN EXAMPLE TO ILLUSTRATE HOW THE ANNUAL DEPRECIATION ACCRUAL RATE FOR A PARTICULAR GROUP OF PROPERTY IS PRESENTED IN YOUR DEPRECIATION STUDY.

A. I will use Account 380.0, Services, as an example because it is one of the larger depreciable accounts and represents approximately 21 percent of depreciable plant. The retirement rate method was used to analyze the survivor characteristics of this property group. Aged plant accounting data was compiled from 2006 through 2020 and analyzed in periods that best represent the overall service life of this property. The life table for the 2006-2020 experience band is presented on pages VII-39 through VII-41 of the Depreciation Study. The life table displays the retirement and surviving ratios of the aged plant data exposed to retirement by age interval. For example, page VII-39 of the study shows $30,993 retired at age 0.5 with $30,454,538 exposed to retirement. Consequently, the retirement ratio is 0.0010 and the surviving ratio is 0.9990. The life table, or original survivor curve, is plotted along with the estimated smooth survivor curve, the 48-R4 on page VII-38 of the study.

The net salvage analyses for Account 380, Services, are presented on page VIII-10 of the Depreciation Study. The percentage is based on the result

of annual gross salvage minus the cost to remove plant assets as compared to the original cost of plant retired during the period 2006 through 2020. This 15-year period experienced $449,335 ($336 - $449,670) in negative net salvage for $2,968,576 plant retired. The result is negative net salvage of 15 percent ($449,335/$2,968,576). Based on the overall negative 15 percent net salvage and the most recent five years of negative 6 percent, as well as industry ranges between negative 20 percent and negative 150 percent and Company expectations, it was determined that negative 15 percent is the most appropriate estimate.

My calculation of the annual depreciation related to the original cost at September 30, 2020, of gas plant is presented on pages IX-22 and IX-23 of the study. The calculation is based on the 48-R4 survivor curve, 15 percent negative net salvage, the attained age, and the allocated book reserve. The tabulation sets forth the installation year, the original cost, calculated accrued depreciation, allocated book reserve, future accruals, remaining life and annual accrual. These totals are brought forward to the table on page VI-5 of the Depreciation Study.

Q. PLEASE COMPARE THE PROPOSED DEPRECIATION EXPENSE TO THE CURRENT PRO-FORMA DEPRECIATION EXPENSE AS OF SEPTEMBER 30, 2020.

A. KSG Direct Exhibit JJS-3 sets forth the proposed versus current depreciation expense as of September 30, 2020. The overall change reflected in the Depreciation Study is an increase of approximately $409,000 annually.

Q. WHAT ARE THE PRIMARY FACTORS CAUSING THE CHANGE IN DEPRECIATION EXPENSE AS A RESULT OF THE DEPRECIATION STUDY?

A. Depreciation rates and expense are generally affected by four major factors: 1) The life and salvage parameters; 2) the plant activity; 3) the depreciation methods and procedures; and 4) the plant to reserve ratio. There are slight overall increases in depreciation for transmission and distribution assets and a decrease for general plant assets. The increase in transmission assets related to the more reasonable net salvage percentage for Account 367, Mains. The increase in distribution assets related to the shorter overall life for Account 381, Meters. The decrease in general plant assets related primarily to the longer average service life for Account 392.03, Transportation Equipment – Light Trucks.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes

AFFIDAVIT OF JOHN J. SPANOS

State of Pennsylvania)
) ss
County of Cumberland)

I, JOHN J. SPANOS, being first duly sworn on oath, depose and state that I am the same John J. Spanos identified in the foregoing Direct Testimony; that I have caused the foregoing Direct Testimony to be prepared and am familiar with the contents thereof; and that the foregoing Direct Testimony is true and correct to the best of my knowledge, information, and belief as of the date of this Affidavit.

John J. Spanos
John J. Spanos

Subscribed and sworn to before me,
A Notary Public, in and for said County
and State, this 27 day of April.

Commonwealth of Pennsylvania - Notary Seal
MEGAN LYNN ECKRICH - Notary Public
Cumberland County
My Commission Expires Sep 16, 2023
Commission Number 1264513

Megan Lynn Eckrich
Notary Public

My Commission expires: Sep. 16, 2023

Exhibit JJS-1

JOHN SPANOS

DEPRECIATION EXPERIENCE

Q. Please state your name.

A. My name is John J. Spanos.

Q. What is your educational background?

A. I have Bachelor of Science degrees in Industrial Management and Mathematics from Carnegie-Mellon University and a Master of Business Administration from York College.

Q. Do you belong to any professional societies?

A. Yes. I am a member and past President of the Society of Depreciation Professionals and a member of the American Gas Association/Edison Electric Institute Industry Accounting Committee.

Q. Do you hold any special certification as a depreciation expert?

A. Yes. The Society of Depreciation Professionals has established national standards for depreciation professionals. The Society administers an examination to become certified in this field. I passed the certification exam in September 1997 and was recertified in August 2003, February 2008, January 2013 and February 2018.

Q. Please outline your experience in the field of depreciation.

A. In June 1986, I was employed by Gannett Fleming Valuation and Rate Consultants, Inc. as a Depreciation Analyst. During the period from June 1986 through December 1995, I helped prepare numerous depreciation and original cost studies for utility companies in various industries. I helped perform depreciation studies for the following telephone companies: United Telephone of Pennsylvania, United Telephone of New Jersey, and Anchorage Telephone Utility. I helped perform depreciation studies for the following

companies in the railroad industry: Union Pacific Railroad, Burlington Northern Railroad, and Wisconsin Central Transportation Corporation.

I helped perform depreciation studies for the following organizations in the electric utility industry: Chugach Electric Association, The Cincinnati Gas and Electric Company (CG&E), The Union Light, Heat and Power Company (ULH&P), Northwest Territories Power Corporation, and the City of Calgary - Electric System.

I helped perform depreciation studies for the following pipeline companies: TransCanada Pipelines Limited, Trans Mountain Pipe Line Company Ltd., Interprovincial Pipe Line Inc., Nova Gas Transmission Limited and Lakehead Pipeline Company.

I helped perform depreciation studies for the following gas utility companies: Columbia Gas of Pennsylvania, Columbia Gas of Maryland, The Peoples Natural Gas Company, T. W. Phillips Gas & Oil Company, CG&E, ULH&P, Lawrenceburg Gas Company and Penn Fuel Gas, Inc.

I helped perform depreciation studies for the following water utility companies: Indiana-American Water Company, Consumers Pennsylvania Water Company and The York Water Company; and depreciation and original cost studies for Philadelphia Suburban Water Company and Pennsylvania-American Water Company.

In each of the above studies, I assembled and analyzed historical and simulated data, performed field reviews, developed preliminary estimates of service life and net salvage, calculated annual depreciation, and prepared reports for submission to state public utility commissions or federal regulatory agencies. I performed these studies under the general direction of William M. Stout, P.E.

In January 1996, I was assigned to the position of Supervisor of Depreciation Studies. In July 1999, I was promoted to the position of Manager, Depreciation and

Valuation Studies. In December 2000, I was promoted to the position as Vice-President of Gannett Fleming Valuation and Rate Consultants, Inc., in April 2012, I was promoted to the position as Senior Vice President of the Valuation and Rate Division of Gannett Fleming Inc. (now doing business as Gannett Fleming Valuation and Rate Consultants, LLC) and in January of 2019, I was promoted to my present position of President of Gannett Fleming Valuation and Rate Consultants, LLC. In my current position I am responsible for conducting all depreciation, valuation and original cost studies, including the preparation of final exhibits and responses to data requests for submission to the appropriate regulatory bodies.

Since January 1996, I have conducted depreciation studies similar to those previously listed including assignments for Pennsylvania-American Water Company; Aqua Pennsylvania; Kentucky-American Water Company; Virginia-American Water Company; Indiana-American Water Company; Iowa-American Water Company; New Jersey-American Water Company; Hampton Water Works Company; Omaha Public Power District; Enbridge Pipe Line Company; Inc.; Columbia Gas of Virginia, Inc.; Virginia Natural Gas Company National Fuel Gas Distribution Corporation - New York and Pennsylvania Divisions; The City of Bethlehem - Bureau of Water; The City of Coatesville Authority; The City of Lancaster - Bureau of Water; Peoples Energy Corporation; The York Water Company; Public Service Company of Colorado; Enbridge Pipelines; Enbridge Gas Distribution, Inc.; Reliant Energy-HLP; Massachusetts-American Water Company; St. Louis County Water Company; Missouri-American Water Company; Chugach Electric Association; Alliant Energy; Oklahoma Gas & Electric Company; Nevada Power Company; Dominion Virginia Power; NUI-Virginia Gas Companies; Pacific Gas & Electric Company; PSI Energy; NUI - Elizabethtown Gas Company; Cinergy Corporation – CG&E; Cinergy Corporation – ULH&P; Columbia Gas of Kentucky; South Carolina Electric & Gas Company; Idaho Power Company; El Paso

Electric Company; Aqua North Carolina; Aqua Ohio; Aqua Texas, Inc.; Aqua Illinois, Inc.; Ameren Missouri; Central Hudson Gas & Electric; Centennial Pipeline Company; CenterPoint Energy-Arkansas; CenterPoint Energy – Oklahoma; CenterPoint Energy – Entex; CenterPoint Energy - Louisiana; NSTAR – Boston Edison Company; Westar Energy, Inc.; United Water Pennsylvania; PPL Electric Utilities; PPL Gas Utilities; Wisconsin Power & Light Company; TransAlaska Pipeline; Avista Corporation; Northwest Natural Gas; Allegheny Energy Supply, Inc.; Public Service Company of North Carolina; South Jersey Gas Company; Duquesne Light Company; MidAmerican Energy Company; Laclede Gas; Duke Energy Company; E.ON U.S. Services Inc.; Elkton Gas Services; Anchorage Water and Wastewater Utility; Kansas City Power and Light; Duke Energy North Carolina; Duke Energy South Carolina; Monongahela Power Company; Potomac Edison Company; Duke Energy Ohio Gas; Duke Energy Kentucky; Duke Energy Indiana; Duke Energy Progress; Northern Indiana Public Service Company; Tennessee-American Water Company; Columbia Gas of Maryland; Maryland-American Water Company; Bonneville Power Administration; NSTAR Electric and Gas Company; EPCOR Distribution, Inc.; B. C. Gas Utility, Ltd; Entergy Arkansas; Entergy Texas; Entergy Mississippi; Entergy Louisiana; Entergy Gulf States Louisiana; the Borough of Hanover; Louisville Gas and Electric Company; Kentucky Utilities Company; Madison Gas and Electric; Central Maine Power; PEPCO; PacifiCorp; Minnesota Energy Resource Group; Jersey Central Power & Light Company; Cheyenne Light, Fuel and Power Company; United Water Arkansas; Central Vermont Public Service Corporation; Green Mountain Power; Portland General Electric Company; Atlantic City Electric; Nicor Gas Company; Black Hills Power; Black Hills Colorado Gas; Black Hills Kansas Gas; Black Hills Service Company; Black Hills Utility Holdings; Public Service Company of Oklahoma; City of

Dubois; Peoples Gas Light and Coke Company; North Shore Gas Company; Connecticut Light and Power; New York State Electric and Gas Corporation; Rochester Gas and Electric Corporation; Greater Missouri Operations; Tennessee Valley Authority; Omaha Public Power District; Indianapolis Power & Light Company; Vermont Gas Systems, Inc.; Metropolitan Edison; Pennsylvania Electric; West Penn Power; Pennsylvania Power; PHI Service Company - Delmarva Power and Light; Atmos Energy Corporation; Citizens Energy Group; PSE&G Company; Berkshire Gas Company; Alabama Gas Corporation; Mid-Atlantic Interstate Transmission, LLC; SUEZ Water; WEC Energy Group; Rocky Mountain Natural Gas, LLC; Illinois-American Water Company; Northern Illinois Gas Company; Public Service of New Hampshire and Newtown Artesian Water Company.

My additional duties include determining final life and salvage estimates, conducting field reviews, presenting recommended depreciation rates to management for its consideration and supporting such rates before regulatory bodies.

Q. Have you submitted testimony to any state utility commission on the subject of utility plant depreciation?

A. Yes. I have submitted testimony to the Pennsylvania Public Utility Commission; the Commonwealth of Kentucky Public Service Commission; the Public Utilities Commission of Ohio; the Nevada Public Utility Commission; the Public Utilities Board of New Jersey; the Missouri Public Service Commission; the Massachusetts Department of Telecommunications and Energy; the Alberta Energy & Utility Board; the Idaho Public Utility Commission; the Louisiana Public Service Commission; the State Corporation Commission of Kansas; the Oklahoma Corporate Commission; the Public Service Commission of South Carolina; Railroad Commission of Texas – Gas Services Division; the New York Public Service Commission; Illinois Commerce Commission; the Indiana

Utility Regulatory Commission; the California Public Utilities Commission; the Federal Energy Regulatory Commission ("FERC"); the Arkansas Public Service Commission; the Public Utility Commission of Texas; Maryland Public Service Commission; Washington Utilities and Transportation Commission; The Tennessee Regulatory Commission; the Regulatory Commission of Alaska; Minnesota Public Utility Commission; Utah Public Service Commission; District of Columbia Public Service Commission; the Mississippi Public Service Commission; Delaware Public Service Commission; Virginia State Corporation Commission; Colorado Public Utility Commission; Oregon Public Utility Commission; South Dakota Public Utilities Commission; Wisconsin Public Service Commission; Wyoming Public Service Commission; the Public Service Commission of West Virginia; Maine Public Utility Commission; Iowa Utility Board; Connecticut Public Utilities Regulatory Authority; New Mexico Public Regulation Commission; Commonwealth of Massachusetts Department of Public Utilities; Rhode Island Public Utilities Commission and the North Carolina Utilities Commission.

Q. Have you had any additional education relating to utility plant depreciation?

A. Yes. I have completed the following courses conducted by Depreciation Programs, Inc.: "Techniques of Life Analysis," "Techniques of Salvage and Depreciation Analysis," "Forecasting Life and Salvage," "Modeling and Life Analysis Using Simulation," and "Managing a Depreciation Study." I have also completed the "Introduction to Public Utility Accounting" program conducted by the American Gas Association.

Q. Does this conclude your qualification statement?

A. Yes.

LIST OF CASES IN WHICH JOHN J. SPANOS SUBMITTED TESTIMONY

	Year	Jurisdiction	Docket No.	Client Utility	Subject
01.	1998	PA PUC	R-00984375	City of Bethlehem – Bureau of Water	Original Cost and Depreciation
02.	1998	PA PUC	R-00984567	City of Lancaster	Original Cost and Depreciation
03.	1999	PA PUC	R-00994605	The York Water Company	Depreciation
04.	2000	D.T.&E.	DTE 00-105	Massachusetts-American Water Company	Depreciation
05.	2001	PA PUC	R-00016114	City of Lancaster	Original Cost and Depreciation
06.	2001	PA PUC	R-00017236	The York Water Company	Depreciation
07.	2001	PA PUC	R-00016339	Pennsylvania-American Water Company	Depreciation
08.	2001	OH PUC	01-1228-GA-AIR	Cinergy Corp – Cincinnati Gas & Elect Company	Depreciation
09.	2001	KY PSC	2001-092	Cinergy Corp – Union Light, Heat & Power Co.	Depreciation
10.	2002	PA PUC	R-00016750	Philadelphia Suburban Water Company	Depreciation
11.	2002	KY PSC	2002-00145	Columbia Gas of Kentucky	Depreciation
12.	2002	NJ BPU	GF02040245	NUI Corporation/Elizabethtown Gas Company	Depreciation
13.	2002	ID PUC	IPC-E-03-7	Idaho Power Company	Depreciation
14.	2003	PA PUC	R-0027975	The York Water Company	Depreciation
15.	2003	IN URC	R-0027975	Cinergy Corp – PSI Energy, Inc.	Depreciation
16.	2003	PA PUC	R-00038304	Pennsylvania-American Water Company	Depreciation
17.	2003	MO PSC	WR-2003-0500	Missouri-American Water Company	Depreciation
18.	2003	FERC	ER03-1274-000	NSTAR-Boston Edison Company	Depreciation
19.	2003	NJ BPU	BPU 03080683	South Jersey Gas Company	Depreciation
20.	2003	NV PUC	03-10001	Nevada Power Company	Depreciation
21.	2003	LA PSC	U-27676	CenterPoint Energy – Arkla	Depreciation
22.	2003	PA PUC	R-00038805	Pennsylvania Suburban Water Company	Depreciation
23.	2004	AB En/Util Bd	1306821	EPCOR Distribution, Inc.	Depreciation
24.	2004	PA PUC	R-00038168	National Fuel Gas Distribution Corp (PA)	Depreciation
25.	2004	PA PUC	R-00049255	PPL Electric Utilities	Depreciation
26.	2004	PA PUC	R-00049165	The York Water Company	Depreciation
27.	2004	OK Corp Cm	PUC 200400187	CenterPoint Energy – Arkla	Depreciation
28.	2004	OH PUC	04-680-El-AIR	Cinergy Corp. – Cincinnati Gas and Electric Company	Depreciation
29.	2004	RR Com of TX	GUD#	CenterPoint Energy – Entex Gas Services Div.	Depreciation
30.	2004	NY PUC	04-G-1047	National Fuel Gas Distribution Gas (NY)	Depreciation
31.	2004	AR PSC	04-121-U	CenterPoint Energy – Arkla	Depreciation
32.	2005	IL CC	05-ICC-06	North Shore Gas Company	Depreciation
33.	2005	IL CC	05-ICC-06	Peoples Gas Light and Coke Company	Depreciation
34.	2005	KY PSC	2005-00042	Union Light Heat & Power	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
35.	2005	IL CC	05-0308	MidAmerican Energy Company	Depreciation
36.	2005	MO PSC	GF-2005	Laclede Gas Company	Depreciation
37.	2005	KS CC	05-WSEE-981-RTS	Westar Energy	Depreciation
38.	2005	RR Com of TX	GUD #	CenterPoint Energy – Entex Gas Services Div.	Depreciation
39.	2005	US District Court	Cause No. 1:99-CV-1693-LJM/VSS	Cinergy Corporation	Accounting
40.	2005	OK CC	PUD 200500151	Oklahoma Gas and Electric Company	Depreciation
41.	2005	MA Dept Tele-com & Ergy	DTE 05-85	NSTAR	Depreciation
42.	2005	NY PUC	05-E-934/05-G-0935	Central Hudson Gas & Electric Company	Depreciation
43.	2005	AK Reg Com	U-04-102	Chugach Electric Association	Depreciation
44.	2005	CA PUC	A05-12-002	Pacific Gas & Electric	Depreciation
45.	2006	PA PUC	R-00051030	Aqua Pennsylvania, Inc.	Depreciation
46.	2006	PA PUC	R-00051178	T.W. Phillips Gas and Oil Company	Depreciation
47.	2006	NC Util Cm.	G-5, Sub522	Pub. Service Company of North Carolina	Depreciation
48.	2006	PA PUC	R-00051167	City of Lancaster	Depreciation
49.	2006	PA PUC	R00061346	Duquesne Light Company	Depreciation
50.	2006	PA PUC	R-00061322	The York Water Company	Depreciation
51.	2006	PA PUC	R-00051298	PPL GAS Utilities	Depreciation
52.	2006	PUC of TX	32093	CenterPoint Energy – Houston Electric	Depreciation
53.	2006	KY PSC	2006-00172	Duke Energy Kentucky	Depreciation
54.	2006	SC PSC		SCANA	Accounting
55.	2006	AK Reg Com	U-06-6	Municipal Light and Power	Depreciation
56.	2006	DE PSC	06-284	Delmarva Power and Light	Depreciation
57.	2006	IN URC	IURC43081	Indiana American Water Company	Depreciation
58.	2006	AK Reg Com	U-06-134	Chugach Electric Association	Depreciation
59.	2006	MO PSC	WR-2007-0216	Missouri American Water Company	Depreciation
60.	2006	FERC	IS05-82-002, et al	TransAlaska Pipeline	Depreciation
61.	2006	PA PUC	R-00061493	National Fuel Gas Distribution Corp. (PA)	Depreciation
62.	2007	NC Util Com.	E-7 SUB 828	Duke Energy Carolinas, LLC	Depreciation
63.	2007	OH PSC	08-709-EL-AIR	Duke Energy Ohio Gas	Depreciation
64.	2007	PA PUC	R-00072155	PPL Electric Utilities Corporation	Depreciation
65.	2007	KY PSC	2007-00143	Kentucky American Water Company	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
66.	2007	PA PUC	R-00072229	Pennsylvania American Water Company	Depreciation
67.	2007	KY PSC	2007-0008	NiSource – Columbia Gas of Kentucky	Depreciation
68.	2007	NY PSC	07-G-0141	National Fuel Gas Distribution Corp (NY)	Depreciation
69.	2008	AK PSC	U-08-004	Anchorage Water & Wastewater Utility	Depreciation
70.	2008	TN Reg Auth	08-00039	Tennessee-American Water Company	Depreciation
71.	2008	DE PSC	08-96	Artesian Water Company	Depreciation
72.	2008	PA PUC	R-2008-2023067	The York Water Company	Depreciation
73.	2008	KS CC	08-WSEE1-RTS	Westar Energy	Depreciation
74.	2008	IN URC	43526	Northern Indiana Public Service Company	Depreciation
75.	2008	IN URC	43501	Duke Energy Indiana	Depreciation
76.	2008	MD PSC	9159	NiSource – Columbia Gas of Maryland	Depreciation
77.	2008	KY PSC	2008-000251	Kentucky Utilities	Depreciation
78.	2008	KY PSC	2008-000252	Louisville Gas & Electric	Depreciation
79.	2008	PA PUC	2008-20322689	Pennsylvania American Water Co. - Wastewater	Depreciation
80.	2008	NY PSC	08-E887/08-00888	Central Hudson	Depreciation
81.	2008	WV TC	VE-080416/VG-8080417	Avista Corporation	Depreciation
82.	2008	IL CC	ICC-09-166	Peoples Gas, Light and Coke Company	Depreciation
83.	2009	IL CC	ICC-09-167	North Shore Gas Company	Depreciation
84.	2009	DC PSC	1076	Potomac Electric Power Company	Depreciation
85.	2009	KY PSC	2009-00141	NiSource – Columbia Gas of Kentucky	Depreciation
86.	2009	FERC	ER08-1056-002	Entergy Services	Depreciation
87.	2009	PA PUC	R-2009-2097323	Pennsylvania American Water Company	Depreciation
88.	2009	NC Util Cm	E-7, Sub 090	Duke Energy Carolinas, LLC	Depreciation
89.	2009	KY PSC	2009-00202	Duke Energy Kentucky	Depreciation
90.	2009	VA St. CC	PUE-2009-00059	Aqua Virginia, Inc.	Depreciation
91.	2009	PA PUC	2009-2132019	Aqua Pennsylvania, Inc.	Depreciation
92.	2009	MS PSC	Docket No. 2011-UA-183	Entergy Mississippi	Depreciation
93.	2009	AK PSC	09-08-U	Entergy Arkansas	Depreciation
94.	2009	TX PUC	37744	Entergy Texas	Depreciation
95.	2009	TX PUC	37690	El Paso Electric Company	Depreciation
96.	2009	PA PUC	R-2009-2106908	The Borough of Hanover	Depreciation
97.	2009	KS CC	10-KCPE-415-RTS	Kansas City Power & Light	Depreciation
98.	2009	PA PUC	R-2009-	United Water Pennsylvania	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
99.	2009	OH PUC		Aqua Ohio Water Company	Depreciation
100.	2009	WI PSC	3270-DU-103	Madison Gas & Electric Company	Depreciation
101.	2009	MO PSC	WR-2010	Missouri American Water Company	Depreciation
102.	2009	AK Reg Cm	U-09-097	Chugach Electric Association	Depreciation
103.	2010	IN URC	43969	Northern Indiana Public Service Company	Depreciation
104.	2010	WI PSC	6690-DU-104	Wisconsin Public Service Corp.	Depreciation
105.	2010	PA PUC	R-2010-2161694	PPL Electric Utilities Corp.	Depreciation
106.	2010	KY PSC	2010-00036	Kentucky American Water Company	Depreciation
107.	2010	PA PUC	R-2009-2149262	Columbia Gas of Pennsylvania	Depreciation
108.	2010	MO PSC	GR-2010-0171	Laclede Gas Company	Depreciation
109.	2010	SC PSC	2009-489-E	South Carolina Electric & Gas Company	Depreciation
110.	2010	NJ BD OF PU	ER09080664	Atlantic City Electric	Depreciation
111.	2010	VA St. CC	PUE-2010-00001	Virginia American Water Company	Depreciation
112.	2010	PA PUC	R-2010-2157140	The York Water Company	Depreciation
113.	2010	MO PSC	ER-2010-0356	Greater Missouri Operations Company	Depreciation
114.	2010	MO PSC	ER-2010-0355	Kansas City Power and Light	Depreciation
115.	2010	PA PUC	R-2010-2167797	T.W. Phillips Gas and Oil Company	Depreciation
116.	2010	PSC SC	2009-489-E	SCANA – Electric	Depreciation
117.	2010	PA PUC	R-2010-22010702	Peoples Natural Gas, LLC	Depreciation
118.	2010	AK PSC	10-067-U	Oklahoma Gas and Electric Company	Depreciation
119.	2010	IN URC	Cause No. 43894	Northern Indiana Public Serv. Company - NIFL	Depreciation
120.	2010	IN URC	Cause No. 43894	Northern Indiana Public Serv. Co. - Kokomo	Depreciation
121.	2010	PA PUC	R-2010-2166212	Pennsylvania American Water Co. - WW	Depreciation
122.	2010	NC Util Cn.	W-218,SUB310	Aqua North Carolina, Inc.	Depreciation
123.	2011	OH PUC	11-4161-WS-AIR	Ohio American Water Company	Depreciation
124.	2011	MS PSC	EC-123-0082-00	Entergy Mississippi	Depreciation
125.	2011	CO PUC	11AL-387E	Black Hills Colorado	Depreciation
126.	2011	PA PUC	R-2010-2215623	Columbia Gas of Pennsylvania	Depreciation
127.	2011	PA PUC	R-2010-2179103	City of Lancaster – Bureau of Water	Depreciation
128.	2011	IN URC	43114 IGCC 4S	Duke Energy Indiana	Depreciation
129.	2011	FERC	IS11-146-000	Enbridge Pipelines (Southern Lights)	Depreciation
130.	2011	IL CC	11-0217	MidAmerican Energy Corporation	Depreciation
131.	2011	OK CC	201100087	Oklahoma Gas & Electric Company	Depreciation
132.	2011	PA PUC	2011-2232243	Pennsylvania American Water Company	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
133.	2011	FERC	RP11-___-000	Carolina Gas Transmission	Depreciation
134.	2012	WA UTC	UE-120436/UG-120437	Avista Corporation	Depreciation
135.	2012	AK Reg Cm	U-12-009	Chugach Electric Association	Depreciation
136.	2012	MA PUC	DPU 12-25	Columbia Gas of Massachusetts	Depreciation
137.	2012	TX PUC	40094	El Paso Electric Company	Depreciation
138.	2012	ID PUC	IPC-E-12	Idaho Power Company	Depreciation
139.	2012	PA PUC	R-2012-2290597	PPL Electric Utilities	Depreciation
140.	2012	PA PUC	R-2012-2311725	Borough of Hanover – Bureau of Water	Depreciation
141.	2012	KY PSC	2012-00222	Louisville Gas and Electric Company	Depreciation
142.	2012	KY PSC	2012-00221	Kentucky Utilities Company	Depreciation
143.	2012	PA PUC	R-2012-2285985	Peoples Natural Gas Company	Depreciation
144.	2012	DC PSC	Case 1087	Potomac Electric Power Company	Depreciation
145.	2012	OH PSC	12-1682-EL-AIR	Duke Energy Ohio (Electric)	Depreciation
146.	2012	OH PSC	12-1685-GA-AIR	Duke Energy Ohio (Gas)	Depreciation
147.	2012	PA PUC	R-2012-2310366	City of Lancaster – Sewer Fund	Depreciation
148.	2012	PA PUC	R-2012-2321748	Columbia Gas of Pennsylvania	Depreciation
149.	2012	FERC	ER-12-2681-000	ITC Holdings	Depreciation
150.	2012	MO PSC	ER-2012-0174	Kansas City Power and Light	Depreciation
151.	2012	MO PSC	ER-2012-0175	KCPL Greater Missouri Operations Company	Depreciation
152.	2012	MO PSC	GO-2012-0363	Laclede Gas Company	Depreciation
153.	2012	MN PUC	G007,001/D-12-533	Integrys – MN Energy Resource Group	Depreciation
154.	2012	TX PUC	SOAH 582-14-1051/ TECQ 2013-2007-UCR	Aqua Texas	Depreciation
155.	2012	PA PUC	2012-2336379	York Water Company	Depreciation
156.	2013	NJ BPU	ER12121071	PHI Service Company– Atlantic City Electric	Depreciation
157.	2013	KY PSC	2013-00167	Columbia Gas of Kentucky	Depreciation
158.	2013	VA St CC	2013-00020	Virginia Electric and Power Company	Depreciation
159.	2013	IA Util Bd	2013-0004	MidAmerican Energy Corporation	Depreciation
160.	2013	PA PUC	2013-2355276	Pennsylvania American Water Company	Depreciation
161.	2013	NY PSC	13-E-0030, 13-G-0031, 13-S-0032	Consolidated Edison of New York	Depreciation
162.	2013	PA PUC	2013-2355886	Peoples TWP LLC	Depreciation
163.	2013	TN Reg Auth	12-0504	Tennessee American Water	Depreciation
164.	2013	ME PUC	2013-168	Central Maine Power Company	Depreciation
165.	2013	DC PSC	Case 1103	PHI Service Company – PEPCO	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
166.	2013	WY PSC	2003-ER-13	Cheyenne Light, Fuel and Power Company	Depreciation
167.	2013	FERC	ER13-2428-0000	Kentucky Utilities	Depreciation
168.	2013	FERC	ER13- -0000	MidAmerican Energy Company	Depreciation
169.	2013	FERC	ER13-2410-0000	PPL Utilities	Depreciation
170.	2013	PA PUC	R-2013-2372129	Duquesne Light Company	Depreciation
171.	2013	NJ BPU	ER12111052	Jersey Central Power and Light Company	Depreciation
172.	2013	PA PUC	R-2013-2390244	Bethlehem, City of – Bureau of Water	Depreciation
173.	2013	OK CC	UM 1679	Oklahoma, Public Service Company of	Depreciation
174.	2013	IL CC	13-0500	Nicor Gas Company	Depreciation
175.	2013	WY PSC	20000-427-EA-13	PacifiCorp	Depreciation
176.	2013	UT PSC	13-035-02	PacifiCorp	Depreciation
177.	2013	OR PUC	UM 1647	PacifiCorp	Depreciation
178.	2013	PA PUC	2013-2350509	Dubois, City of	Depreciation
179.	2014	IL CC	14-0224	North Shore Gas Company	Depreciation
180.	2014	FERC	ER14- -0000	Duquesne Light Company	Depreciation
181.	2014	SD PUC	EL14-026	Black Hills Power Company	Depreciation
182.	2014	WY PSC	20002-91-ER-14	Black Hills Power Company	Depreciation
183.	2014	PA PUC	2014-2428304	Borough of Hanover – Municipal Water Works	Depreciation
184.	2014	PA PUC	2014-2406274	Columbia Gas of Pennsylvania	Depreciation
185.	2014	IL CC	14-0225	Peoples Gas Light and Coke Company	Depreciation
186.	2014	MO PSC	ER-2014-0258	Ameren Missouri	Depreciation
187.	2014	KS CC	14-BHCG-502-RTS	Black Hills Service Company	Depreciation
188.	2014	KS CC	14-BHCG-502-RTS	Black Hills Utility Holdings	Depreciation
189.	2014	KS CC	14-BHCG-502-RTS	Black Hills Kansas Gas	Depreciation
190.	2014	PA PUC	2014-2418872	Lancaster, City of – Bureau of Water	Depreciation
191.	2014	WV PSC	14-0701-E-D	First Energy – MonPower/PotomacEdison	Depreciation
192	2014	VA St CC	PUC-2014-00045	Aqua Virginia	Depreciation
193.	2014	VA St CC	PUE-2013	Virginia American Water Company	Depreciation
194.	2014	OK CC	PUD201400229	Oklahoma Gas and Electric Company	Depreciation
195.	2014	OR PUC	UM1679	Portland General Electric	Depreciation
196.	2014	IN URC	Cause No. 44576	Indianapolis Power & Light	Depreciation
197.	2014	MA DPU	DPU. 14-150	NSTAR Gas	Depreciation
198.	2014	CT PURA	14-05-06	Connecticut Light and Power	Depreciation
199.	2014	MO PSC	ER-2014-0370	Kansas City Power & Light	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
200.	2014	KY PSC	2014-00371	Kentucky Utilities Company	Depreciation
201.	2014	KY PSC	2014-00372	Louisville Gas and Electric Company	Depreciation
202.	2015	PA PUC	R-2015-2462723	United Water Pennsylvania Inc.	Depreciation
203.	2015	PA PUC	R-2015-2468056	NiSource - Columbia Gas of Pennsylvania	Depreciation
204.	2015	NY PSC	15-E-0283/15-G-0284	New York State Electric and Gas Corporation	Depreciation
205.	2015	NY PSC	15-E-0285/15-G-0286	Rochester Gas and Electric Corporation	Depreciation
206.	2015	MO PSC	WR-2015-0301/SR-2015-0302	Missouri American Water Company	Depreciation
207.	2015	OK CC	PUD 201500208	Oklahoma, Public Service Company of	Depreciation
208.	2015	WV PSC	15-0676-W-42T	West Virginia American Water Company	Depreciation
209.	2015	PA PUC	2015-2469275	PPL Electric Utilities	Depreciation
210.	2015	IN URC	Cause No. 44688	Northern Indiana Public Service Company	Depreciation
211.	2015	OH PSC	14-1929-EL-RDR	First Energy-Ohio Edison/Cleveland Electric/ Toledo Edison	Depreciation
212.	2015	NM PRC	15-00127-UT	El Paso Electric	Depreciation
213.	2015	TX PUC	PUC-44941; SOAH 473-15-5257	El Paso Electric	Depreciation
214.	2015	WI PSC	3270-DU-104	Madison Gas and Electric Company	Depreciation
215.	2015	OK CC	PUD 201500273	Oklahoma Gas and Electric	Depreciation
216.	2015	KY PSC	Doc. No. 2015-00418	Kentucky American Water Company	Depreciation
217.	2015	NC UC	Doc. No. G-5, Sub 565	Public Service Company of North Carolina	Depreciation
218.	2016	WA UTC	Docket UE-17	Puget Sound Energy	Depreciation
219.	2016	NY PSC	Case No. 16-W-0130	SUEZ Water New York, Inc.	Depreciation
220.	2016	MO PSC	ER-2016-0156	KCPL – Greater Missouri	Depreciation
221.	2016	WI PSC		Wisconsin Public Service Corporation	Depreciation
222.	2016	KY PSC	Case No. 2016-00026	Kentucky Utilities Company	Depreciation
223.	2016	KY PSC	Case No. 2016-00027	Louisville Gas and Electric Company	Depreciation
224.	2016	OH PUC	Case No. 16-0907-WW-AIR	Aqua Ohio	Depreciation
225.	2016	MD PSC	Case 9417	NiSource - Columbia Gas of Maryland	Depreciation
226.	2016	KY PSC	2016-00162	Columbia Gas of Kentucky	Depreciation
227.	2016	DE PSC	16-0649	Delmarva Power and Light Company – Electric	Depreciation
228.	2016	DE PSC	16-0650	Delmarva Power and Light Company – Gas	Depreciation
229.	2016	NY PSC	Case 16-G-0257	National Fuel Gas Distribution Corp – NY Div	Depreciation
230.	2016	PA PUC	R-2016-2537349	Metropolitan Edison Company	Depreciation
231.	2016	PA PUC	R-2016-2537352	Pennsylvania Electric Company	Depreciation
232.	2016	PA PUC	R-2016-2537355	Pennsylvania Power Company	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
233.	2016	PA PUC	R-2016-2537359	West Penn Power Company	Depreciation
234.	2016	PA PUC	R-2016-2529660	NiSource - Columbia Gas of PA	Depreciation
235.	2016	KY PSC	Case No. 2016-00063	Kentucky Utilities / Louisville Gas & Electric Co	Depreciation
236.	2016	MO PSC	ER-2016-0285	KCPL Missouri	Depreciation
237.	2016	AR PSC	16-052-U	Oklahoma Gas & Electric Co	Depreciation
238.	2016	PSCW	6680-DU-104	Wisconsin Power and Light	Depreciation
239.	2016	ID PUC	IPC-E-16-23	Idaho Power Company	Depreciation
240.	2016	OR PUC	UM1801	Idaho Power Company	Depreciation
241.	2016	ILL CC	16-	MidAmerican Energy Company	Depreciation
242.	2016	KY PSC	Case No. 2016-00370	Kentucky Utilities Company	Depreciation
243.	2016	KY PSC	Case No. 2016-00371	Louisville Gas and Electric Company	Depreciation
244.	2016	IN URC	Cause No. 45029	Indianapolis Power & Light	Depreciation
245.	2016	AL RC	U-16-081	Chugach Electric Association	Depreciation
246.	2017	MA DPU	D.P.U. 17-05	NSTAR Electric Company and Western Massachusetts Electric Company	Depreciation
247.	2017	TX PUC	PUC-26831, SOAH 973-17-2686	El Paso Electric Company	Depreciation
248.	2017	WA UTC	UE-17033 and UG-170034	Puget Sound Energy	Depreciation
249.	2017	OH PUC	Case No. 17-0032-EL-AIR	Duke Energy Ohio	Depreciation
250.	2017	VA SCC	Case No. PUE-2016-00413	Virginia Natural Gas, Inc.	Depreciation
251.	2017	OK CC	Case No. PUD201700151	Public Service Company of Oklahoma	Depreciation
252.	2017	MD PSC	Case No. 9447	Columbia Gas of Maryland	Depreciation
253.	2017	NC UC	Docket No. E-2, Sub 1142	Duke Energy Progress	Depreciation
254.	2017	VA SCC	Case No. PUR-2017-00090	Dominion Virginia Electric and Power Company	Depreciation
255.	2017	FERC	ER17-1162	MidAmerican Energy Company	Depreciation
256.	2017	PA PUC	R-2017-2595853	Pennsylvania American Water Company	Depreciation
257.	2017	OR PUC	UM1809	Portland General Electric	Depreciation
258.	2017	FERC	ER17-217-000	Jersey Central Power & Light	Depreciation
259.	2017	FERC	ER17-211-000	Mid-Atlantic Interstate Transmission, LLC	Depreciation
260.	2017	MN PUC	Docket No. G007/D-17-442	Minnesota Energy Resources Corporation	Depreciation
261.	2017	IL CC	Docket No. 17-0124	Northern Illinois Gas Company	Depreciation
262.	2017	OR PUC	UM1808	Northwest Natural Gas Company	Depreciation
263.	2017	NY PSC	Case No. 17-W-0528	SUEZ Water Owego-Nichols	Depreciation
264.	2017	MO PSC	GR-2017-0215	Laclede Gas Company	Depreciation
265.	2017	MO PSC	GR-2017-0216	Missouri Gas Energy	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
266.	2017	ILL CC	Docket No. 17-0337	Illinois-American Water Company	Depreciation
267.	2017	FERC	Docket No. ER18-22-000	PPL Electric Utilities Corporation	Depreciation
268.	2017	IN URC	Cause No. 44988	Northern Indiana Public Service Company	Depreciation
269.	2017	NJ BPU	BPU Docket No. WR17090985	New Jersey American Water Company, Inc.	Depreciation
270.	2017	RI PUC	Docket No. 4800	SUEZ Water Rhode Island	Depreciation
271.	2017	OK CC	Cause No. PUD 201700496	Oklahoma Gas and Electric Company	Depreciation
272.	2017	NJ BPU	ER18010029 & GR18010030	Public Service Electric and Gas Company	Depreciation
273.	2017	NC Util Com.	Docket No. E-7, SUB 1146	Duke Energy Carolinas, LLC	Depreciation
274.	2017	KY PSC	Case No. 2017-00321	Duke Energy Kentucky, Inc.	Depreciation
275.	2017	MA DPU	D.P.U. 18-40	Berkshire Gas Company	Depreciation
276.	2018	IN IURC	Cause No. 44992	Indiana-American Water Company, Inc.	Depreciation
277.	2018	IN IURC	Cause No. 45029	Indianapolis Power and Light	Depreciation
278.	2018	NC Util Com.	Docket No. W-218, Sub 497	Aqua North Carolina, Inc.	Depreciation
279.	2018	PA PUC	Docket No. R-2018-2647577	NiSource - Columbia Gas of Pennsylvania, Inc.	Depreciation
280.	2018	OR PUC	Docket UM 1933	Avista Corporation	Depreciation
281.	2018	WA UTC	Docket No. UE-108167	Avista Corporation	Depreciation
282.	2018	ID PUC	AVU-E-18-03, AVU-G-18-02	Avista Corporation	Depreciation
283.	2018	IN URC	Cause No. 45039	Citizens Energy Group	Depreciation
284.	2018	FERC	Docket No. ER18-	Duke Energy Progress	Depreciation
285.	2018	PA PUC	Docket No. R-2018-3000124	Duquesne Light Company	Depreciation
286.	2018	MD PSC	Case No. 948	NiSource - Columbia Gas of Maryland	Depreciation
287.	2018	MA DPU	D.P.U. 18-45	NiSource - Columbia Gas of Massachusetts	Depreciation
288.	2018	OH PUC	Case No. 18-0299-GA-ALT	Vectren Energy Delivery of Ohio	Depreciation
289.	2018	PA PUC	Docket No. R-2018-3000834	SUEZ Water Pennsylvania Inc.	Depreciation
290.	2018	MD PSC	Case No. 9847	Maryland-American Water Company	Depreciation
291.	2018	PA PUC	Docket No. R-2018-3000019	The York Water Company	Depreciation
292.	2018	FERC	ER-18-2231-000	Duke Energy Carolinas, LLC	Depreciation
293.	2018	KY PSC	Case No. 2018-00261	Duke Energy Kentucky, Inc.	Depreciation
294.	2018	NJ BPU	BPU Docket No. WR18050593	SUEZ Water New Jersey	Depreciation
295.	2018	WA UTC	Docket No. UE-180778	PacifiCorp	Depreciation
296.	2018	UT PSC	Docket No. 18-035-36	PacifiCorp	Depreciation
297.	2018	OR PUC	Docket No. UM-1968	PacifiCorp	Depreciation
298.	2018	ID PUC	Case No. PAC-E-18-08	PacifiCorp	Depreciation
299.	2018	WY PSC	20000-539-EA-18	PacifiCorp	Depreciation
300.	2018	PA PUC	Docket No. R-2018-3003068	Aqua Pennsylvania, Inc.	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
301.	2018	IL CC	Docket No. 18-1467	Aqua Illinois, Inc.	Depreciation
302.	2018	KY PSC	Case No. 2018-00294	Louisville Gas & Electric Company	Depreciation
303.	2018	KY PSC	Case No. 2018-00295	Kentucky Utilities Company	Depreciation
304.	2018	IN URC	Cause No. 45159	Northern Indiana Public Service Company	Depreciation
305.	2018	VA SCC	Case No. PUR-2019-00175	Virginia American Water Company	Depreciation
306.	2019	PA PUC	Docket No. R-2018-3006818	Peoples Natural Gas Company, LLC	Depreciation
307.	2019	OK CC	Cause No. PUD201800140	Oklahoma Gas and Electric Company	Depreciation
308.	2019	MD PSC	Case No. 9490	FirstEnergy – Potomac Edison	Depreciation
309.	2019	SC PSC	Docket No. 2018-318-E	Duke Energy Progress	Depreciation
310.	2019	SC PSC	Docket No. 2018-319-E	Duke Energy Carolinas	Depreciation
311.	2019	DE PSC	DE 19-057	Public Service of New Hampshire	Depreciation
312.	2019	NY PSC	Case No. 19-W-0168 & 19-W-0269	SUEZ Water New York	Depreciation
313.	2019	PA PUC	Docket No. R-2019-3006904	Newtown Artesian Water Company	Depreciation
314.	2019	MO PSC	ER-2019-0335	Ameren Missouri	Depreciation
315.	2019	MO PSC	EC-2019-0200	KCP&L Greater Missouri Operations Company	Depreciation
316.	2019	MN DOC	G011/D-19-377	Minnesota Energy Resource Corp.	Depreciation
317.	2019	NY PSC	Case 19-E-0378 & 19-G-0379	New York State Electric and Gas Corporation	Depreciation
318.	2019	NY PSC	Case 19-E-0380 & 19-G-0381	Rochester Gas and Electric Corporation	Depreciation
319.	2019	WA UTC	Docket UE-190529 / UG-190530	Puget Sound Energy	Depreciation
320.	2019	PA PUC	Docket No. R-2019-3010955	City of Lancaster	Depreciation
321.	2019	IURC	Cause No. 45253	Duke Energy Indiana	Depreciation
322.	2019	KY PSC	Case No. 2019-00271	Duke Energy Kentucky, Inc.	Depreciation
323.	2019	OH PUC	Case No. 18-1720-GA-AIR	Northeast Ohio Natural Gas Corp	Depreciation
324.	2019	NC Util. Com.	Docket No. E-2, Sub 1219	Duke Energy Carolinas	Depreciation
325.	2019	FERC	Docket No. ER20-277-000	Jersey Central Power & Light Company	Depreciation
326.	2019	MA DPU	D.P.U. 19-120	NSTAR Gas Company	Depreciation
327.	2019	SC PSC	Docket No. 2019-290-WS	Blue Granite Water Company	Depreciation
328.	2019	NC Util. Com.	Docket No. E-2, Sub 1219	Duke Energy Progress	Depreciation
329.	2019	MD PSC	Case No. 9609	NiSource Columbia Gas of Maryland, Inc.	Depreciation
330.	2020	NJ BPU	Docket No. ER20020146	Jersey Central Power & Light Company	Depreciation
331.	2020	PA PUC	Docket No. R-2020-3018835	NiSource - Columbia Gas of Pennsylvania, Inc.	Depreciation
332.	2020	PA PUC	Docket No. R-2020-3019369	Pennsylvania-American Water Company	Depreciation
333.	2020	PA PUC	Docket No. R-2020-3019371	Pennsylvania-American Water Company	Depreciation
334.	2020	MO PSC	GO-2018-0309, GO-2018-0310	Spire Missouri, Inc.	Depreciation
335.	2020	NM PRC	Case No. 20-00104-UT	El Paso Electric Company	Depreciation
336.	2020	MD PSC	Case No. 9644	Columbia Gas of Maryland, Inc.	Depreciation
337.	2020	MO PSC	GO-2018-0309, GO-2018-0310	Spire Missouri, Inc.	Depreciation
338.	2020	VA St CC	Case No. PUR-2020-00095	Virginia Natural Gas Company	Depreciation

	Year	Jurisdiction	Docket No.	Client Utility	Subject
339.	2020	SC PSC	Docket No. 2020-125-E	Dominion Energy South Carolina, Inc.	Depreciation
340.	2020	WV PSC	Case No. 20-0745-G-D	Hope Gas, Inc. d/b/a Dominion Energy West Virginia	Depreciation
341.	2020	VA St CC	Case No. PUR-2020-00106	Aqua Virginia, Inc.	Depreciation
342.	2020	PA PUC	Docket No. R-2020-3020256	City of Bethlehem – Bureau of Water	Depreciation
343.	2020	NE PSC	Docket No. NG-109	Black Hills Nebraska	Depreciation
344.	2020	NY PSC	Case No. 20-E-0428 & 20-G-0429	Central Hudson Gas & Electric Corporation	Depreciation
345.	2020	FERC	ER20-598	Duke Energy Indiana	Depreciation
346.	2020	FERC	ER20-855	Northern Indiana Public Service Company	Depreciation
347.	2020	OR PSC	UE 374	Pacificorp	Depreciation
348.	2020	MD PSC	Case No. 9490 Phase II	Potomac Edison – Maryland	Depreciation
349.	2020	IN URC	Case No. 45447	Southern Indiana Gas and Electric Company	Depreciation
350.	2020	IN URC	IURC Cause No. 45468	Indiana Gas Company, Inc. d/b/a Vectren Energy	Depreciation
351.	2020	KY PSC	Case No. 2020-00349	Kentucky Utilities Company	Depreciation
352.	2020	KY PSC	Case No. 2020-00350	Louisville Gas and Electric Company	Depreciation
353.	2020	FERC	Docket No. ER21- 000	South FirstEnergy Operating Companies	Depreciation
354.	2020	OH PUC	Case Nos 20-1651-EL-AIR, 20-1652-EL-AAM & 20-1653-EL-ATA	Dayton Power and Light Company	Depreciation
355.	2020	OR PSC	UE 388	Northwest Natural Gas Company	Depreciation
356.	2021	KY PSC	Case No. 2021-00103	East Kentucky Power Cooperative	Depreciation
357.	2021	MPUC	Docket No. 2021-00024	Bangor Natural Gas	Depreciation
358.	2021	PA PUC	Docket No. R-2021-3024296	Columbia Gas of Pennsylvania, Inc.	Depreciation
359.	2021	NC Util. Com.	Doc. No. G-5, Sub 632	Public Service of North Carolina	Depreciation
360.	2021	MO PSC	ER-2021-0240	Ameren Missouri	Depreciation

2020 DEPRECIATION STUDY

CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO GAS PLANT AS OF SEPTEMBER 30, 2020

Prepared by:

Excellence Delivered ***As Promised***

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
d/b/a BLACK HILLS ENERGY
Lawrence, Kansas

2020 DEPRECIATION STUDY

CALCULATED ANNUAL DEPRECIATION
ACCRUALS RELATED TO GAS PLANT
AS OF SEPTEMBER 30, 2020

GANNETT FLEMING VALUATION AND RATE CONSULTANTS, LLC
Camp Hill, Pennsylvania

Gannett Fleming

Excellence Delivered ***As Promised***

April 12, 2021

Black Hills/Kansas Gas Utility Company, LLC
d/b/a Black Hills Energy
PO Box 1400
Rapid City, SD 57709

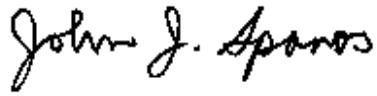
Attention Tom Stevens
Director, Regulatory

Ladies and Gentlemen:

Pursuant to your request, we have conducted a depreciation study related to the gas plant in service of Black Hills/Kansas Gas Utility Company, LLC d/b/a Black Hills Energy as of September 30, 2020. The attached report presents a description of the methods used in the estimation of depreciation, the summary of annual depreciation accrual rates, the statistical support for the life and net salvage estimates and the detailed tabulations of annual depreciation.

Respectfully submitted,

GANNETT FLEMING VALUATION
AND RATE CONSULTANTS, LLC.



JOHN J. SPANOS
President

JJS:mle

067760.000

Gannett Fleming Valuation and Rate Consultants, LLC
207 Senate Avenue • Camp Hill, PA 17011-2316
t: 717.763.7211 • f: 717.763.4590

www.gfvrc.com

TABLE OF CONTENTS

TABLE OF CONTENTS, cont.

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
d/b/a BLACK HILLS ENERGY

DEPRECIATION STUDY

EXECUTIVE SUMMARY

Pursuant to Black Hills/Kansas Gas Utility Company, LLC's ("BHKG" or "Company") request, Gannett Fleming Valuation and Rate Consultants, LLC ("Gannett Fleming") conducted a depreciation study related to the gas plant of BHKG as of September 30, 2020. The purpose of this study was to determine the annual depreciation accrual rates and amounts for book and ratemaking purposes.

The depreciation rates are based on the straight line method using the average service life ("ASL") procedure and were applied on a remaining life basis. The calculations were based on attained ages and estimated average service life and forecasted net salvage characteristics for each depreciable group of assets.

BHKG's accounting policy has not changed since depreciation rates were most recently established. However, there have been changes to the plant in service due to system improvements and new types of assets which established new service life and net salvage parameters. The changes in the life and salvage estimates which results in new depreciation rates as compared to what currently are utilized by the company.

Gannett Fleming recommends the calculated annual depreciation accrual rates set forth herein apply specifically to gas plant in service as of September 30, 2020 as summarized by Table 1 of the study. Supporting analysis and calculations are provided within the study.

The study results set forth an annual depreciation expense of $8.6 million when applied to depreciable plant balances as of September 30, 2020. The results are summarized at the functional level as follows:

SUMMARY OF ORIGINAL COST, ACCRUAL RATES AND AMOUNTS

FUNCTION	ORIGINAL COST	PROPOSED RATE	ANNUAL ACCRUAL
INTANGIBLE PLANT	$ 3,140,828.04	3.58	$ 112,367
PRODUCTION PLANT	18,718.78	2.76	516
TRANSMISSION PLANT	44,058,800.77	1.60	706,192
DISTRIBUTION PLANT	255,836,375.36	2.56	6,540,374
GENERAL PLANT	23,485,369.84	5.29	1,242,055
UNRECOVERED RESERVE FOR AMORTIZATION	-		(5,105)
TOTAL	**$326,540,092.79**	**2.63**	**$8,596,399**

PART I. INTRODUCTION

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
d/b/a BLACK HILLS ENERGY

DEPRECIATION STUDY

PART I. INTRODUCTION

SCOPE

This report sets forth the results of the depreciation study for Black Hills/Kansas Gas Utility Company, LLC d/b/a Black Hills Energy ("Company"), to determine the annual depreciation accrual rates and amounts for book purposes applicable to the original cost of the gas plant in service as of September 30, 2020. The rates and amounts are based on the straight line remaining life method of depreciation. This report also describes the concepts, methods and judgments which underlie the recommended annual depreciation accrual rates related to gas plant in service as of September 30, 2020.

The service life and net salvage estimates resulting from the study were based on informed judgment which incorporated analyses of historical plant retirement data as recorded through September 2020, a review of Company practice and outlook as they relate to plant operation and retirement, and consideration of current practice in the gas industry, including knowledge of service lives and net salvage estimates used for other gas companies.

PLAN OF REPORT

Part I, Introduction, contains statements with respect to the plan of the report, and the basis of the study. Part II, Estimation of Survivor Curves, presents descriptions of the considerations and methods used in the service life study. Part III, Service Life Considerations, presents the results of the average service life analysis. Part IV, Net Salvage Considerations, presents the results of the net salvage study. Part V, Calculation of Annual and Accrued Depreciation, describes the procedures used in the calculation of

group depreciation. Part VI, Results of Study, presents summaries by depreciable group of annual depreciation accrual rates and amounts, as well as composite remaining lives. Part VII, Service Life Statistics presents the statistical analysis of service life estimates, Part VIII, Net Salvage Statistics sets forth the statistical indications of net salvage percents, and Part IX, Detailed Depreciation Calculations presents the detailed tabulations of annual depreciation.

BASIS OF THE STUDY

Depreciation

Depreciation, in public utility regulation, is the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of utility plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among causes to be given consideration are wear and tear, deterioration, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand, and the requirements of public authorities.

Depreciation, as used in accounting, is a method of distributing fixed capital costs, less net salvage, over a period of time by allocating annual amounts to expense. Each annual amount of such depreciation expense is part of that year's total cost of providing gas utility service. Normally, the period of time over which the fixed capital cost is allocated to the cost of service is equal to the period of time over which an item renders service, that is, the item's service life. The most prevalent method of allocation is to distribute an equal amount of cost to each year of service life. This method is known as the straight-line method of depreciation.

For most accounts, the annual depreciation was calculated by the straight line method using the average service life procedure and the remaining life basis. For certain

General Plant accounts, the annual depreciation is based on amortization accounting. Both types of calculations were based on original cost, attained ages, and estimates of service lives and net salvage.

The straight line method, average service life procedure is a commonly used depreciation calculation procedure that has been widely accepted in jurisdictions throughout North America. Gannett Fleming recommends its continued use. Amortization accounting is used for certain General Plant accounts because of the disproportionate plant accounting effort required when compared to the minimal original cost of the large number of items in these accounts. An explanation of the calculation of annual and accrued amortization is presented beginning on page V-4 of the report.

Service Life and Net Salvage Estimates

The service life and net salvage estimates used in the depreciation and amortization calculations were based on informed judgment which incorporated a review of management's plans, policies and outlook, a general knowledge of the gas utility industry, and comparisons of the service life and net salvage estimates from our studies of other gas utilities. The use of survivor curves to reflect the expected dispersion of retirement provides a consistent method of estimating depreciation for gas plant. Iowa type survivor curves were used to depict the estimated survivor curves for the plant accounts not subject to amortization accounting.

The procedure for estimating service lives consisted of compiling historical data for the plant accounts or depreciable groups, analyzing this history through the use of widely accepted techniques, and forecasting the survivor characteristics for each depreciable group on the basis of interpretations of the historical data analyses and the probable future. The combination of the historical experience and the estimated future yielded estimated survivor curves from which the average service lives were derived.

PART II. ESTIMATION OF SURVIVOR CURVES

PART II. ESTIMATION OF SURVIVOR CURVES

The calculation of annual depreciation based on the straight line method requires the estimation of survivor curves and the selection of group depreciation procedures. The estimation of survivor curves is discussed below and the development of net salvage is discussed in later sections of this report.

SURVIVOR CURVES

The use of an average service life for a property group implies that the various units in the group have different lives. Thus, the average life may be obtained by determining the separate lives of each of the units, or by constructing a survivor curve by plotting the number of units which survive at successive ages.

The survivor curve graphically depicts the amount of property existing at each age throughout the life of an original group. From the survivor curve, the average life of the group, the remaining life expectancy, the probable life, and the frequency curve can be calculated. In Figure 1, a typical smooth survivor curve and the derived curves are illustrated. The average life is obtained by calculating the area under the survivor curve, from age zero to the maximum age, and dividing this area by the ordinate at age zero. The remaining life expectancy at any age can be calculated by obtaining the area under the curve, from the observation age to the maximum age, and dividing this area by the percent surviving at the observation age. For example, in Figure 1, the remaining life at age 30 is equal to the crosshatched area under the survivor curve divided by 29.5 percent surviving at age 30. The probable life at any age is developed by adding the age and remaining life. If the probable life of the property is calculated for each year of age, the probable life curve shown in the chart can be developed. The frequency curve presents the number of units retired in each age interval. It is derived by obtaining the differences between the amount of property surviving at the beginning and at the end of each interval.

This study has incorporated the use of Iowa curves developed from a retirement rate analysis of historical retirement history. A discussion of the concepts of survivor curves and of the development of survivor curves using the retirement rate method is presented below.

Iowa Type Curves

The range of survivor characteristics usually experienced by utility and industrial properties is encompassed by a system of generalized survivor curves known as the Iowa type curves. There are four families in the Iowa system, labeled in accordance with the location of the modes of the retirements in relationship to the average life and the relative height of the modes. The left moded curves, presented in Figure 2, are those in which the greatest frequency of retirement occurs to the left of, or prior to, average service life. The symmetrical moded curves, presented in Figure 3, are those in which the greatest frequency of retirement occurs at average service life. The right moded curves, presented in Figure 4, are those in which the greatest frequency occurs to the right of, or after, average service life. The origin moded curves, presented in Figure 5, are those in which the greatest frequency of retirement occurs at the origin, or immediately after age zero. The letter designation of each family of curves (L, S, R or O) represents the location of the mode of the associated frequency curve with respect to the average service life. The numbers represent the relative heights of the modes of the frequency curves within each family.

The Iowa curves were developed at the Iowa State College Engineering Experiment Station through an extensive process of observation and classification of the ages at which industrial property had been retired. A report of the study which resulted in the classification of property survivor characteristics into 18 type curves, which constitute three of the four families, was published in 1935 in the form of the Experiment Station's Bulletin 125.

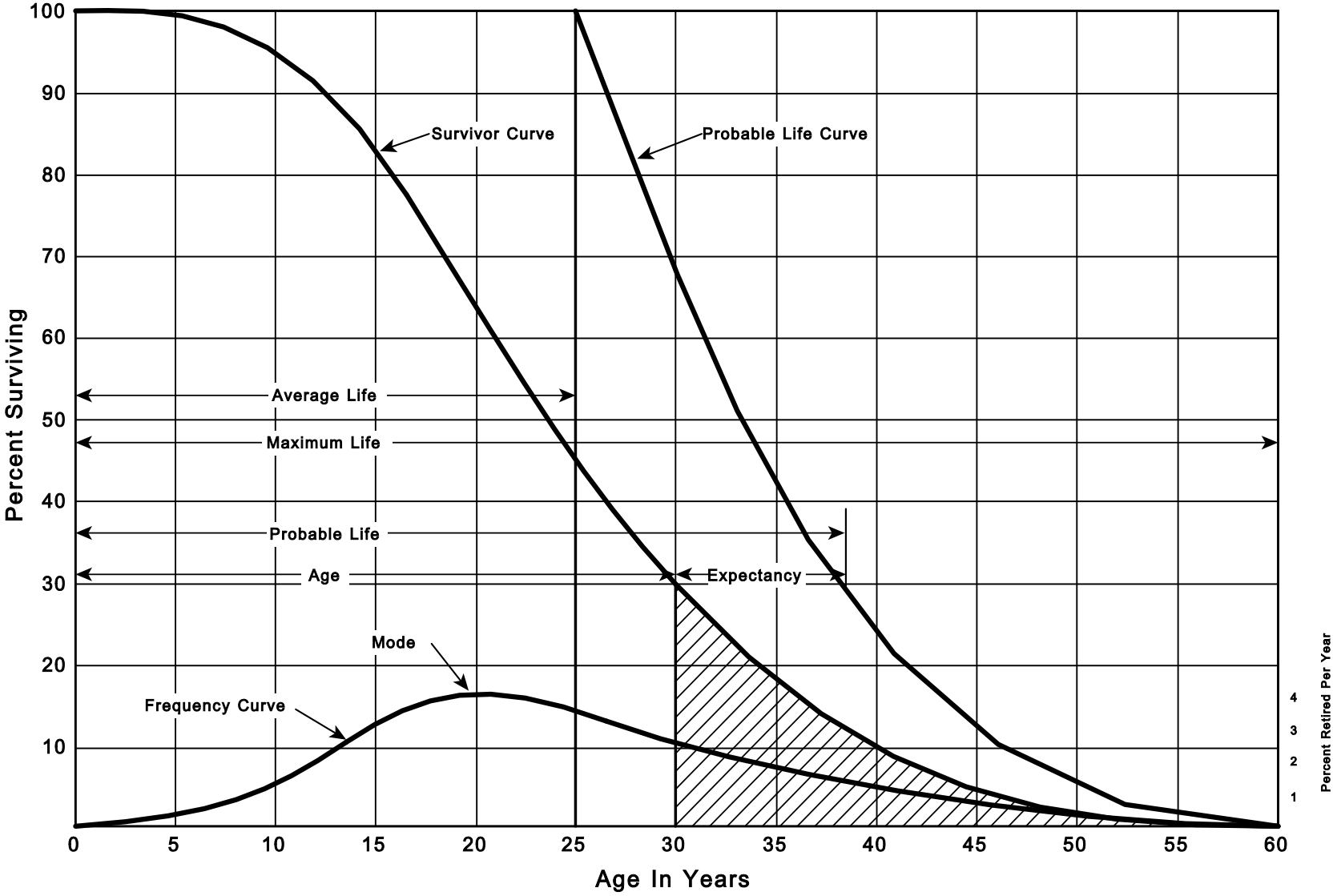


Figure 1. A Typical Survivor Curve and Derived Curves

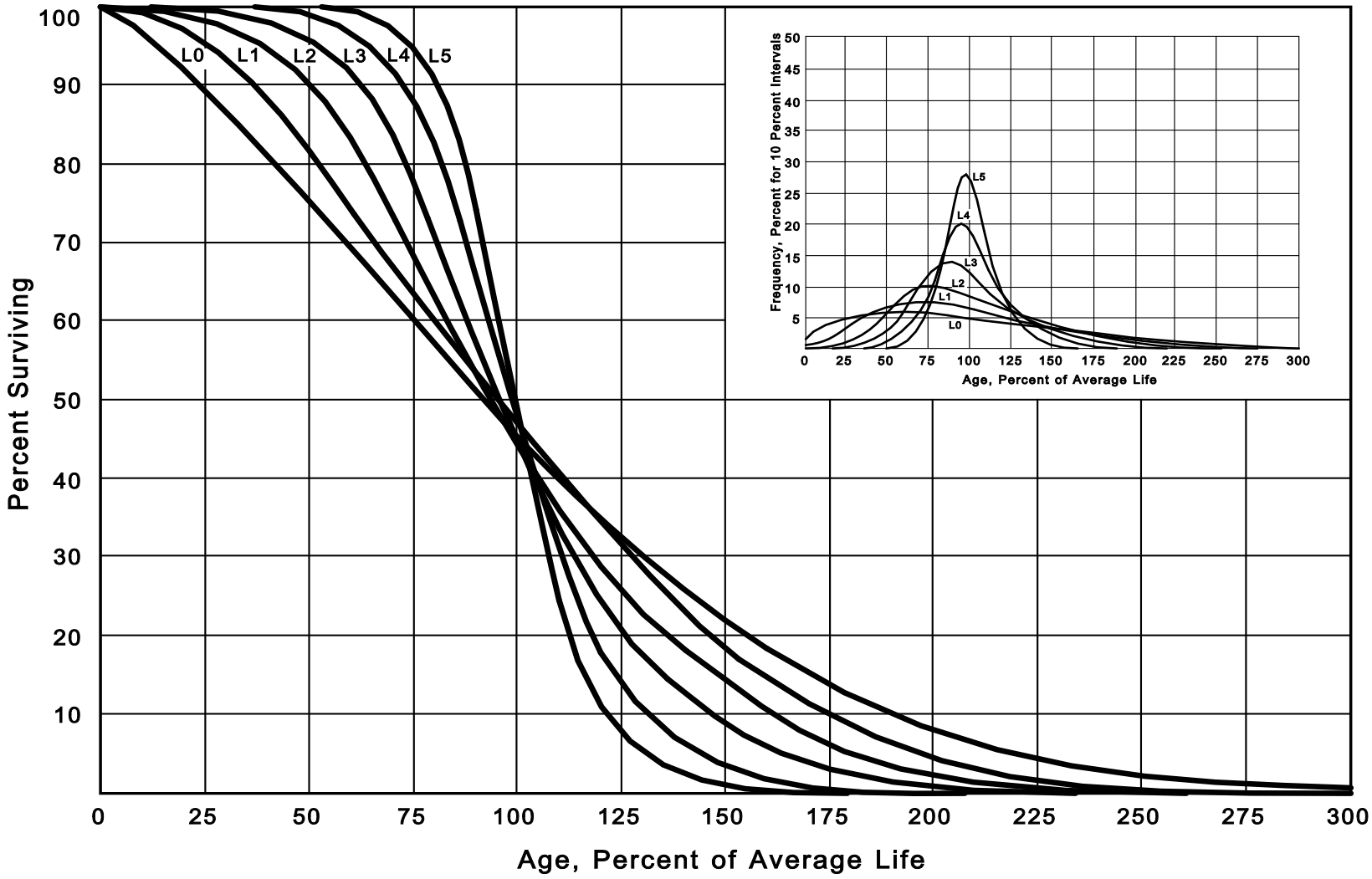


Figure 2. Left Modal or "L" Iowa Type Survivor Curves

Gannett Fleming

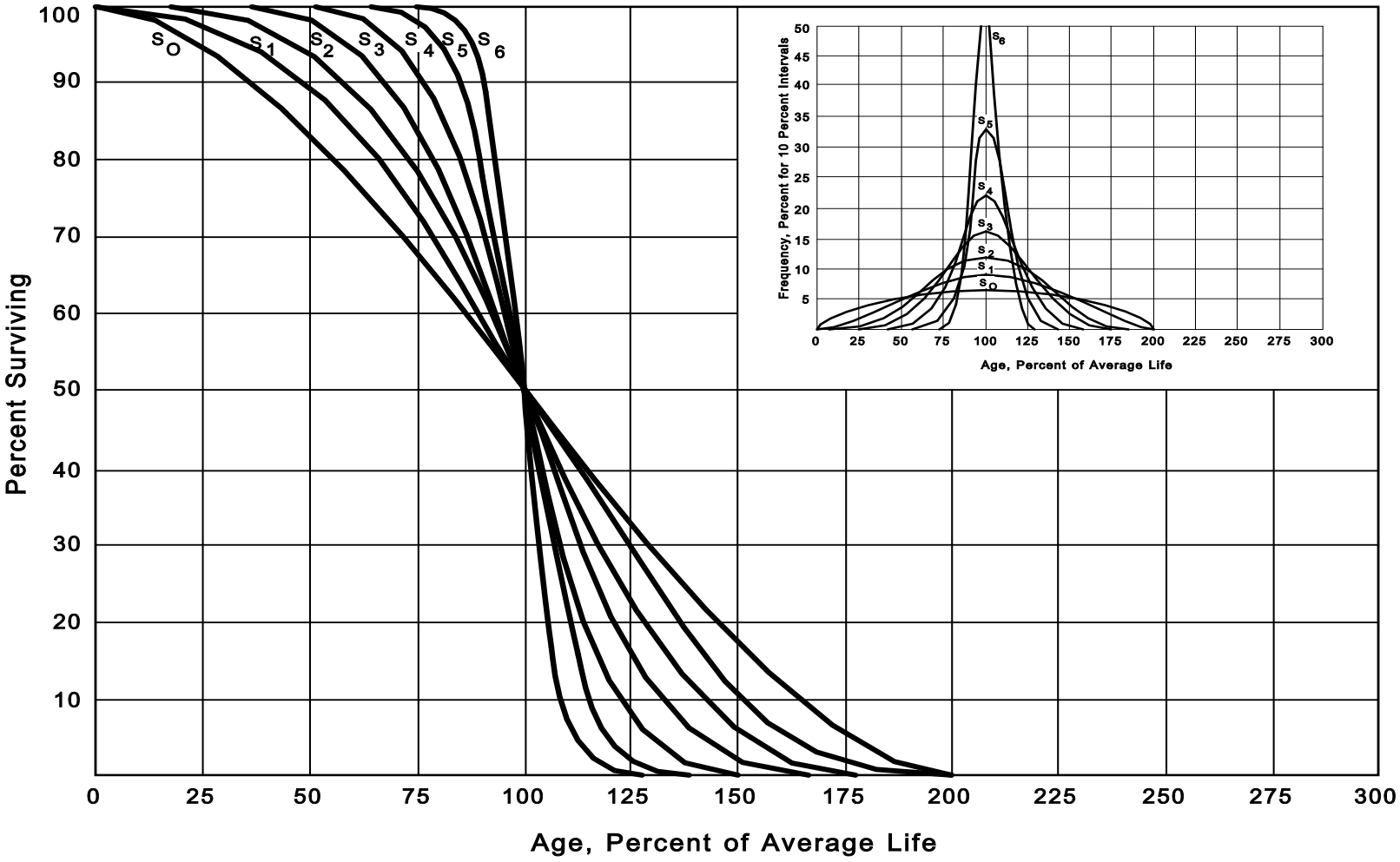


Figure 3. Symmetrical or "S" Iowa Type Survivor Curves

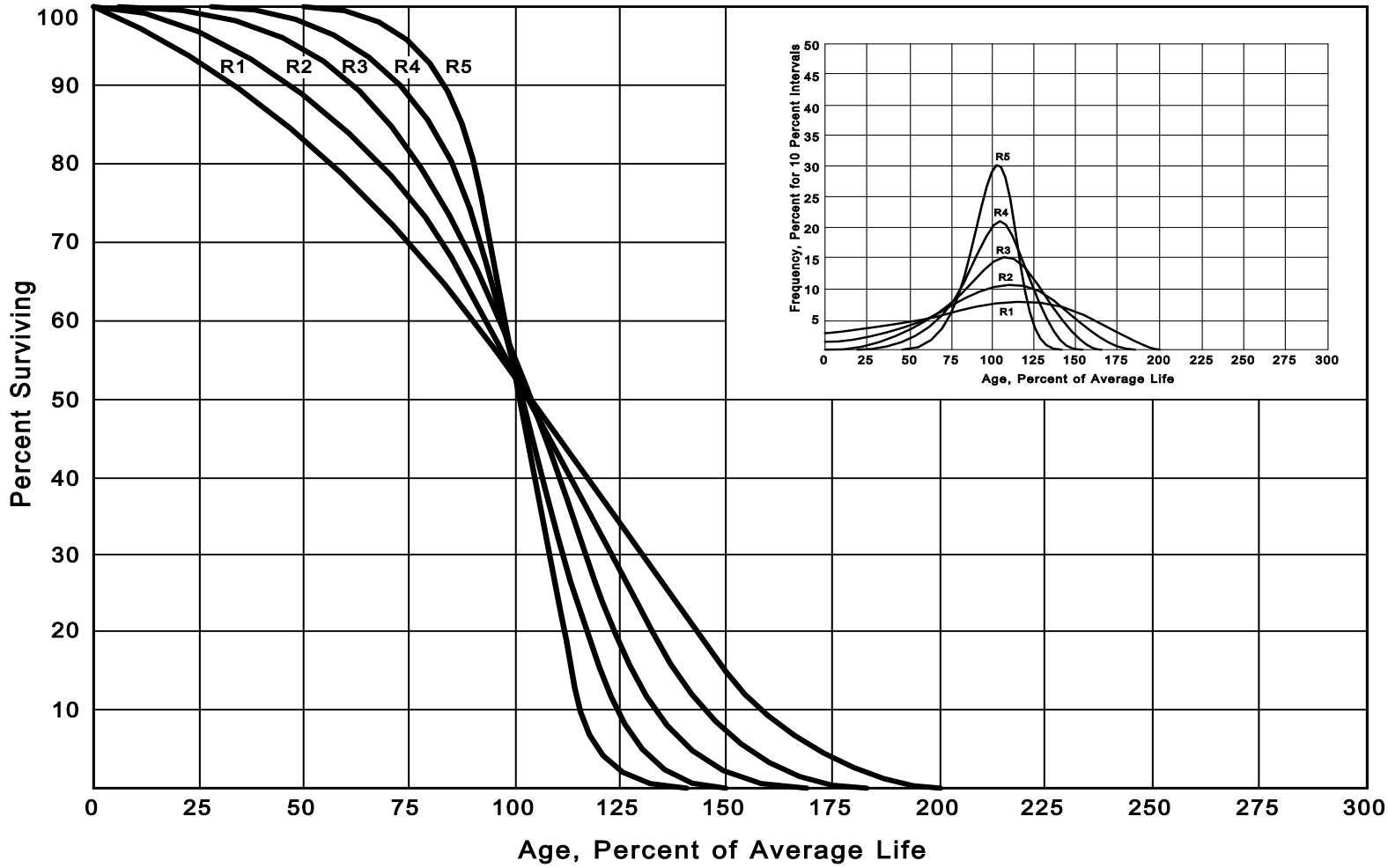


Figure 4. Right Modal or "R" Iowa Type Survivor Curves

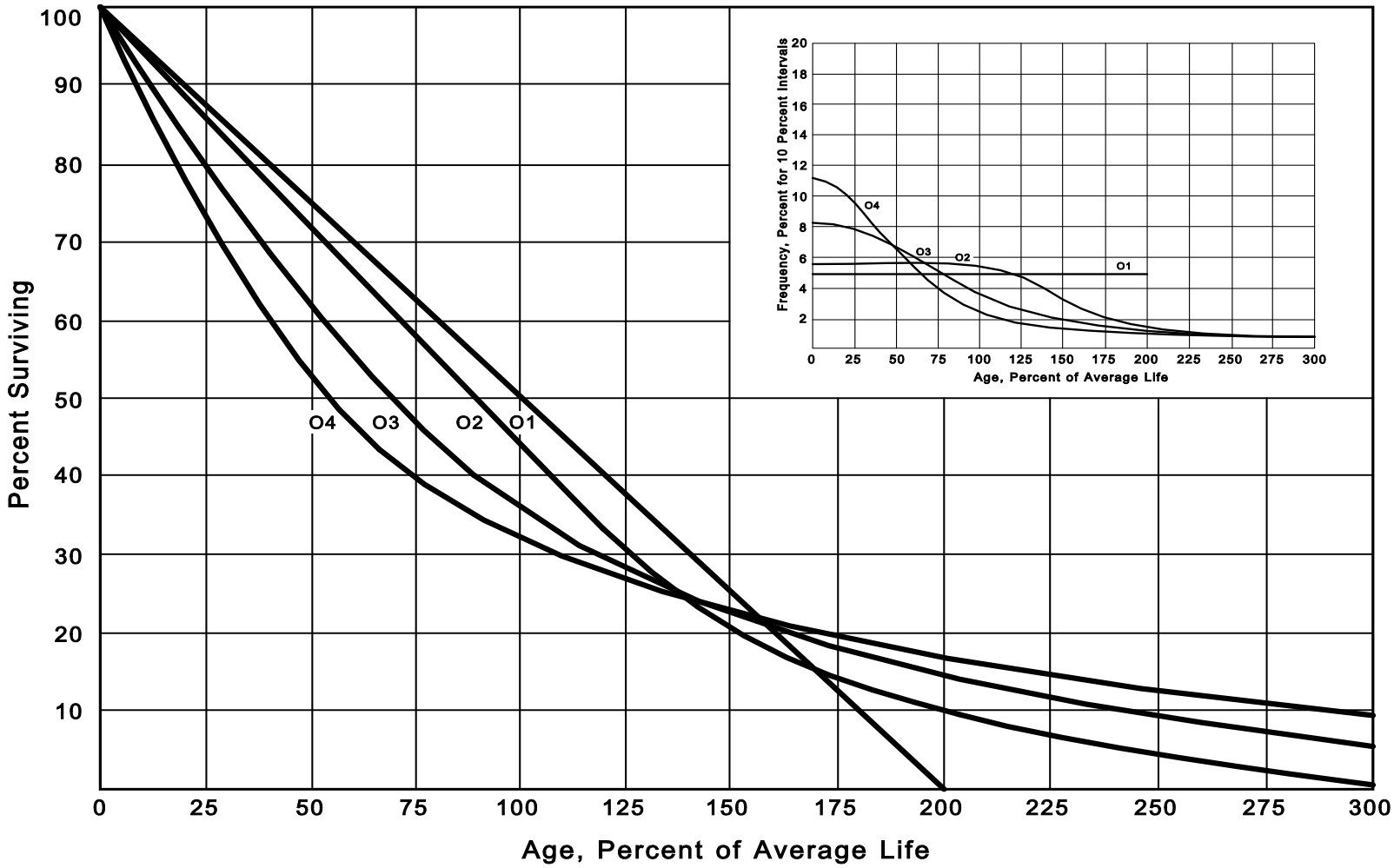


Figure 5. Origin Modal or "O" Iowa Type Survivor Curves

These curve types have also been presented in subsequent Experiment Station bulletins and in the text, "Engineering Valuation and Depreciation."[1] In 1957, Frank V. B. Couch, Jr., an Iowa State College graduate student submitted a thesis presenting his development of the fourth family consisting of the four O type survivor curves.

Retirement Rate Method of Analysis

The retirement rate method is an actuarial method of deriving survivor curves using the average rates at which property of each age group is retired. The method relates to property groups for which aged accounting experience is available and is the method used to develop the original stub survivor curves in this study. The method (also known as the annual rate method) is illustrated through the use of an example in the following text, and is also explained in several publications, including "Statistical Analyses of Industrial Property Retirements,"[2] "Engineering Valuation and Depreciation,"[3] and "Depreciation Systems."[4]

The average rate of retirement used in the calculation of the percent surviving for the survivor curve (life table) requires two sets of data: first, the property retired during a period of observation, identified by the property's age at retirement; and second, the property exposed to retirement at the beginning of the age intervals during the same period. The period of observation is referred to as the experience band, and the band of years which represent the installation dates of the property exposed to retirement during the experience band is referred to as the placement band. An example of the calculations used in the development of a life table follows. The example includes schedules of annual aged property transactions, a schedule of plant exposed to retirement, a life table and illustrations of smoothing the stub survivor curve.

[1]Marston, Anson, Robley Winfrey and Jean C. Hempstead. Engineering Valuation and Depreciation, 2nd Edition. New York, McGraw-Hill Book Company. 1953.

[2]Winfrey, Robley, Statistical Analyses of Industrial Property Retirements. Iowa State College. Engineering Experiment Station, Bulletin 125. 1935.

[3]Marston, Anson, Robley Winfrey, and Jean C. Hempstead, Supra Note 1.

[4]Wolf, Frank K. and W. Chester Fitch. Depreciation Systems. Iowa State University Press. 1994.

Schedules of Annual Transactions in Plant Records

The property group used to illustrate the retirement rate method is observed for the experience band 2011-2020 during which there were placements during the years 2006-2020. In order to illustrate the summation of the aged data by age interval, the data were compiled in the manner presented in Schedules 1 and 2 on pages II-11 and II-12. In Schedule 1, the year of installation (year placed) and the year of retirement are shown. The age interval during which a retirement occurred is determined from this information. In the example which follows, $10,000 of the dollars invested in 2006 were retired in 2011. The $10,000 retirement occurred during the age interval between 4½ and 5½ years on the basis that approximately one-half of the amount of property was installed prior to and subsequent to July 1 of each year. That is, on the average, property installed during a year is placed in service at the midpoint of the year for the purpose of the analysis. All retirements also are stated as occurring at the midpoint of a one-year age interval of time, except the first age interval which encompasses only one-half year.

The total retirements occurring in each age interval in a band are determined by summing the amounts for each transaction year-installation year combination for that age interval. For example, the total of $143,000 retired for age interval 4½-5½ is the sum of the retirements entered on Schedule 1 immediately above the stair step line drawn on the table beginning with the 2011 retirements of 2006 installations and ending with the 2020 retirements of the 2015 installations. Thus, the total amount of 143 for age interval 4½-5½ equals the sum of:

10 + 12 + 13 + 11 + 13 + 13 + 15 + 17 + 19 + 20.

Gannett Fleming

SCHEDULE 1. RETIREMENTS FOR EACH YEAR 2011-2020
SUMMARIZED BY AGE INTERVAL

Experience Band 2011-2020

Placement Band 2006-2020

Year	Retirements, Thousands of Dollars During Year										Total During	Age
Placed	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Age Interval	Interval
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2006	10	11	12	13	14	16	23	24	25	26	26	13½-14½
2007	11	12	13	15	16	18	20	21	22	19	44	12½-13½
2008	11	12	13	14	16	17	19	21	22	18	64	11½-12½
2009	8	9	10	11	11	13	14	15	16	17	83	10½-11½
2010	9	10	11	12	13	14	16	17	19	20	93	9½-10½
2011	4	9	10	11	12	13	14	15	16	20	105	8½-9½
2012		5	11	12	13	14	15	16	18	20	113	7½-8½
2013			6	12	13	15	16	17	19	19	124	6½-7½
2014				6	13	15	16	17	19	19	131	5½-6½
2015					7	14	16	17	19	20	143	4½-5½
2016						8	18	20	22	23	146	3½-4½
2017							9	20	22	25	150	2½-3½
2018								11	23	25	151	1½-2½
2019									11	24	153	½-1½
2020										13	80	0-½
Total	53	68	86	106	128	157	196	231	273	308	1,606	

Gannett Fleming

SCHEDULE 2. OTHER TRANSACTIONS FOR EACH YEAR 2011-2020
SUMMARIZED BY AGE INTERVAL

Experience Band 2011-2020 Placement Band 2006-2020

Year Placed	Acquisitions, Transfers and Sales, Thousands of Dollars During Year										Total During Age Interval	Age Interval
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2006	-	-	-	-	-	-	60[a]	-	-	-	-	13½-14½
2007	-	-	-	-	-	-	-	-	-	-	-	12½-13½
2008	-	-	-	-	-	-	-	-	-	-	-	11½-12½
2009	-	-	-	-	-	-	-	(5)[b]	-	-	60	10½-11½
2010	-	-	-	-	-	-	-	6[a]	-	-	-	9½-10½
2011	-	-	-	-	-	-	-	-	-	-	(5)	8½-9½
2012		-	-	-	-	-	-	-	-	-	6	7½-8½
2013			-	-	-	-	-	-	-	-	-	6½-7½
2014				-	-	-	-	(12)[b]	-	-	-	5½-6½
2015					-	-	-	-	22[a]	-	-	4½-5½
2016						-	-	(19)[b]	-	-	10	3½-4½
2017							-	-	-	-	-	2½-3½
2018								-	-	(102)[c]	(121)	1½-2½
2019									-	-	-	½-1½
2020											-	0-½
Total	-	-	-	-	-	-	60	(30)	22	(102)	(50)	

[a] Transfer Affecting Exposures at Beginning of Year
[b] Transfer Affecting Exposures at End of Year
[c] Sale with Continued Use
Parentheses Denote Credit Amount.

In Schedule 2, other transactions which affect the group are recorded in a similar manner. The entries illustrated include transfers and sales. The entries which are credits to the plant account are shown in parentheses. The items recorded on this schedule are not totaled with the retirements but are used in developing the exposures at the beginning of each age interval.

Schedule of Plant Exposed to Retirement

The development of the amount of plant exposed to retirement at the beginning of each age interval is illustrated in Schedule 3 on page II-14. The surviving plant at the beginning of each year from 2011 through 2020 is recorded by year in the portion of the table headed "Annual Survivors at the Beginning of the Year." The last amount entered in each column is the amount of new plant added to the group during the year. The amounts entered in Schedule 3 for each successive year following the beginning balance or addition are obtained by adding or subtracting the net entries shown on Schedules 1 and 2. For the purpose of determining the plant exposed to retirement, transfers-in are considered as being exposed to retirement in this group at the beginning of the year in which they occurred, and the sales and transfers-out are considered to be removed from the plant exposed to retirement at the beginning of the following year. Thus, the amounts of plant shown at the beginning of each year are the amounts of plant from each placement year considered to be exposed to retirement at the beginning of each successive transaction year. For example, the exposures for the installation year 2016 are calculated in the following manner:

Exposures at age 0	= amount of addition	= $750,000
Exposures at age ½	= $750,000 - $ 8,000	= $742,000
Exposures at age 1½	= $742,000 - $18,000	= $724,000
Exposures at age 2½	= $724,000 - $20,000 - $19,000	= $685,000
Exposures at age 3½	= $685,000 - $22,000	= $663,000

Gannett Fleming

SCHEDULE 3. PLANT EXPOSED TO RETIREMENT
JANUARY 1 OF EACH YEAR 2011-2020
SUMMARIZED BY AGE INTERVAL

Experience Band 2011-2020

Placement Band 2006-2020

Year Placed	Exposures, Thousands of Dollars — Annual Survivors at the Beginning of the Year										Total at Beginning of Age Interval	Age Interval
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2006	255	245	234	222	209	195	239	216	192	167	167	13½-14½
2007	279	268	256	243	228	212	194	174	153	131	323	12½-13½
2008	307	296	284	271	257	241	224	205	184	162	531	11½-12½
2009	338	330	321	311	300	289	276	262	242	226	823	10½-11½
2010	376	367	357	346	334	321	307	297	280	261	1,097	9½-10½
2011	420[a]	416	407	397	386	374	361	347	332	316	1,503	8½-9½
2012		460[a]	455	444	432	419	405	390	374	356	1,952	7½-8½
2013			510[a]	504	492	479	464	448	431	412	2,463	6½-7½
2014				580[a]	574	561	546	530	501	482	3,057	5½-6½
2015					660[a]	653	639	623	628	609	3,789	4½-5½
2016						750[a]	742	724	685	663	4,332	3½-4½
2017							850[a]	841	821	799	4,955	2½-3½
2018								960[a]	949	926	5,719	1½-2½
2019									1,080[a]	1,069	6,579	½-1½
2020										1,220[a]	7,490	0-½
Total	1,975	2,382	2,824	3,318	3,872	4,494	5,247	6,017	6,852	7,799	44,780	

[a]Additions during the year

For the entire experience band 2011-2020, the total exposures at the beginning of an age interval are obtained by summing diagonally in a manner similar to the summing of the retirements during an age interval (Schedule 1). For example, the figure of 3,789, shown as the total exposures at the beginning of age interval 4½-5½, is obtained by summing:

255 + 268 + 284 + 311 + 334 + 374 + 405 + 448 + 501 + 609.

Original Life Table

The original life table, illustrated in Schedule 4 on page II-16**,** is developed from the totals shown on the schedules of retirements and exposures, Schedules 1 and 3, respectively. The exposures at the beginning of the age interval are obtained from the corresponding age interval of the exposure schedule, and the retirements during the age interval are obtained from the corresponding age interval of the retirement schedule. The retirement ratio is the result of dividing the retirements during the age interval by the exposures at the beginning of the age interval. The percent surviving at the beginning of each age interval is derived from survivor ratios, each of which equals one minus the retirement ratio. The percent surviving is developed by starting with 100% at age zero and successively multiplying the percent surviving at the beginning of each interval by the survivor ratio, i.e., one minus the retirement ratio for that age interval. The calculations necessary to determine the percent surviving at age 5½ are as follows:

Percent surviving at age 4½	=	88.15				
Exposures at age 4½	=	3,789,000				
Retirements from age 4½ to 5½	=	143,000				
Retirement Ratio	=	143,000	÷	3,789,000	=	0.0377
Survivor Ratio	=	1.000	-	0.0377	=	0.9623
Percent surviving at age 5½	=	(88.15)	x	(0.9623)	=	84.83

The totals of the exposures and retirements (columns 2 and 3) are shown for the purpose of checking with the respective totals in Schedules 1 and 3. The ratio of the total retirements to the total exposures, other than for each age interval, is meaningless. The original survivor curve is plotted from the original life table (column 6, Schedule 4). When the curve terminates at a percent surviving greater than zero, it is called a stub survivor curve. Survivor curves developed from retirement rate studies generally are stub curves.

SCHEDULE 4. ORIGINAL LIFE TABLE
CALCULATED BY THE RETIREMENT RATE METHOD

Experience Band 2011-2020 Placement Band 2006-2020

(Exposure and Retirement Amounts are in Thousands of Dollars)

Age at Beginning of Interval	Exposures at Beginning of Age Interval	Retirements During Age Interval	Retirement Ratio	Survivor Ratio	Percent Surviving at Beginning of Age Interval
(1)	(2)	(3)	(4)	(5)	(6)
0.0	7,490	80	0.0107	0.9893	100.00
0.5	6,579	153	0.0233	0.9767	98.93
1.5	5,719	151	0.0264	0.9736	96.62
2.5	4,955	150	0.0303	0.9697	94.07
3.5	4,332	146	0.0337	0.9663	91.22
4.5	3,789	143	0.0377	0.9623	88.15
5.5	3,057	131	0.0429	0.9571	84.83
6.5	2,463	124	0.0503	0.9497	81.19
7.5	1,952	113	0.0579	0.9421	77.11
8.5	1,503	105	0.0699	0.9301	72.65
9.5	1,097	93	0.0848	0.9152	67.57
10.5	823	83	0.1009	0.8991	61.84
11.5	531	64	0.1205	0.8795	55.60
12.5	323	44	0.1362	0.8638	48.90
13.5	167	26	0.1557	0.8443	42.24
14.5					35.66
Total	44,780	1,606			

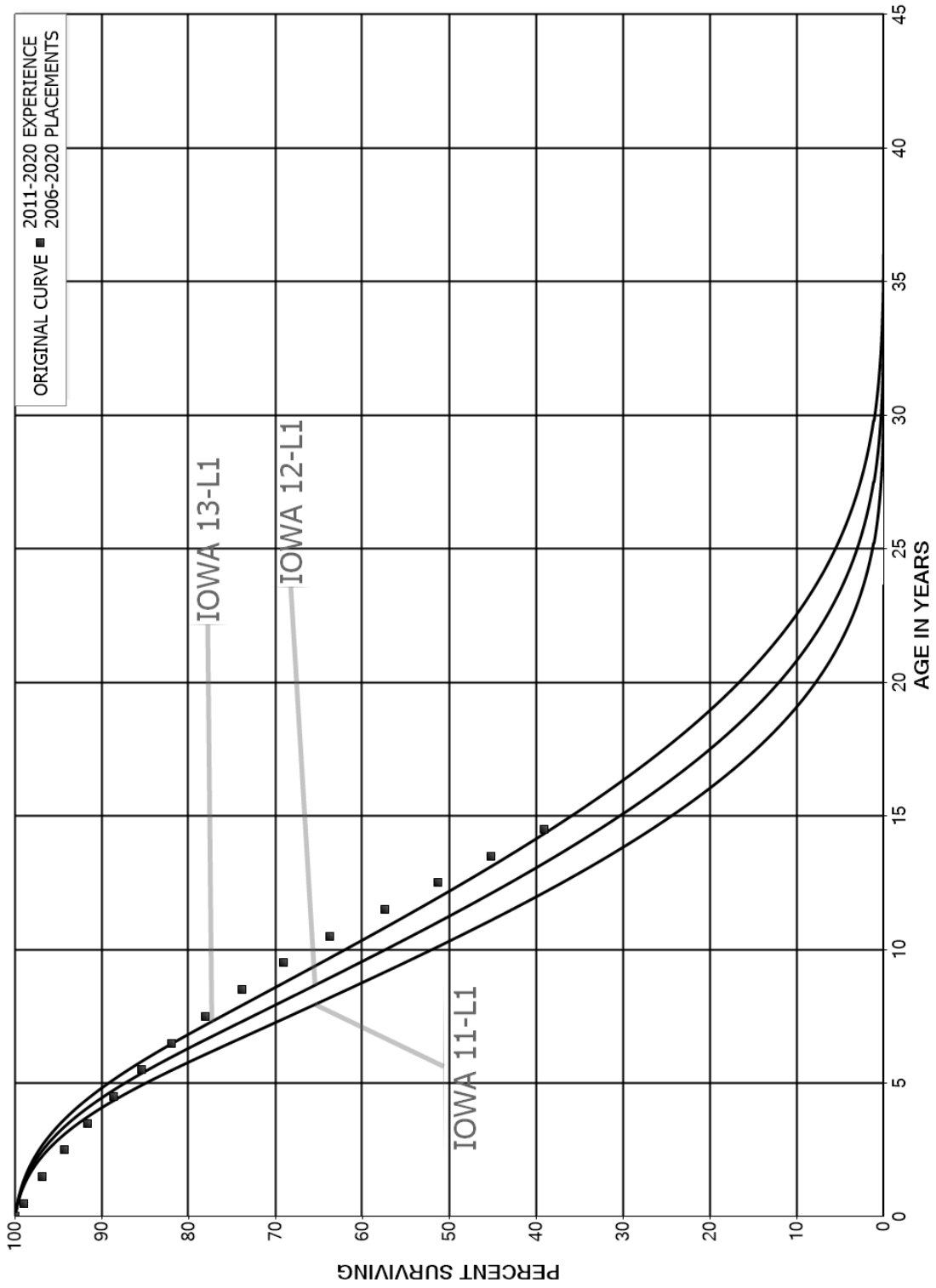
Column 2 from Schedule 3, Column 12, Plant Exposed to Retirement.
Column 3 from Schedule 1, Column 12, Retirements for Each Year.
Column 4 = Column 3 Divided by Column 2.
Column 5 = 1.0000 Minus Column 4.
Column 6 = Column 5 Multiplied by Column 6 as of the Preceding Age Interval.

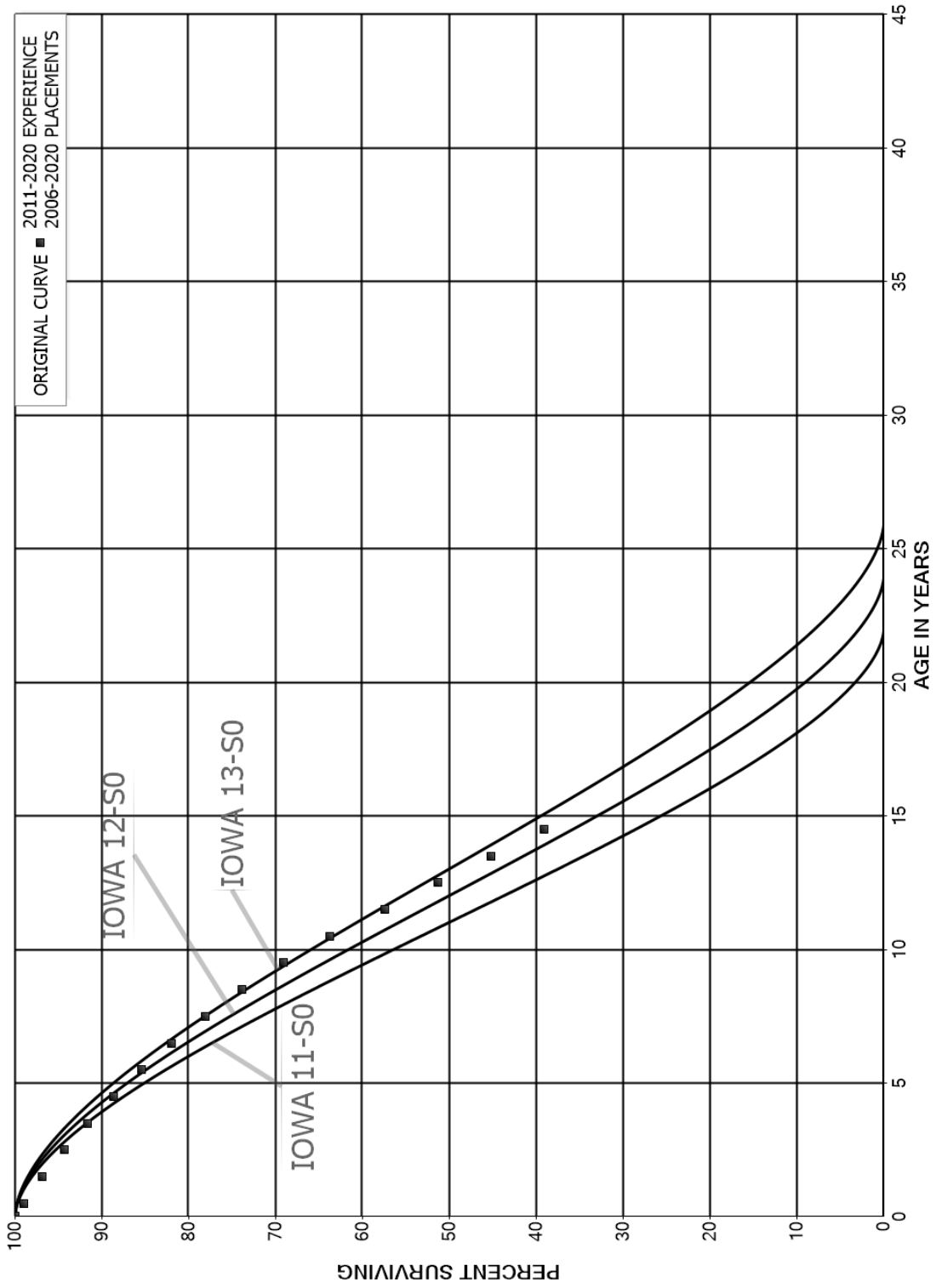
Smoothing the Original Survivor Curve

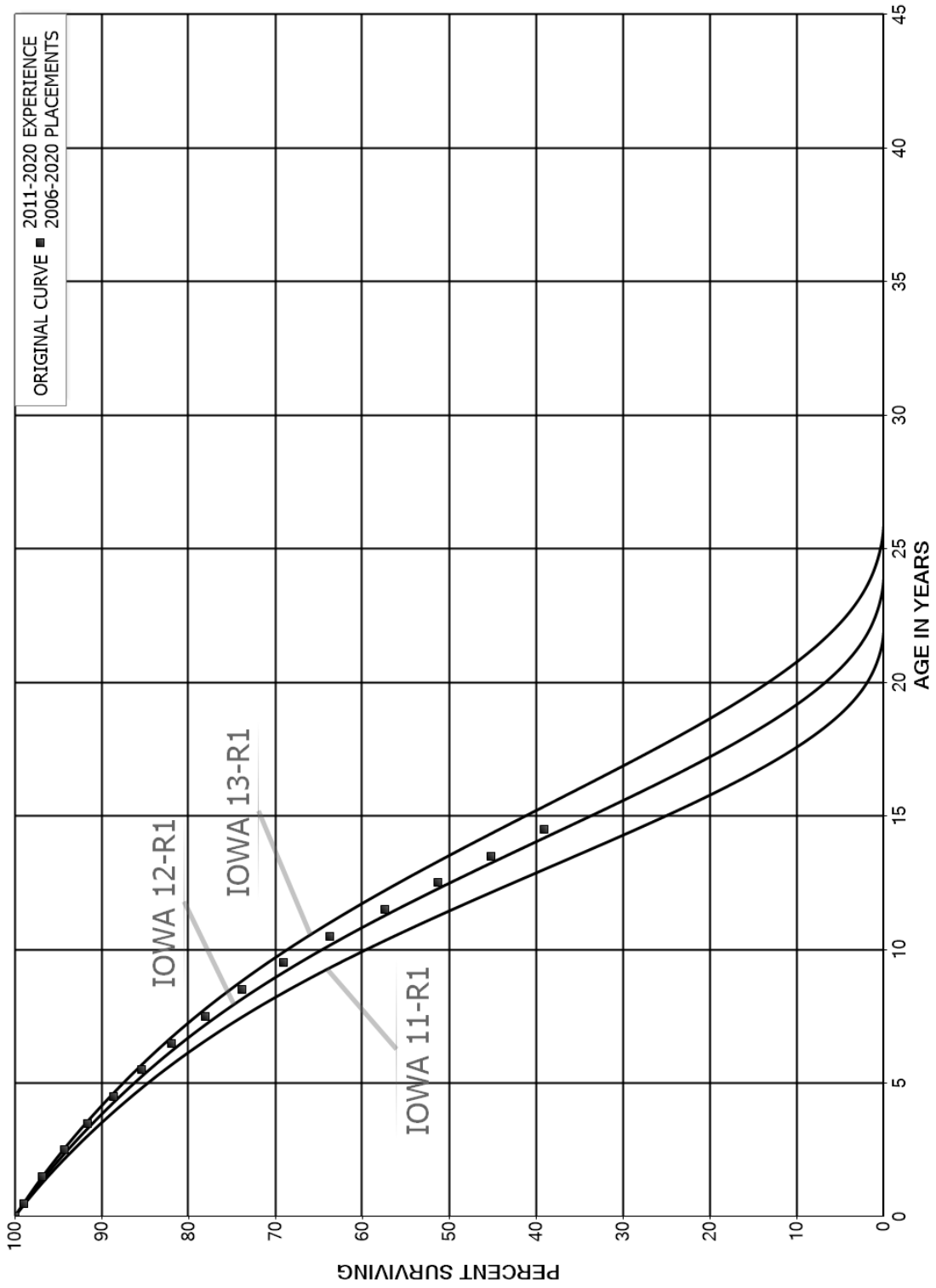
The smoothing of the original survivor curve eliminates any irregularities and serves as the basis for the preliminary extrapolation to zero percent surviving of the original stub curve. Even if the original survivor curve is complete from 100% to zero percent, it is desirable to eliminate any irregularities, as there is still an extrapolation for the vintages which have not yet lived to the age at which the curve reaches zero percent. In this study, the smoothing of the original curve with established type curves was used to eliminate irregularities in the original curve.

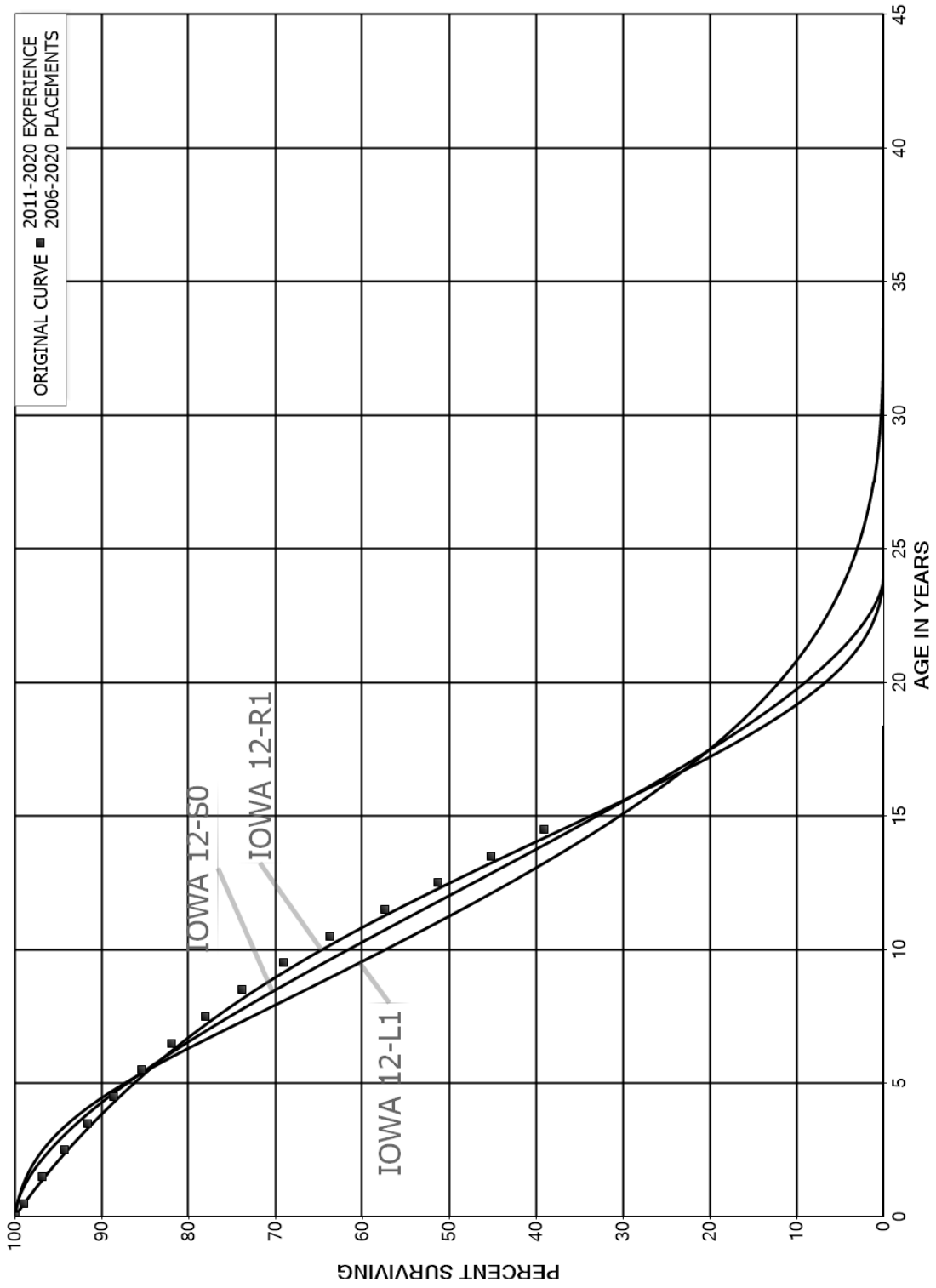
The Iowa type curves are used in this study to smooth those original stub curves which are expressed as percents surviving at ages in years. Each original survivor curve was compared to the Iowa curves using visual and mathematical matching in order to determine the better fitting smooth curves. In Figures 6, 7, and 8, the original curve developed in Schedule 4 is compared with the L, S, and R Iowa type curves which most nearly fit the original survivor curve. In Figure 6, the L1 curve with an average life between 12 and 13 years appears to be the best fit. In Figure 7, the S0 type curve with a 12-year average life appears to be the best fit and appears to be better than the L1 fitting. In Figure 8, the R1 type curve with a 12-year average life appears to be the best fit and appears to be better than either the L1 or the S0.

In Figure 9, the three fittings, 12-L1, 12-S0 and 12-R1 are drawn for comparison purposes. It is probable that the 12-R1 Iowa curve would be selected as the most representative of the plotted survivor characteristics of the group.


ORIGINAL CURVE ■ 2011-2020 EXPERIENCE
2006-2020 PLACEMENTS
IOWA 13-L1
IOWA 12-L1
IOWA 11-L1
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45


ORIGINAL CURVE ■ 2011-2020 EXPERIENCE
2006-2020 PLACEMENTS
IOWA 12-S0
IOWA 13-S0
IOWA 11-S0
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45


ORIGINAL CURVE ■ 2011-2020 EXPERIENCE
2006-2020 PLACEMENTS
IOWA 12-R1
IOWA 13-R1
IOWA 11-R1
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
AGE IN YEARS


ORIGINAL CURVE ■ 2011-2020 EXPERIENCE
2006-2020 PLACEMENTS
IOWA 12-S0
IOWA 12-R1
IOWA 12-L1
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45

PART III. SERVICE LIFE CONSIDERATIONS

PART III. SERVICE LIFE CONSIDERATIONS

FIELD TRIPS

In order to be familiar with the operation of the Company and observe representative portions of the plant, field trips are conducted for studies. Due to travel restrictions a virtual tour was taken for this study. A general understanding of the function of the plant and information with respect to the reasons for past retirements and the expected future causes of retirements are obtained during field trips. This knowledge and information were incorporated in the interpretation and extrapolation of the statistical analyses.

The following is a list of the locations visited during the most recent field trips.

December 16, 2020

55th and West St – District Regulator Station
Wichita South Town Border
Farmland Pawnee and Sheridan
Irving and West Street
Downtown Wichita LP OPP
12550 Larson Road
Wichita North Town Border Station
523 E. Union in Colwich
151st W and 29th N
Cheney Custody Transfer
215th W and 71st N
Wichita Service Center

December 12, 2013

55th and Hoover Town Border Station
South Wichita Town Border Station
Wichita Town Border Station
North Town Border Station
55th and West Street District Regulator Station
47th and West Street District Regulator Station
West Street and MacArthur St. District Regulator Station
Maize District Regulator Station
Maize Town Border Station
Sedgewick County Yard Meter Set
West Street and Bolin Industrial Measuring and Regulating Station
Wichita Service Center

SERVICE LIFE ANALYSIS

The service life estimates were based on informed judgment which considered a number of factors. The primary factors were the statistical analyses of data; current Company policies and outlook as determined during conversations with management; and the survivor curve estimates from previous studies of this company and other gas companies.

For many of the plant accounts and subaccounts for which survivor curves were estimated, the statistical analyses using the retirement rate method resulted in good to excellent indications of the survivor patterns experienced. These accounts represent 85 percent of depreciable plant. Generally, the information external to the statistics led to little to no significant departure from the indicated survivor curves for the accounts listed below. The statistical support for the service life estimates is presented in the section beginning on page VII-2.

TRANSMISSION PLANT

366.01	Structures and Improvements
369.03	Measuring and Regulating Station Equipment
371.01	Other Equipment

DISTRIBUTION PLANT

375.01	Structures and Improvements
376.00	Mains
378.00	Measuring and Regulating Station Equipment – General
380.00	Services
381.00	Meters
381.01	Meters – ERT and AMI
382.01	Meter Installations
383.01	House Regulators
385.01	Industrial Measuring and Regulating Station Equipment
387.00	Other Equipment

GENERAL PLANT

390.01	Structures and Improvements – Owned

392.03	Transportation Equipment – Light Trucks
392.04	Transportation Equipment – Medium Trucks
392.06	Transportation Equipment – Trailers
396.00	Power Operated Equipment

The estimated survivor curves for most of the mass property accounts are based on statistical analyses of plant accounting data and the range of lives and type curves used for other companies in the gas industry. Account 376.00, Mains has a survivor curve estimate of 57-R3 which is consistent with the statistical indications for the period 2006 through 2020. The Iowa 57-R3 is a good fit of the stub curve for Mains through age 88 and is consistent with the outlook for this account. The 57-year service life is at the lower end of the typical service life range of 55 to 75 years for mains. Based on these considerations, the 57-R3 survivor curve is the most reasonable estimate for this account.

Account 378.00, Measuring and Regulating Station Equipment has aged plant accounting data compiled for the years 2006 through 2020. The survivor curve estimate of 45-R2.5 is comparable to the statistical indications for the period 2006 through 2020. The Iowa 45-R2.5 is an excellent fit of the entire stub curve for measuring and regulating station equipment and is consistent with the company's outlook for this account. The 45-year service life is within the typical service life range of 40 to 55 years for measuring and regulating station equipment. Based on these considerations, the 45-R2.5 survivor curve is the most reasonable estimate for this account.

Account 380.00, Services has aged plant accounting data compiled for the years 2006 through 2020. The survivor curve estimate of 48-R4 is consistent with the statistical indications for the period 2006 through 2020. The Iowa 48-R4 is a good fit of the stub curve for Services through age 64 and is consistent with the outlook for this account. The 48-year service life is within the typical service life range of 40 to 55 years for services and is consistent with the Company's practices relating to assets in this account. Based

on these considerations, the 48-R4 survivor curve is the most reasonable estimate for this account.

Similar studies were performed for the remaining plant accounts. Each of the judgments represented a consideration of statistical analyses of aged plant activity, management's outlook for the future, and the typical range of lives used by other gas companies.

The selected amortization periods for other General Plant accounts are described in the section "Calculated Annual and Accrued Amortization."

PART IV. NET SALVAGE CONSIDERATIONS

PART IV. NET SALVAGE CONSIDERATIONS

SALVAGE ANALYSIS

The estimates of net salvage by account were based in part on historical data compiled for the years 2006 through 2020. Cost of removal and salvage were expressed as percents of the original cost of plant retired, both on annual and three-year moving average bases. The most recent five-year average also was calculated for consideration. The net salvage estimates by account are expressed as a percent of the original cost of plant retired.

Net Salvage Considerations

The estimates of future net salvage are expressed as percentages of surviving plant in service, i.e., all future retirements. In cases in which removal costs are expected to exceed salvage receipts, a negative net salvage percentage is estimated. The net salvage estimates were based on judgment which incorporated analyses of historical cost of removal and salvage data, expectations with respect to future removal requirements and markets for retired equipment and materials.

The analyses of historical cost of removal and salvage data are presented in the section titled “Net Salvage Statistics” for the plant accounts for which the net salvage estimate relied partially on those analyses.

Statistical analyses of historical data for the period 2006 through 2020 were key factors in determining net salvage estimates combined with judgment and estimates of other gas companies.

The net salvage results for Account 376.00, Mains, is used to illustrate the methods for estimating net salvage. The net salvage estimate for Mains is negative 10 percent and is based on the historical analysis of net salvage percents for the period, 2006

through 2020. The overall net salvage percent for this period is negative 6 percent with the most recent five-year average, 2016-2020, trending to negative 2 percent, however, the majority of cost of removal for the associated 2019 and 2020 retirements have not been recorded yet. The estimate of negative 10 percent is at the lower end of the industry range of negative 10 percent to negative 60 percent used by other gas utilities for Mains. Based on these considerations, the negative 10 percent is the most reasonable estimate for this account.

Account 380.00, Services, is another large account used to illustrate the net salvage estimation. The net salvage estimate for Services is negative 15 percent and is based on the historical analysis of net salvage percents for the period, 2006-2020. The overall net salvage percent for this period is negative 15 percent. The cost of removal has been lower in recent years however, the majority of cost of removal for the associated 2019 and 2020 retirements have not been recorded yet. The most recent five-year average for net salvage is negative 6 percent. The estimate of negative 15 percent is below the lower end of the industry average of negative 25 percent to negative 150 percent used by other gas utilities for Services. Based on these considerations, the negative 15 percent is the most reasonable estimate for this account.

The combined analysis for Account 392.01, Transportation Equipment – Subunit through Account 392.06 Transportation Equipment - Trailers, is another analysis used to illustrate the methods of estimating net salvage. The net salvage estimate for combined transportation equipment accounts is positive 25 percent and is based on the historical analysis of net salvage percents for the period, 2006-2020. The overall net salvage percent for this period is 28 percent with the most recent five-year average trending more

positive to 22 percent. The estimate of 25 percent is at the upper end of the industry average of 0 percent to 25 percent used by other gas utilities for transportation equipment. Based on these considerations, 25 percent is the most reasonable estimate for this account.

The net salvage estimates for the remaining accounts were estimated using the above-described process of historical indications, judgment and reviewing the typical range of estimates used by other gas companies. The results of the net salvage for each plant account are presented in account sequence beginning in the section titled “Net Salvage Statistics”, page VIII-2.

Generally, the net salvage estimates for remaining amortized general plant accounts were zero percent, consistent with amortization accounting.

PART V. CALCULATION OF ANNUAL AND ACCRUED DEPRECIATION

PART V. CALCULATION OF ANNUAL AND ACCRUED DEPRECIATION

GROUP DEPRECIATION PROCEDURES

A group procedure for depreciation is appropriate when considering more than a single item of property. Normally the items within a group do not have identical service lives, but have lives that are dispersed over a range of time. There are two primary group procedures, namely, average service life and equal life group. In the average service life procedure, the rate of annual depreciation is based on the average life or average remaining life of the group, and this rate is applied to the surviving balances of the group's cost. A characteristic of this procedure is that the cost of plant retired prior to average life is not fully recouped at the time of retirement, whereas the cost of plant retired subsequent to average life is more than fully recouped. Over the entire life cycle, the portion of cost not recouped prior to average life is balanced by the cost recouped subsequent to average life.

Single Unit of Property

The calculation of straight line depreciation for a single unit of property is straightforward. For example, if a $1,000 unit of property attains an age of four years and has a life expectancy of six years, the annual accrual over the total life is:

$$\frac{\$1{,}000}{(4 + 6)} = \$100 \text{ per year.}$$

The accrued depreciation is:

$$\$1{,}000\left(1 - \frac{6}{10}\right) = \$400.$$

Remaining Life Annual Accruals

For the purpose of calculating remaining life accruals as of September 30, 2020, the depreciation reserve for each plant account is allocated among vintages in proportion to the calculated accrued depreciation for the account. Explanations of remaining life accruals and calculated accrued depreciation follow. The detailed calculations as of September 30, 2020, are set forth in the Results of Study section of the report.

Average Service Life Procedure

In the average service life procedure, the remaining life annual accrual for each vintage is determined by dividing future book accruals (original cost less book reserve) by the average remaining life of the vintage. The average remaining life is a directly weighted average derived from the estimated future survivor curve in accordance with the average service life procedure.

The calculated accrued depreciation for each depreciable property group represents that portion of the depreciable cost of the group which would not be allocated to expense through future depreciation accruals if current forecasts of life characteristics are used as the basis for such accruals. The accrued depreciation calculation consists of applying an appropriate ratio to the surviving original cost of each vintage of each account based upon the attained age and service life. The straight line accrued depreciation ratios are calculated as follows for the average service life procedure:

$$Ratio = 1 - \frac{Average\ Remaining\ Life}{Average\ Service\ Life}.$$

CALCULATION OF ANNUAL AND ACCRUED AMORTIZATION

Amortization is the gradual extinguishment of an amount in an account by distributing such amount over a fixed period, over the life of the asset or liability to which it applies, or over the period during which it is anticipated the benefit will be realized. Normally, the distribution of the amount is in equal amounts to each year of the amortization period.

The calculation of annual and accrued amortization requires the selection of an amortization period. The amortization periods used in this report were based on judgment which incorporated a consideration of the period during which the assets will render most of their service, the amortization period and service lives used by other utilities, and the service life estimates previously used for the asset under depreciation accounting.

Amortization accounting is proposed for a number of accounts that represent numerous units of property, but a very small portion of depreciable gas plant in service. The accounts and their amortization periods are as follows:

Account		Amortization Period, Years
391.01	Office Furniture and Equipment	20
391.03	Computer Hardware	5
391.07	iPad Hardware	5
393.00	Stores Equipment	25
394.00	Tools, Shop, and Garage Equipment	25
395.00	Laboratory Equipment	20
397.00	Communication Equipment	15
398.00	Miscellaneous Equipment	15

For the purpose of calculating annual amortization amounts as of September 30, 2020, the book depreciation reserve for each plant account or subaccount is assigned or allocated to vintages. The book reserve assigned to vintages with an age greater than

For the purpose of calculating annual amortization amounts as of September 30, 2020, the book depreciation reserve for each plant account or subaccount is assigned or allocated to vintages. The book reserve assigned to vintages with an age greater than the amortization period is equal to the vintage's original cost. The remaining book reserve is allocated among vintages with an age less than the amortization period in proportion to the calculated accrued amortization. The calculated accrued amortization is equal to the original cost multiplied by the ratio of the vintage's age to its amortization period. The annual amortization amount is determined by dividing the future amortizations (original cost less allocated book reserve) by the remaining period of amortization for the vintage.

PART VI. RESULTS OF STUDY

PART VI. RESULTS OF STUDY

QUALIFICATION OF RESULTS

The calculated annual and accrued depreciation are the principal results of the study. Continued surveillance and periodic revisions are normally required to maintain continued use of appropriate annual depreciation accrual rates. An assumption that accrual rates can remain unchanged over a long period of time implies a disregard for the inherent variability in service lives and salvage and for the change of the composition of property in service. The annual accrual rates were calculated in accordance with the straight line remaining life method of depreciation, using the average service life procedure based on estimates which reflect considerations of current historical evidence and expected future conditions.

The annual depreciation accrual rates are applicable specifically to the gas plant in service as of September 30, 2020. For most plant accounts, the application of such rates to future balances that reflect additions subsequent to September 30, 2020, is reasonable for a period of three to five years.

DESCRIPTION OF STATISTICAL SUPPORT

The service life estimates were based on judgment that incorporated statistical analysis of retirement data, discussions with management and consideration of estimates made for other gas utilities. The results of the statistical analysis of service life are presented in the section beginning on page VII-2, within the supporting documents of this report.

For each depreciable group analyzed by the retirement rate method, a chart depicting the original and estimated survivor curves followed by a tabular presentation of

the original life table(s) plotted on the chart. The survivor curves estimated for the depreciable groups are shown as dark smooth curves on the charts. Each smooth survivor curve is denoted by a numeral followed by the curve type designation. The numeral used is the average life derived from the entire curve from 100 percent to zero percent surviving. The titles of the chart indicate the group, the symbol used to plot the points of the original life table, and the experience and placement bands of the life tables which where plotted. The experience band indicates the range of years for which retirements were used to develop the stub survivor curve. The placements indicate, for the related experience band, the range of years of installations which appear in the experience.

The analyses of salvage data are presented in the section titled, “Net Salvage Statistics”. The tabulations present annual cost of removal and salvage data, three-year moving averages and the most recent five-year average. Data are shown in dollars and as percentages of original costs retired.

DESCRIPTION OF DETAILED TABULATIONS

A summary of the results of the study, as applied to the original cost of gas plant at September 30, 2020, is presented on pages VI-5 through VI-7 of this report. The schedule sets forth the original cost, the book depreciation reserve, future accruals, the calculated annual depreciation rate and amount, and the composite remaining life related to gas plant.

The tables of the calculated annual depreciation applicable to depreciable assets as of September 30, 2020 are presented in account sequence starting on page IX-2 of the supporting documents. The tables indicate the estimated survivor curve and net

salvage percent for the account and set forth, for each installation year, the original cost, the calculated accrued depreciation, the allocated book reserve, future accruals, the remaining life, and the calculated annual accrual amount.

Gannett Fleming

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
D/B/A BLACK HILLS ENERGY

TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE PERCENT, ORIGINAL COST, BOOK DEPRECIATION RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO GAS PLANT AS OF SEPTEMBER 30, 2020

	ACCOUNT	SURVIVOR CURVE	NET SALVAGE PERCENT	ORIGINAL COST AS OF SEPTEMBER 30, 2020	BOOK DEPRECIATION RESERVE	FUTURE ACCRUALS	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	COMPOSITE REMAINING LIFE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)=(7)/(4)	(9)=(6)/(7)
	INTANGIBLE PLANT								
302.00	FRANCHISES AND CONSENTS	30 - SQ	0	74,989.75	72,676	2,314	358	0.48	6.5
303.00	MISCELLANEOUS INTANGIBLE PLANT	30 - SQ	0	1,335,506.09	1,061,138	274,368	24,424	1.83	11.2
303.01	MISCELLANEOUS INTANGIBLE PLANT - EASEMENTS	20 - SQ	0	1,730,332.20	1,051,552	678,781	87,585	5.06	7.7
	TOTAL INTANGIBLE PLANT			**3,140,828.04**	**2,185,366**	**955,463**	**112,367**	**3.58**	**8.5**
	PRODUCTION PLANT								
336.01	PURIFICATION EQUIPMENT	30 - S2	0	18,718.78	12,618	6,101	516	2.76	11.8
	TOTAL PRODUCTION PLANT			**18,718.78**	**12,618**	**6,101**	**516**	**2.76**	**11.8**
	TRANSMISSION PLANT								
366.01	STRUCTURES AND IMPROVEMENTS	50 - R2	(5)	131,401.69	101,999	35,973	1,282	0.98	28.1
367.00	MAINS	70 - R1	(10)	39,814,130.60	10,258,430	33,537,113	582,465	1.46	57.6
368.04	COMPRESSOR STATION EQUIPMENT	25 - S2.5	(5)	2,474.71	1,678	921	180	7.27	5.1
369.03	MEASURING AND REGULATING STATION EQUIPMENT	40 - R2	(10)	4,002,449.35	1,596,331	2,806,364	112,621	2.81	24.9
371.01	OTHER EQUIPMENT	25 - S1.5	0	108,344.42	38,354	69,991	9,644	8.90	7.3
	TOTAL TRANSMISSION PLANT			**44,058,800.77**	**11,996,792**	**36,450,362**	**706,192**	**1.60**	**51.6**
	DISTRIBUTION PLANT								
375.01	STRUCTURES AND IMPROVEMENTS	35 - S0	(5)	937,595.97	303,181	681,295	23,005	2.45	29.6
376.00	MAINS	57 - R3	(10)	118,761,514.56	41,628,843	89,008,823	1,966,410	1.66	45.3
377.00	COMPRESSOR EQUIPMENT	25 - S2.5	(5)	175,303.75	56,068	128,001	8,515	4.86	15.0
378.00	MEASURING AND REGULATING STATION EQUIPMENT - GENERAL	45 - R2.5	(10)	5,724,718.80	1,767,775	4,529,415	133,188	2.33	34.0
379.00	MEASURING AND REGULATING STATION EQUIPMENT - CITY GATE	35 - S1.5	(10)	61,110.51	30,663	36,558	2,897	4.74	12.6
380.00	SERVICES	48 - R4	(15)	70,054,267.85	27,703,262	52,859,146	1,567,922	2.24	33.7
381.00	METERS	22 - S0	0	10,897,456.30	952,787	9,944,669	1,005,857	9.23	9.9
381.01	METERS - ERT AND AMI	15 - R3	0	9,756,739.33	4,279,910	5,476,829	692,952	7.10	7.9
382.01	METER INSTALLATIONS	50 - R1.5	0	1,665,776.13	1,218,422	447,354	14,918	0.90	30.0
383.01	HOUSE REGULATORS	37 - S0.5	(5)	31,459,092.04	3,204,944	29,827,103	968,534	3.08	30.8
385.01	INDUSTRIAL MEASURING AND REGULATING STATION EQUIPMENT	42 - R0.5	(5)	6,233,437.40	1,842,868	4,702,241	152,986	2.45	30.7
387.00	OTHER EQUIPMENT	32 - S2	0	109,362.72	23,558	85,805	3,190	2.92	26.9
	TOTAL DISTRIBUTION PLANT			**255,836,375.36**	**83,012,281**	**197,727,239**	**6,540,374**	**2.56**	**30.2**

Gannett Fleming

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
D/B/A BLACK HILLS ENERGY

TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE PERCENT, ORIGINAL COST, BOOK DEPRECIATION RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO GAS PLANT AS OF SEPTEMBER 30, 2020

	ACCOUNT	SURVIVOR CURVE	NET SALVAGE PERCENT	ORIGINAL COST AS OF SEPTEMBER 30, 2020	BOOK DEPRECIATION RESERVE	FUTURE ACCRUALS	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	COMPOSITE REMAINING LIFE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)=(7)/(4)	(9)=(6)/(7)
	GENERAL PLANT								
	STRUCTURES AND IMPROVEMENTS								
390.01	OWNED	40 - R2.5	(5)	9,083,466.08	1,345,360	8,192,279	246,529	2.71	33.2
390.51	LEASED	20 - S3	0	26,483.32	26,483	0	0	-	-
	TOTAL STRUCTURES AND IMPROVEMENTS			9,109,949.40	1,371,843	8,192,279	246,529	2.71	33.2
	OFFICE FURNITURE AND EQUIPMENT								
391.01	FURNITURE AND EQUIPMENT								
	FULLY ACCRUED	FULLY ACCRUED		1,406.54	1,407	0	0	-	-
	AMORTIZED	20 - SQ	0	355,265.89	130,300	224,966	17,758	5.00	12.7
	TOTAL OFFICE FURNITURE AND EQUIPMENT			356,672.43	131,707	224,966	17,758	4.98	12.7
391.03	COMPUTER HARDWARE								
	FULLY ACCRUED	FULLY ACCRUED		93,868.41	93,868	0	0	-	-
	AMORTIZED	5 - SQ	0	701,898.15	160,600	541,298	140,390	20.00	3.9
	TOTAL COMPUTER HARDWARE			795,766.56	254,468	541,298	140,390	17.64	3.9
391.07	IPAD HARDWARE	5 - SQ	0	222,823.63	55,700	167,124	44,566	20.00	3.8
	TOTAL OFFICE FURNITURE AND EQUIPMENT			1,375,262.62	441,875	933,388	202,714	14.74	4.6
	TRANSPORTATION EQUIPMENT								
392.01	SUBUNIT	7 - L3	25	50,025.41	27,141	10,378	4,269	8.53	2.4
392.03	LIGHT TRUCKS	8 - L2.5	25	7,276,261.57	2,510,327	2,946,870	519,111	7.13	5.7
392.04	MEDIUM TRUCKS	6 - R2.5	25	62,551.20	33,707	13,207	7,257	11.60	1.8
392.05	HEAVY TRUCKS	15 - L2.5	25	427,250.81	263,749	56,689	4,796	1.12	11.8
392.06	TRAILERS	20 - S1.5	25	167,614.63	89,584	36,127	2,455	1.46	14.7
	TOTAL TRANSPORTATION EQUIPMENT			7,983,703.62	2,924,506	3,063,271	537,888	6.74	5.7
393.00	STORES EQUIPMENT	25 - SQ	0	29,524.98	20,780	8,745	1,182	4.00	7.4
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT								
	FULLY ACCRUED	FULLY ACCRUED		64,301.81	64,302	0	0	-	-
	AMORTIZED	25 - SQ	0	2,304,764.77	708,500	1,596,265	92,278	4.00	17.3
	TOTAL TOOLS, SHOP AND GARAGE EQUIPMENT			2,369,066.58	772,802	1,596,265	92,278	3.90	17.3
395.00	LABORATORY EQUIPMENT								
	FULLY ACCRUED	FULLY ACCRUED		1,564.04	1,564	0	0	-	-
	AMORTIZED	20 - SQ	0	11,714.23	5,600	6,114	586	5.00	10.4
	TOTAL LABORATORY EQUIPMENT			13,278.27	7,164	6,114	586	4.41	10.4
396.00	POWER OPERATED EQUIPMENT	17 - S1	15	1,060,469.78	286,151	615,249	59,095	5.57	10.4

Gannett Fleming

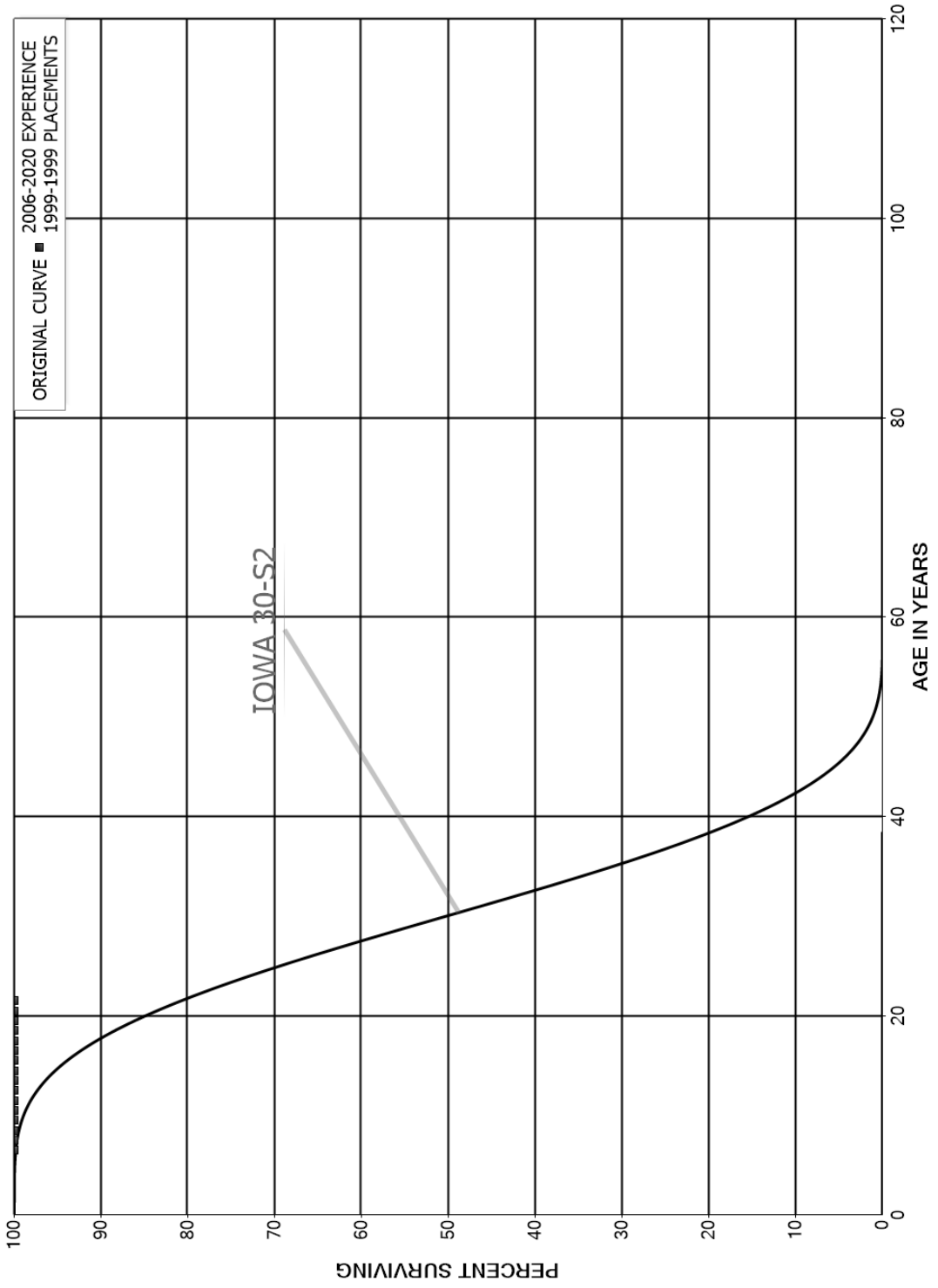
BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
D/B/A BLACK HILLS ENERGY

TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE PERCENT, ORIGINAL COST, BOOK DEPRECIATION RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO GAS PLANT AS OF SEPTEMBER 30, 2020

	ACCOUNT	SURVIVOR CURVE	NET SALVAGE PERCENT	ORIGINAL COST AS OF SEPTEMBER 30, 2020	BOOK DEPRECIATION RESERVE	FUTURE ACCRUALS	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	COMPOSITE REMAINING LIFE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)=(7)/(4)	(9)=(6)/(7)
397.00	COMMUNICATION EQUIPMENT								
	FULLY ACCRUED	FULLY ACCRUED		17,111.00	17,111	0	0	-	-
	AMORTIZED	15 - SQ	0	1,509,785.68	765,000	744,786	100,635	6.67	7.4
	TOTAL COMMUNICATION EQUIPMENT			1,526,896.68	782,111	744,786	100,635	6.59	7.4
398.00	MISCELLANEOUS EQUIPMENT	15 - SQ	0	17,217.91	2,420	14,798	1,148	6.67	12.9
	TOTAL GENERAL PLANT			**23,485,369.84**	**6,609,652**	**15,174,895**	**1,242,055**	**5.29**	**12.2**
	TOTAL DEPRECIABLE PLANT			**326,540,092.79**	**103,816,710**	**250,314,060**	**8,601,504**	**2.63**	**29.1**
	UNRECOVERED RESERVE FOR AMORTIZATION								
391.01	FURNITURE AND EQUIPMENT				203,233		(40,647) *		
391.03	COMPUTER HARDWARE				(25,744)		5,149 *		
391.07	IPAD HARDWARE				(5,952)		1,190 *		
393.00	STORES EQUIPMENT				1,827		(365) *		
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT				88,720		(17,744) *		
395.00	LABORATORY EQUIPMENT				11,961		(2,392) *		
397.00	COMMUNICATION EQUIPMENT				(241,544)		48,309 *		
398.00	MISCELLANEOUS EQUIPMENT				(6,976)		1,395 *		
	TOTAL UNRECOVERED RESERVE FOR AMORTIZATION				**25,526**		**(5,105)**		
	NONDEPRECIABLE AND ACCOUNTS NOT STUDIED								
301.00	ORGANIZATION			186,931.82	169,571				
303.02	MISCELLANEOUS INTANGIBLE PLANT - TRADEMARKS			181,000.00					
365.01	LAND			9,430.51					
365.02	LAND RIGHTS			594,368.16	691,895				
365.71	LAND - FARM TAP			643.94					
365.72	LAND RIGHTS - FARM TAP			2,100.26					
374.01	LAND			187,066.01					
374.02	LAND RIGHTS			183,574.03	(8,628)				
389.01	LAND			905,127.35	(216)				
	TOTAL NONDEPRECIABLE AND ACCOUNTS NOT STUDIED			**2,250,242.08**	**852,621**				
	TOTAL GAS PLANT			**328,790,334.87**	**104,694,857**	**250,314,060**	**8,596,399**		

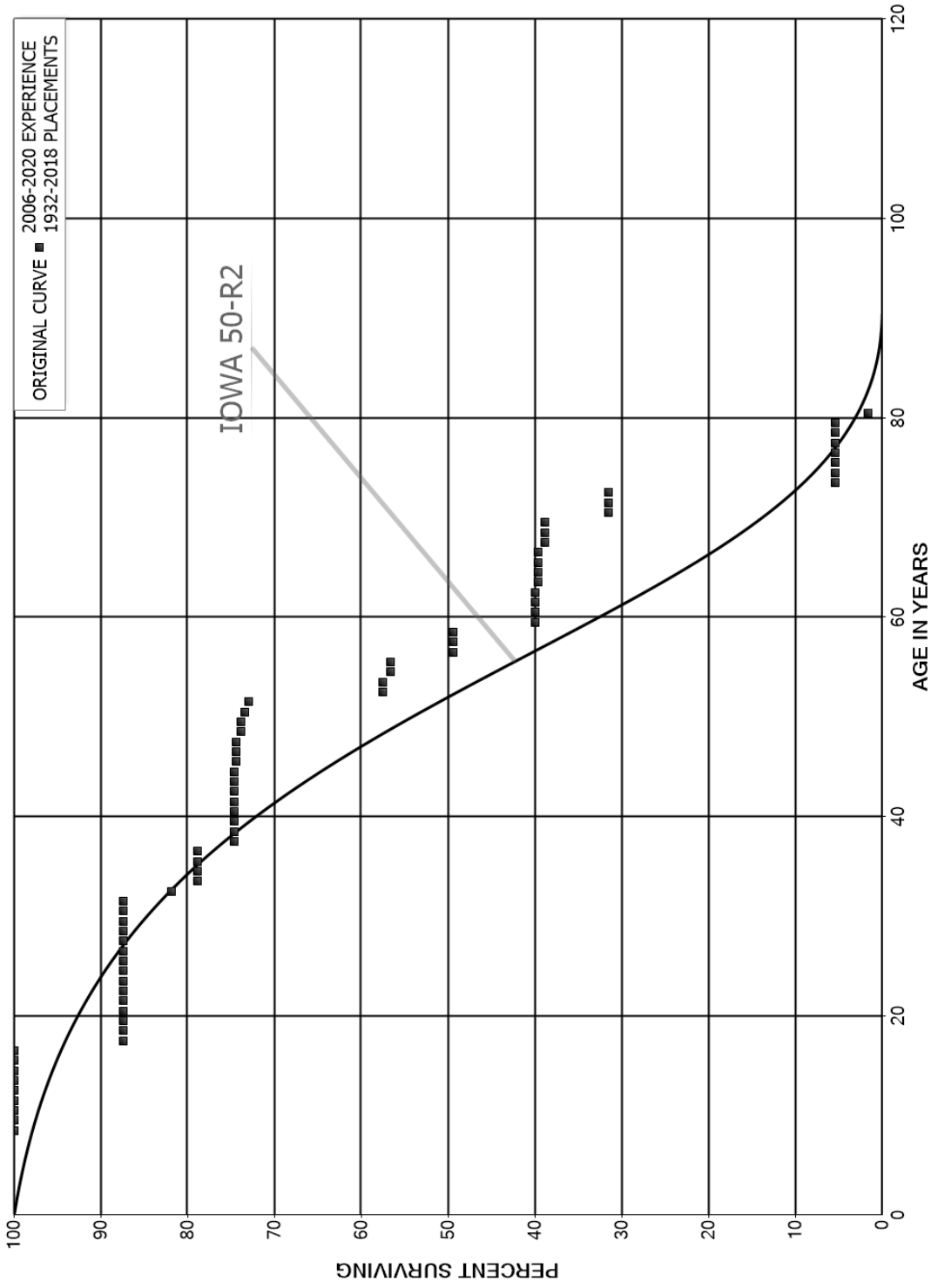
* 5-year amortization of unrecovered reserve related to utilization of amortization accounting.

PART VII. SERVICE LIFE STATISTICS


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1999-1999 PLACEMENTS
IOWA 30-S2
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

PLACEMENT BAND 1999-1999 EXPERIENCE BAND 2006-2020

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					
0.5					
1.5					
2.5					
3.5					
4.5					
5.5					
6.5	18,719		0.0000	1.0000	100.00
7.5	18,719		0.0000	1.0000	100.00
8.5	18,719		0.0000	1.0000	100.00
9.5	18,719		0.0000	1.0000	100.00
10.5	18,719		0.0000	1.0000	100.00
11.5	18,719		0.0000	1.0000	100.00
12.5	18,719		0.0000	1.0000	100.00
13.5	18,719		0.0000	1.0000	100.00
14.5	18,719		0.0000	1.0000	100.00
15.5	18,719		0.0000	1.0000	100.00
16.5	18,719		0.0000	1.0000	100.00
17.5	18,719		0.0000	1.0000	100.00
18.5	18,719		0.0000	1.0000	100.00
19.5	18,719		0.0000	1.0000	100.00
20.5	18,719		0.0000	1.0000	100.00
21.5					100.00


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1932-2018 PLACEMENTS
IOWA 50-R2
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

PLACEMENT BAND 1932-2018 EXPERIENCE BAND 2006-2020

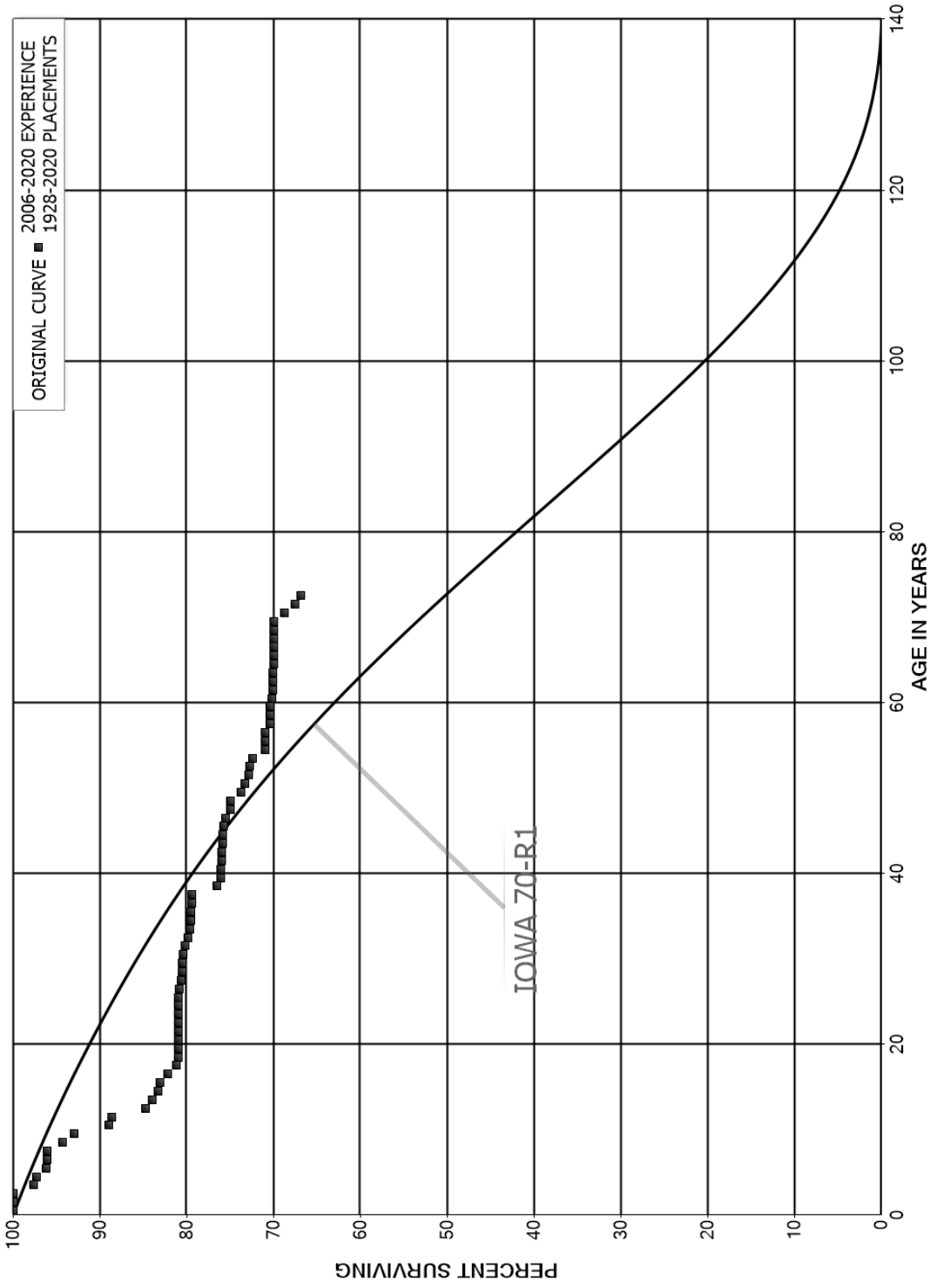
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	13,421		0.0000	1.0000	100.00
0.5	13,421		0.0000	1.0000	100.00
1.5	13,421		0.0000	1.0000	100.00
2.5	522		0.0000	1.0000	100.00
3.5	522		0.0000	1.0000	100.00
4.5	522		0.0000	1.0000	100.00
5.5	522		0.0000	1.0000	100.00
6.5	522		0.0000	1.0000	100.00
7.5	522		0.0000	1.0000	100.00
8.5	8,959		0.0000	1.0000	100.00
9.5	15,089		0.0000	1.0000	100.00
10.5	16,830		0.0000	1.0000	100.00
11.5	17,919		0.0000	1.0000	100.00
12.5	17,919		0.0000	1.0000	100.00
13.5	17,919		0.0000	1.0000	100.00
14.5	17,919		0.0000	1.0000	100.00
15.5	17,919		0.0000	1.0000	100.00
16.5	17,919	2,264	0.1264	0.8736	100.00
17.5	15,654		0.0000	1.0000	87.36
18.5	19,901		0.0000	1.0000	87.36
19.5	19,907		0.0000	1.0000	87.36
20.5	25,081		0.0000	1.0000	87.36
21.5	31,763		0.0000	1.0000	87.36
22.5	35,166		0.0000	1.0000	87.36
23.5	57,329		0.0000	1.0000	87.36
24.5	56,878		0.0000	1.0000	87.36
25.5	63,073		0.0000	1.0000	87.36
26.5	64,934		0.0000	1.0000	87.36
27.5	64,934		0.0000	1.0000	87.36
28.5	64,934		0.0000	1.0000	87.36
29.5	73,768		0.0000	1.0000	87.36
30.5	75,839		0.0000	1.0000	87.36
31.5	75,839	4,775	0.0630	0.9370	87.36
32.5	71,064	2,615	0.0368	0.9632	81.86
33.5	64,676		0.0000	1.0000	78.85
34.5	71,048		0.0000	1.0000	78.85
35.5	70,720		0.0000	1.0000	78.85
36.5	67,948	3,686	0.0542	0.9458	78.85
37.5	61,519		0.0000	1.0000	74.57
38.5	33,268		0.0000	1.0000	74.57

PLACEMENT BAND 1932-2018 EXPERIENCE BAND 2006-2020

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	27,591		0.0000	1.0000	74.57
40.5	26,363		0.0000	1.0000	74.57
41.5	26,355		0.0000	1.0000	74.57
42.5	26,355		0.0000	1.0000	74.57
43.5	26,465		0.0000	1.0000	74.57
44.5	18,230	40	0.0022	0.9978	74.57
45.5	24,123		0.0000	1.0000	74.41
46.5	24,123		0.0000	1.0000	74.41
47.5	30,214	235	0.0078	0.9922	74.41
48.5	29,881		0.0000	1.0000	73.83
49.5	32,130	194	0.0060	0.9940	73.83
50.5	31,830	200	0.0063	0.9937	73.38
51.5	28,095	5,933	0.2112	0.7888	72.92
52.5	29,568		0.0000	1.0000	57.52
53.5	29,348	475	0.0162	0.9838	57.52
54.5	28,873		0.0000	1.0000	56.59
55.5	28,682	3,658	0.1275	0.8725	56.59
56.5	25,057		0.0000	1.0000	49.37
57.5	25,057		0.0000	1.0000	49.37
58.5	24,947	4,765	0.1910	0.8090	49.37
59.5	19,784		0.0000	1.0000	39.94
60.5	19,864		0.0000	1.0000	39.94
61.5	19,864		0.0000	1.0000	39.94
62.5	13,773	125	0.0091	0.9909	39.94
63.5	13,443		0.0000	1.0000	39.58
64.5	8,668		0.0000	1.0000	39.58
65.5	3,928		0.0000	1.0000	39.58
66.5	4,280	80	0.0187	0.9813	39.58
67.5	897		0.0000	1.0000	38.84
68.5	897		0.0000	1.0000	38.84
69.5	897	170	0.1895	0.8105	38.84
70.5	727		0.0000	1.0000	31.48
71.5	727		0.0000	1.0000	31.48
72.5	877	727	0.8290	0.1710	31.48
73.5	511		0.0000	1.0000	5.38
74.5	511		0.0000	1.0000	5.38
75.5	511		0.0000	1.0000	5.38
76.5	511		0.0000	1.0000	5.38
77.5	511		0.0000	1.0000	5.38
78.5	511		0.0000	1.0000	5.38

PLACEMENT BAND 1932-2018 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	511	361	0.7065	0.2935	5.38
80.5	150		0.0000	1.0000	1.58
81.5	150		0.0000	1.0000	1.58
82.5	150		0.0000	1.0000	1.58
83.5	150		0.0000	1.0000	1.58
84.5	150		0.0000	1.0000	1.58
85.5	150		0.0000	1.0000	1.58
86.5	150		0.0000	1.0000	1.58
87.5					1.58


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1928-2020 PLACEMENTS
IOWA 70-R1
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
AGE IN YEARS
0
20
40
60
80
100
120
140

PLACEMENT BAND 1928-2020 EXPERIENCE BAND 2006-2020

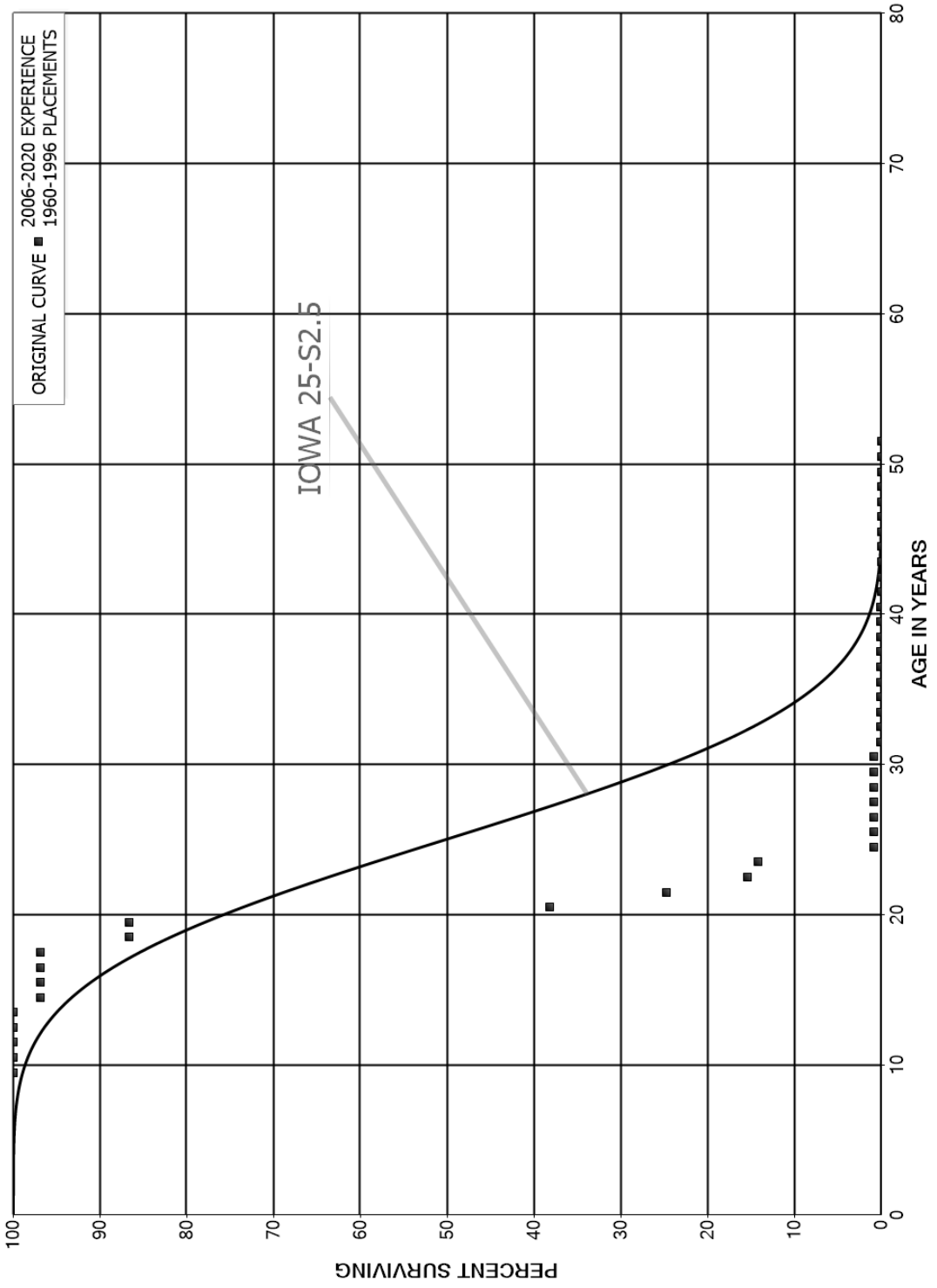
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	23,843,645		0.0000	1.0000	100.00
0.5	23,025,872	17,654	0.0008	0.9992	100.00
1.5	22,280,363	3,402	0.0002	0.9998	99.92
2.5	19,452,818	437,218	0.0225	0.9775	99.91
3.5	16,830,249	66,075	0.0039	0.9961	97.66
4.5	17,096,724	193,898	0.0113	0.9887	97.28
5.5	16,276,036	15,189	0.0009	0.9991	96.18
6.5	15,426,498	7,232	0.0005	0.9995	96.09
7.5	11,278,956	209,088	0.0185	0.9815	96.04
8.5	10,419,410	142,547	0.0137	0.9863	94.26
9.5	10,336,815	443,094	0.0429	0.9571	92.97
10.5	9,358,389	34,513	0.0037	0.9963	88.99
11.5	7,962,298	355,407	0.0446	0.9554	88.66
12.5	7,350,791	64,011	0.0087	0.9913	84.70
13.5	7,009,999	59,307	0.0085	0.9915	83.96
14.5	8,468,854	23,226	0.0027	0.9973	83.25
15.5	8,451,840	86,593	0.0102	0.9898	83.02
16.5	8,408,279	97,725	0.0116	0.9884	82.17
17.5	8,652,305	22,742	0.0026	0.9974	81.22
18.5	9,274,897		0.0000	1.0000	81.00
19.5	8,501,153		0.0000	1.0000	81.00
20.5	8,376,243		0.0000	1.0000	81.00
21.5	7,795,643		0.0000	1.0000	81.00
22.5	6,738,228	3,061	0.0005	0.9995	81.00
23.5	7,007,397	1,822	0.0003	0.9997	80.97
24.5	7,508,696	617	0.0001	0.9999	80.95
25.5	7,248,761	5,717	0.0008	0.9992	80.94
26.5	7,309,264	22,722	0.0031	0.9969	80.88
27.5	7,154,632	8,871	0.0012	0.9988	80.63
28.5	7,131,086	3,780	0.0005	0.9995	80.53
29.5	5,612,330	7,266	0.0013	0.9987	80.48
30.5	5,440,722	10,598	0.0019	0.9981	80.38
31.5	5,331,951	26,844	0.0050	0.9950	80.22
32.5	4,934,691	14,957	0.0030	0.9970	79.82
33.5	4,196,956	3,936	0.0009	0.9991	79.58
34.5	4,213,993	486	0.0001	0.9999	79.50
35.5	4,102,461	6,650	0.0016	0.9984	79.49
36.5	3,856,300		0.0000	1.0000	79.36
37.5	3,570,846	126,638	0.0355	0.9645	79.36
38.5	2,649,868	17,777	0.0067	0.9933	76.55

PLACEMENT BAND 1928-2020 EXPERIENCE BAND 2006-2020

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	2,232,624		0.0000	1.0000	76.04
40.5	2,345,862	1,226	0.0005	0.9995	76.04
41.5	2,097,034	2,411	0.0011	0.9989	76.00
42.5	2,307,180	2,891	0.0013	0.9987	75.91
43.5	2,208,630	538	0.0002	0.9998	75.81
44.5	3,116,729	922	0.0003	0.9997	75.79
45.5	3,117,254	9,038	0.0029	0.9971	75.77
46.5	2,937,124	21,930	0.0075	0.9925	75.55
47.5	2,779,638	1,055	0.0004	0.9996	74.99
48.5	2,794,591	48,076	0.0172	0.9828	74.96
49.5	2,684,473	13,107	0.0049	0.9951	73.67
50.5	2,993,431	17,656	0.0059	0.9941	73.31
51.5	2,956,682	6,275	0.0021	0.9979	72.88
52.5	2,766,275	13,015	0.0047	0.9953	72.72
53.5	2,603,581	52,947	0.0203	0.9797	72.38
54.5	2,373,490		0.0000	1.0000	70.91
55.5	2,134,614		0.0000	1.0000	70.91
56.5	1,945,077	12,860	0.0066	0.9934	70.91
57.5	2,051,232	992	0.0005	0.9995	70.44
58.5	2,022,856		0.0000	1.0000	70.41
59.5	1,079,954	3,779	0.0035	0.9965	70.41
60.5	987,394	635	0.0006	0.9994	70.16
61.5	985,822	1,037	0.0011	0.9989	70.11
62.5	971,958		0.0000	1.0000	70.04
63.5	940,362	1,100	0.0012	0.9988	70.04
64.5	852,519		0.0000	1.0000	69.96
65.5	491,467		0.0000	1.0000	69.96
66.5	455,854		0.0000	1.0000	69.96
67.5	441,546		0.0000	1.0000	69.96
68.5	510,914		0.0000	1.0000	69.96
69.5	561,862	9,490	0.0169	0.9831	69.96
70.5	552,083	9,808	0.0178	0.9822	68.78
71.5	644,495	6,476	0.0100	0.9900	67.56
72.5	228,523	8,721	0.0382	0.9618	66.88
73.5	236,995		0.0000	1.0000	64.32
74.5	235,900	1,498	0.0063	0.9937	64.32
75.5	233,336	6,410	0.0275	0.9725	63.92
76.5	377,750		0.0000	1.0000	62.16
77.5	380,615	1	0.0000	1.0000	62.16
78.5	375,415	1,636	0.0044	0.9956	62.16

PLACEMENT BAND 1928-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	373,779		0.0000	1.0000	61.89
80.5	373,779		0.0000	1.0000	61.89
81.5	372,519		0.0000	1.0000	61.89
82.5	372,519	19,000	0.0510	0.9490	61.89
83.5	336,870	2,469	0.0073	0.9927	58.73
84.5	284,887		0.0000	1.0000	58.30
85.5	281,773	7,357	0.0261	0.9739	58.30
86.5	179,036	4,788	0.0267	0.9733	56.78
87.5	172,638		0.0000	1.0000	55.26
88.5	152,504		0.0000	1.0000	55.26
89.5	152,504		0.0000	1.0000	55.26
90.5	152,504		0.0000	1.0000	55.26
91.5	1,680		0.0000	1.0000	55.26
92.5					55.26

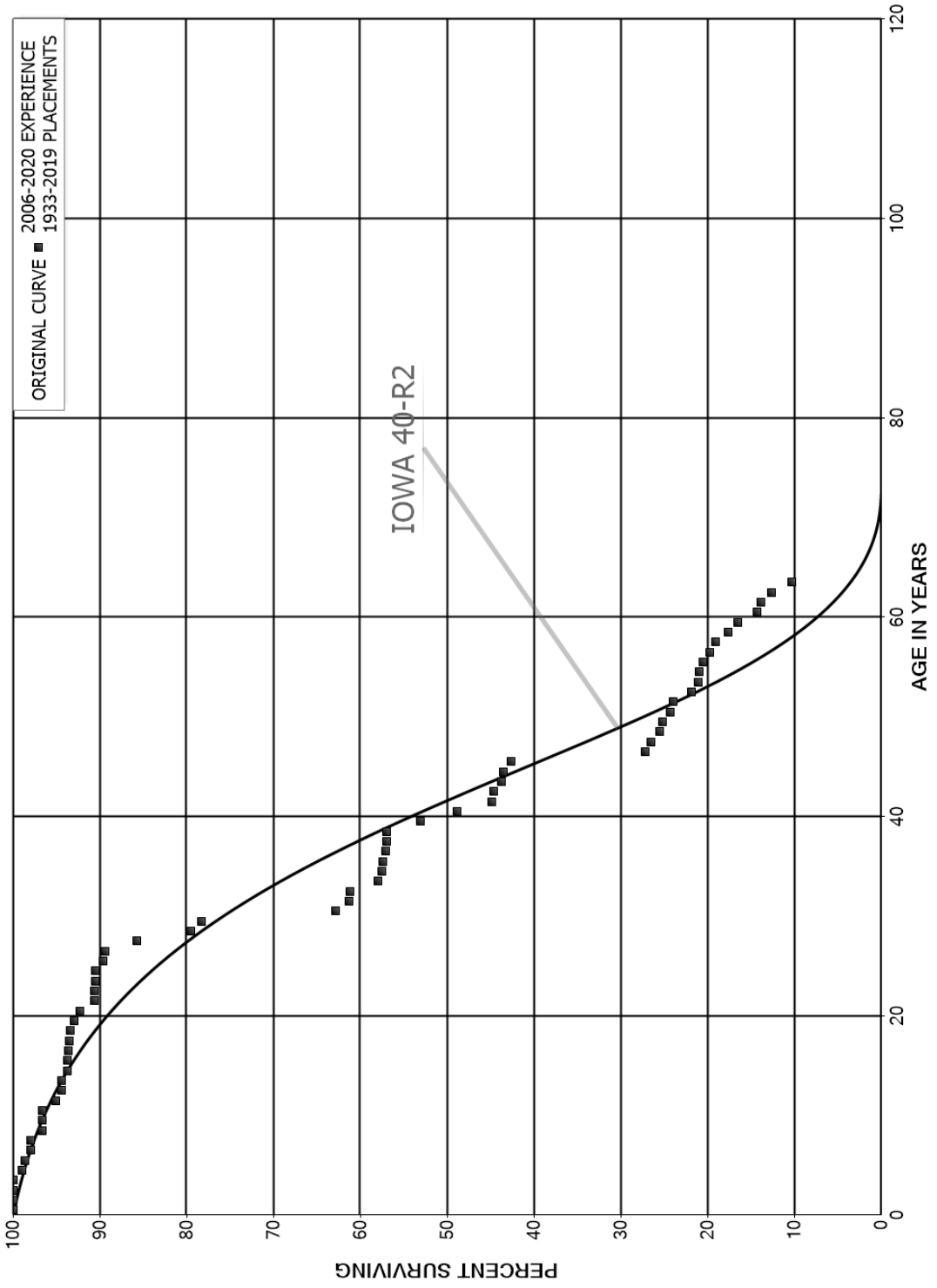

ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1960-1996 PLACEMENTS
IOWA 25-S2.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80

PLACEMENT BAND 1960-1996 EXPERIENCE BAND 2006-2020

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					
0.5					
1.5					
2.5					
3.5					
4.5					
5.5					
6.5					
7.5					
8.5					
9.5	20,927		0.0000	1.0000	100.00
10.5	21,820		0.0000	1.0000	100.00
11.5	21,820		0.0000	1.0000	100.00
12.5	21,820		0.0000	1.0000	100.00
13.5	105,227	3,290	0.0313	0.9687	100.00
14.5	125,064		0.0000	1.0000	96.87
15.5	140,869		0.0000	1.0000	96.87
16.5	142,976		0.0000	1.0000	96.87
17.5	165,905	17,637	0.1063	0.8937	96.87
18.5	148,268		0.0000	1.0000	86.57
19.5	148,268	82,882	0.5590	0.4410	86.57
20.5	65,386	23,126	0.3537	0.6463	38.18
21.5	42,259	15,806	0.3740	0.6260	24.68
22.5	26,453	2,107	0.0796	0.9204	15.45
23.5	24,347	22,929	0.9418	0.0582	14.22
24.5	156,409		0.0000	1.0000	0.83
25.5	155,707		0.0000	1.0000	0.83
26.5	155,707		0.0000	1.0000	0.83
27.5	155,707		0.0000	1.0000	0.83
28.5	155,672		0.0000	1.0000	0.83
29.5	155,672		0.0000	1.0000	0.83
30.5	158,077	154,991	0.9805	0.0195	0.83
31.5	11,081	191	0.0172	0.9828	0.02
32.5	10,890		0.0000	1.0000	0.02
33.5	11,200		0.0000	1.0000	0.02
34.5	94,923	490	0.0052	0.9948	0.02
35.5	108,852		0.0000	1.0000	0.02
36.5	108,852	2,405	0.0221	0.9779	0.02
37.5	106,609	7,995	0.0750	0.9250	0.02
38.5	98,613		0.0000	1.0000	0.01

PLACEMENT BAND 1960-1996 EXPERIENCE BAND 2006-2020

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	98,917	309	0.0031	0.9969	0.01
40.5	100,975	83,724	0.8292	0.1708	0.01
41.5	17,753	14,418	0.8122	0.1878	0.00
42.5	14,313		0.0000	1.0000	0.00
43.5	82,937	162	0.0019	0.9981	0.00
44.5	136,414		0.0000	1.0000	0.00
45.5	171,862	304	0.0018	0.9982	0.00
46.5	171,559	2,367	0.0138	0.9862	0.00
47.5	169,192	502	0.0030	0.9970	0.00
48.5	168,690	8,550	0.0507	0.9493	0.00
49.5	160,139	68,624	0.4285	0.5715	0.00
50.5	91,516	55,010	0.6011	0.3989	0.00
51.5	36,505	35,448	0.9710	0.0290	0.00
52.5	1,057		0.0000	1.0000	0.00
53.5	1,057		0.0000	1.0000	0.00
54.5	1,057		0.0000	1.0000	0.00
55.5	1,057		0.0000	1.0000	0.00
56.5	1,057		0.0000	1.0000	0.00
57.5	1,057		0.0000	1.0000	0.00
58.5	1,057		0.0000	1.0000	0.00
59.5					0.00


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1933-2019 PLACEMENTS
IOWA 40-R2
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

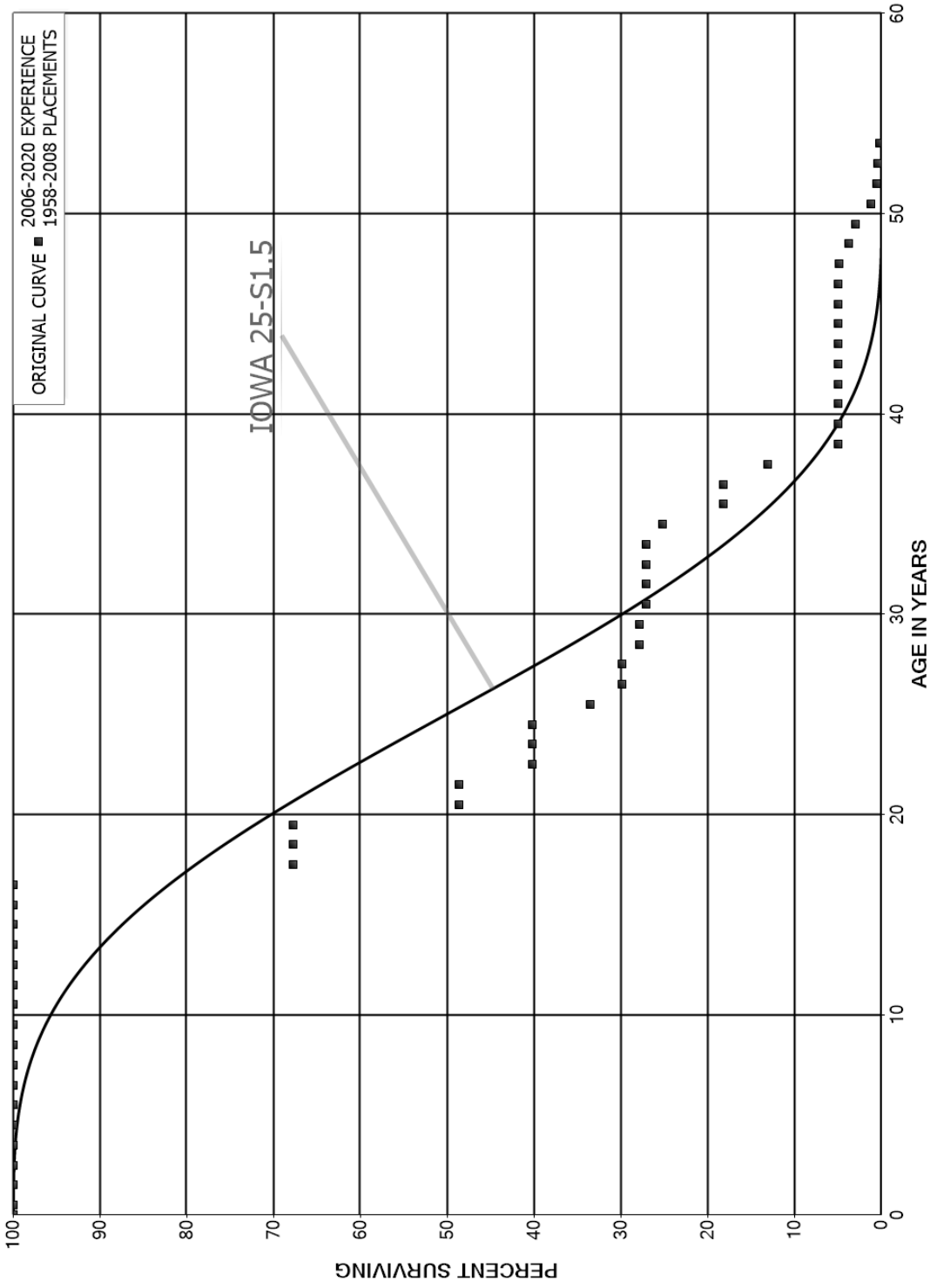
PLACEMENT BAND 1933-2019 EXPERIENCE BAND 2006-2020

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	2,198,863		0.0000	1.0000	100.00
0.5	2,214,935		0.0000	1.0000	100.00
1.5	1,883,761		0.0000	1.0000	100.00
2.5	1,723,934	17	0.0000	1.0000	100.00
3.5	1,630,845	17,766	0.0109	0.9891	100.00
4.5	1,450,914	4,517	0.0031	0.9969	98.91
5.5	1,565,635	10,261	0.0066	0.9934	98.60
6.5	1,463,927	68	0.0000	1.0000	97.96
7.5	1,582,380	21,351	0.0135	0.9865	97.95
8.5	1,440,863		0.0000	1.0000	96.63
9.5	1,491,394		0.0000	1.0000	96.63
10.5	1,483,011	23,309	0.0157	0.9843	96.63
11.5	1,375,917	10,636	0.0077	0.9923	95.11
12.5	1,236,378		0.0000	1.0000	94.38
13.5	1,233,209	8,810	0.0071	0.9929	94.38
14.5	1,420,681		0.0000	1.0000	93.70
15.5	1,454,826	742	0.0005	0.9995	93.70
16.5	1,423,566	1,604	0.0011	0.9989	93.65
17.5	1,434,070	1,965	0.0014	0.9986	93.55
18.5	1,602,292	8,681	0.0054	0.9946	93.42
19.5	1,587,743	11,569	0.0073	0.9927	92.91
20.5	1,483,647	26,130	0.0176	0.9824	92.24
21.5	1,635,580		0.0000	1.0000	90.61
22.5	1,402,815	1,344	0.0010	0.9990	90.61
23.5	1,592,057		0.0000	1.0000	90.53
24.5	1,510,963	15,706	0.0104	0.9896	90.53
25.5	1,374,951	2,324	0.0017	0.9983	89.58
26.5	1,333,114	55,417	0.0416	0.9584	89.43
27.5	1,254,109	90,063	0.0718	0.9282	85.72
28.5	1,146,431	17,966	0.0157	0.9843	79.56
29.5	911,331	180,504	0.1981	0.8019	78.31
30.5	690,232	16,191	0.0235	0.9765	62.80
31.5	672,222	1,197	0.0018	0.9982	61.33
32.5	653,980	34,769	0.0532	0.9468	61.22
33.5	426,557	3,730	0.0087	0.9913	57.96
34.5	421,576	600	0.0014	0.9986	57.46
35.5	403,692	2,223	0.0055	0.9945	57.38
36.5	338,901	815	0.0024	0.9976	57.06
37.5	333,207		0.0000	1.0000	56.92
38.5	134,164	9,189	0.0685	0.9315	56.92

PLACEMENT BAND 1933-2019 EXPERIENCE BAND 2006-2020

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	85,339	6,685	0.0783	0.9217	53.02
40.5	76,546	6,398	0.0836	0.9164	48.87
41.5	73,194	312	0.0043	0.9957	44.79
42.5	104,606	1,961	0.0187	0.9813	44.59
43.5	95,805	500	0.0052	0.9948	43.76
44.5	92,542	2,034	0.0220	0.9780	43.53
45.5	142,073	51,551	0.3628	0.6372	42.57
46.5	94,101	2,343	0.0249	0.9751	27.13
47.5	97,469	3,460	0.0355	0.9645	26.45
48.5	102,218	1,205	0.0118	0.9882	25.51
49.5	105,180	3,646	0.0347	0.9653	25.21
50.5	105,694	1,798	0.0170	0.9830	24.34
51.5	106,069	9,147	0.0862	0.9138	23.92
52.5	94,888	3,568	0.0376	0.9624	21.86
53.5	92,159	404	0.0044	0.9956	21.04
54.5	90,053	1,759	0.0195	0.9805	20.95
55.5	83,992	3,103	0.0369	0.9631	20.54
56.5	72,482	2,606	0.0359	0.9641	19.78
57.5	35,699	2,813	0.0788	0.9212	19.07
58.5	32,225	1,960	0.0608	0.9392	17.56
59.5	24,655	3,374	0.1369	0.8631	16.50
60.5	22,170	555	0.0250	0.9750	14.24
61.5	19,602	1,780	0.0908	0.9092	13.88
62.5	13,121	2,439	0.1859	0.8141	12.62
63.5	8,022		0.0000	1.0000	10.28
64.5	5,775	125	0.0216	0.9784	10.28
65.5	2,625	38	0.0144	0.9856	10.05
66.5	2,592	1,002	0.3867	0.6133	9.91
67.5	1,488	47	0.0315	0.9685	6.08
68.5	12		0.0000	1.0000	5.89
69.5	12		0.0000	1.0000	5.89
70.5	12		0.0000	1.0000	5.89
71.5	12		0.0000	1.0000	5.89
72.5	2,227	12	0.0056	0.9944	5.89
73.5	2,215		0.0000	1.0000	5.85
74.5	2,215		0.0000	1.0000	5.85
75.5	2,215		0.0000	1.0000	5.85
76.5	2,215		0.0000	1.0000	5.85
77.5	2,215		0.0000	1.0000	5.85
78.5	2,215	2,150	0.9706	0.0294	5.85

PLACEMENT BAND 1933-2019			EXPERIENCE BAND 2006-2020		
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	65		0.0000	1.0000	0.17
80.5	65		0.0000	1.0000	0.17
81.5	65		0.0000	1.0000	0.17
82.5	65		0.0000	1.0000	0.17
83.5	65		0.0000	1.0000	0.17
84.5	65		0.0000	1.0000	0.17
85.5	65		0.0000	1.0000	0.17
86.5	65		0.0000	1.0000	0.17
87.5					0.17

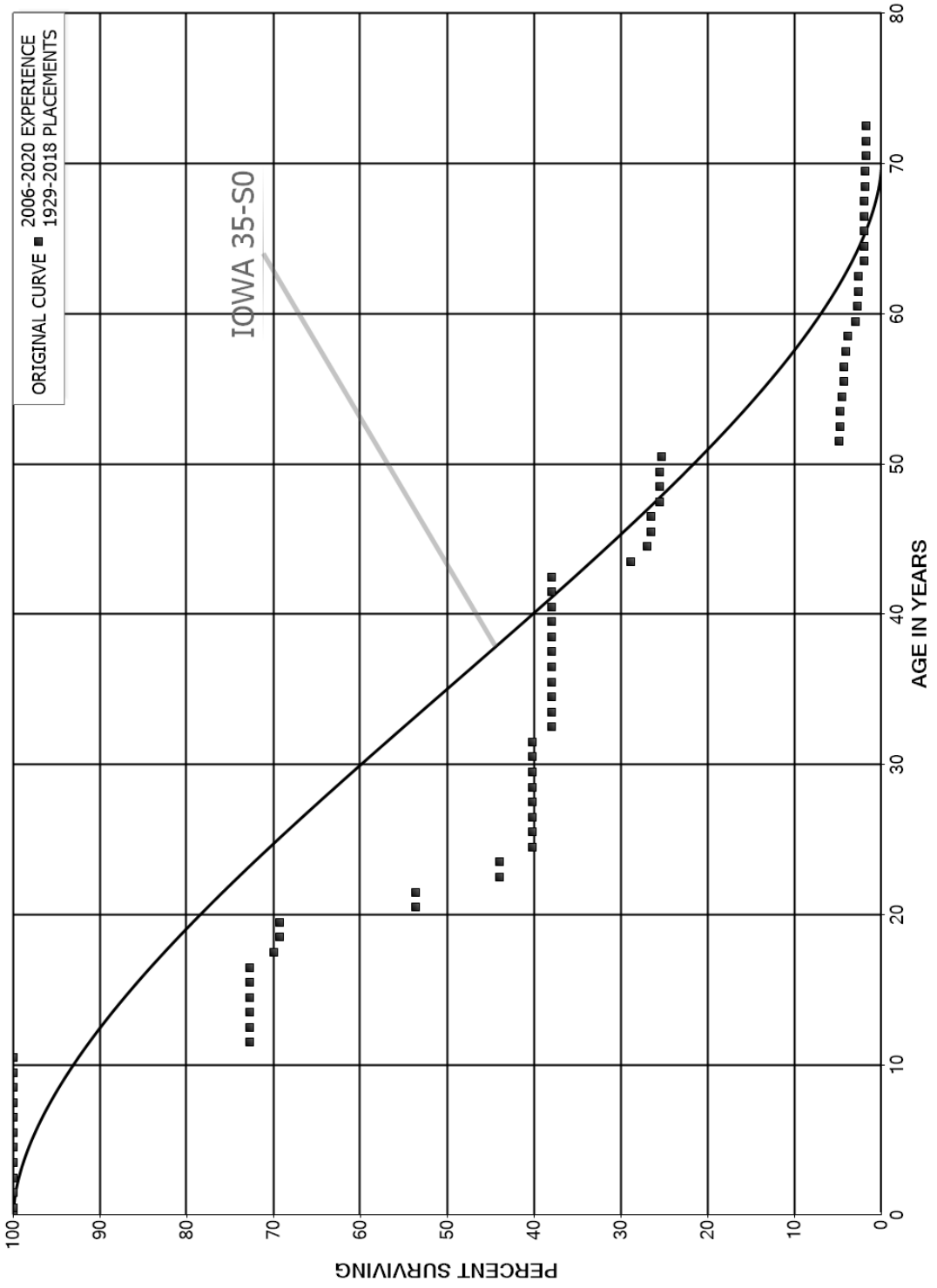

ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1958-2008 PLACEMENTS
IOWA 25-S1.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60

PLACEMENT BAND 1958-2008 EXPERIENCE BAND 2006-2020

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	50,034		0.0000	1.0000	100.00
0.5	50,034		0.0000	1.0000	100.00
1.5	50,034		0.0000	1.0000	100.00
2.5	50,034		0.0000	1.0000	100.00
3.5	50,034		0.0000	1.0000	100.00
4.5	50,034		0.0000	1.0000	100.00
5.5	50,034		0.0000	1.0000	100.00
6.5	50,034		0.0000	1.0000	100.00
7.5	50,034		0.0000	1.0000	100.00
8.5	50,034		0.0000	1.0000	100.00
9.5	51,479		0.0000	1.0000	100.00
10.5	82,378		0.0000	1.0000	100.00
11.5	85,818		0.0000	1.0000	100.00
12.5	35,783		0.0000	1.0000	100.00
13.5	75,700		0.0000	1.0000	100.00
14.5	75,700		0.0000	1.0000	100.00
15.5	94,563		0.0000	1.0000	100.00
16.5	100,046	32,344	0.3233	0.6767	100.00
17.5	94,655		0.0000	1.0000	67.67
18.5	108,266		0.0000	1.0000	67.67
19.5	115,814	32,601	0.2815	0.7185	67.67
20.5	92,810		0.0000	1.0000	48.62
21.5	96,818	16,749	0.1730	0.8270	48.62
22.5	80,069		0.0000	1.0000	40.21
23.5	82,141		0.0000	1.0000	40.21
24.5	82,141	13,611	0.1657	0.8343	40.21
25.5	68,530	7,548	0.1101	0.8899	33.55
26.5	57,543		0.0000	1.0000	29.85
27.5	59,414	4,008	0.0675	0.9325	29.85
28.5	55,462		0.0000	1.0000	27.84
29.5	56,301	1,609	0.0286	0.9714	27.84
30.5	55,143		0.0000	1.0000	27.04
31.5	54,804		0.0000	1.0000	27.04
32.5	27,851		0.0000	1.0000	27.04
33.5	27,851	1,871	0.0672	0.9328	27.04
34.5	26,211	7,371	0.2812	0.7188	25.23
35.5	9,242		0.0000	1.0000	18.13
36.5	9,242	2,566	0.2776	0.7224	18.13
37.5	8,231	5,144	0.6250	0.3750	13.10
38.5	2,624		0.0000	1.0000	4.91

PLACEMENT BAND 1958-2008 EXPERIENCE BAND 2006-2020

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	2,624		0.0000	1.0000	4.91
40.5	3,507		0.0000	1.0000	4.91
41.5	12,575		0.0000	1.0000	4.91
42.5	19,816		0.0000	1.0000	4.91
43.5	34,469		0.0000	1.0000	4.91
44.5	39,337		0.0000	1.0000	4.91
45.5	39,967		0.0000	1.0000	4.91
46.5	39,967	883	0.0221	0.9779	4.91
47.5	40,959	9,068	0.2214	0.7786	4.80
48.5	31,891	7,241	0.2270	0.7730	3.74
49.5	24,419	14,653	0.6001	0.3999	2.89
50.5	9,766	5,386	0.5515	0.4485	1.16
51.5	4,380	630	0.1438	0.8562	0.52
52.5	2,196	1,100	0.5009	0.4991	0.44
53.5	1,096	775	0.7072	0.2928	0.22
54.5	321		0.0000	1.0000	0.06
55.5	321		0.0000	1.0000	0.06
56.5	321		0.0000	1.0000	0.06
57.5	321		0.0000	1.0000	0.06
58.5	321		0.0000	1.0000	0.06
59.5					0.06


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1929-2018 PLACEMENTS
IOWA 35-S0
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80

PLACEMENT BAND 1929-2018 EXPERIENCE BAND 2006-2020

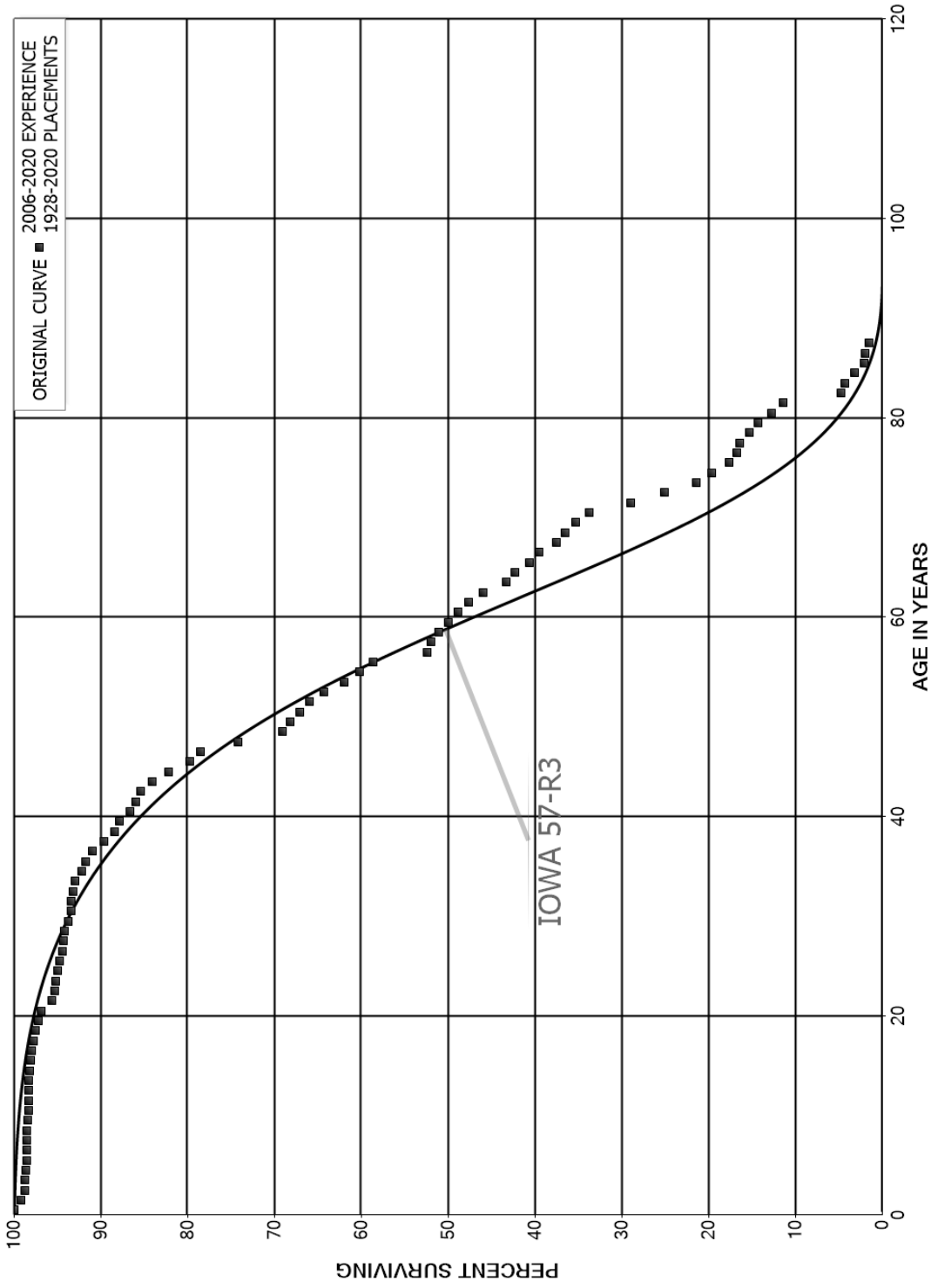
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	921,770		0.0000	1.0000	100.00
0.5	921,770		0.0000	1.0000	100.00
1.5	918,678		0.0000	1.0000	100.00
2.5	919,533		0.0000	1.0000	100.00
3.5	842,715		0.0000	1.0000	100.00
4.5	827,326		0.0000	1.0000	100.00
5.5	753,110		0.0000	1.0000	100.00
6.5	267,986		0.0000	1.0000	100.00
7.5	112,914		0.0000	1.0000	100.00
8.5	61,646		0.0000	1.0000	100.00
9.5	61,646		0.0000	1.0000	100.00
10.5	61,646	16,783	0.2722	0.7278	100.00
11.5	35,053		0.0000	1.0000	72.78
12.5	27,680		0.0000	1.0000	72.78
13.5	40,449		0.0000	1.0000	72.78
14.5	62,016		0.0000	1.0000	72.78
15.5	62,016		0.0000	1.0000	72.78
16.5	62,016	2,371	0.0382	0.9618	72.78
17.5	71,325	697	0.0098	0.9902	69.99
18.5	71,321		0.0000	1.0000	69.31
19.5	56,413	12,769	0.2264	0.7736	69.31
20.5	43,644		0.0000	1.0000	53.62
21.5	43,644	7,918	0.1814	0.8186	53.62
22.5	35,726		0.0000	1.0000	43.89
23.5	44,592	3,757	0.0842	0.9158	43.89
24.5	40,835		0.0000	1.0000	40.19
25.5	43,740		0.0000	1.0000	40.19
26.5	43,740		0.0000	1.0000	40.19
27.5	46,450		0.0000	1.0000	40.19
28.5	46,450		0.0000	1.0000	40.19
29.5	30,206		0.0000	1.0000	40.19
30.5	30,206		0.0000	1.0000	40.19
31.5	30,206	1,716	0.0568	0.9432	40.19
32.5	16,409		0.0000	1.0000	37.91
33.5	18,370		0.0000	1.0000	37.91
34.5	18,669		0.0000	1.0000	37.91
35.5	18,669		0.0000	1.0000	37.91
36.5	21,635		0.0000	1.0000	37.91
37.5	21,961		0.0000	1.0000	37.91
38.5	14,762		0.0000	1.0000	37.91

PLACEMENT BAND 1929-2018 EXPERIENCE BAND 2006-2020

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	14,762		0.0000	1.0000	37.91
40.5	13,128		0.0000	1.0000	37.91
41.5	14,154		0.0000	1.0000	37.91
42.5	12,367	2,965	0.2398	0.7602	37.91
43.5	9,671	623	0.0645	0.9355	28.82
44.5	16,914	294	0.0174	0.9826	26.96
45.5	16,620		0.0000	1.0000	26.49
46.5	16,620	621	0.0374	0.9626	26.49
47.5	16,680		0.0000	1.0000	25.50
48.5	38,697		0.0000	1.0000	25.50
49.5	40,230	270	0.0067	0.9933	25.50
50.5	41,373	33,423	0.8079	0.1921	25.33
51.5	9,279	309	0.0332	0.9668	4.87
52.5	17,341		0.0000	1.0000	4.71
53.5	17,433	681	0.0391	0.9609	4.71
54.5	17,513	751	0.0429	0.9571	4.52
55.5	18,285		0.0000	1.0000	4.33
56.5	22,811	1,412	0.0619	0.9381	4.33
57.5	22,450	1,330	0.0592	0.9408	4.06
58.5	21,121	4,876	0.2308	0.7692	3.82
59.5	15,807	1,144	0.0723	0.9277	2.94
60.5	14,663	402	0.0274	0.9726	2.73
61.5	14,455		0.0000	1.0000	2.65
62.5	14,455	3,935	0.2722	0.7278	2.65
63.5	10,016		0.0000	1.0000	1.93
64.5	8,445		0.0000	1.0000	1.93
65.5	8,538		0.0000	1.0000	1.93
66.5	9,028		0.0000	1.0000	1.93
67.5	5,564	194	0.0349	0.9651	1.93
68.5	5,370		0.0000	1.0000	1.86
69.5	5,225	325	0.0622	0.9378	1.86
70.5	3,378		0.0000	1.0000	1.75
71.5	2,510	93	0.0371	0.9629	1.75
72.5	736	490	0.6655	0.3345	1.68
73.5	246	31	0.1249	0.8751	0.56
74.5	314		0.0000	1.0000	0.49
75.5	828	216	0.2602	0.7398	0.49
76.5	2,051		0.0000	1.0000	0.36
77.5	2,051		0.0000	1.0000	0.36
78.5	2,051		0.0000	1.0000	0.36

PLACEMENT BAND 1929-2018 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	2,051		0.0000	1.0000	0.36
80.5	2,051	99	0.0482	0.9518	0.36
81.5	1,953	462	0.2366	0.7634	0.35
82.5	1,491	1,439	0.9652	0.0348	0.26
83.5	52		0.0000	1.0000	0.01
84.5	52		0.0000	1.0000	0.01
85.5	52		0.0000	1.0000	0.01
86.5	52		0.0000	1.0000	0.01
87.5	52		0.0000	1.0000	0.01
88.5	52		0.0000	1.0000	0.01
89.5	52		0.0000	1.0000	0.01
90.5					0.01


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1928-2020 PLACEMENTS
IOWA 57-R3
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

PLACEMENT BAND 1928-2020 EXPERIENCE BAND 2006-2020

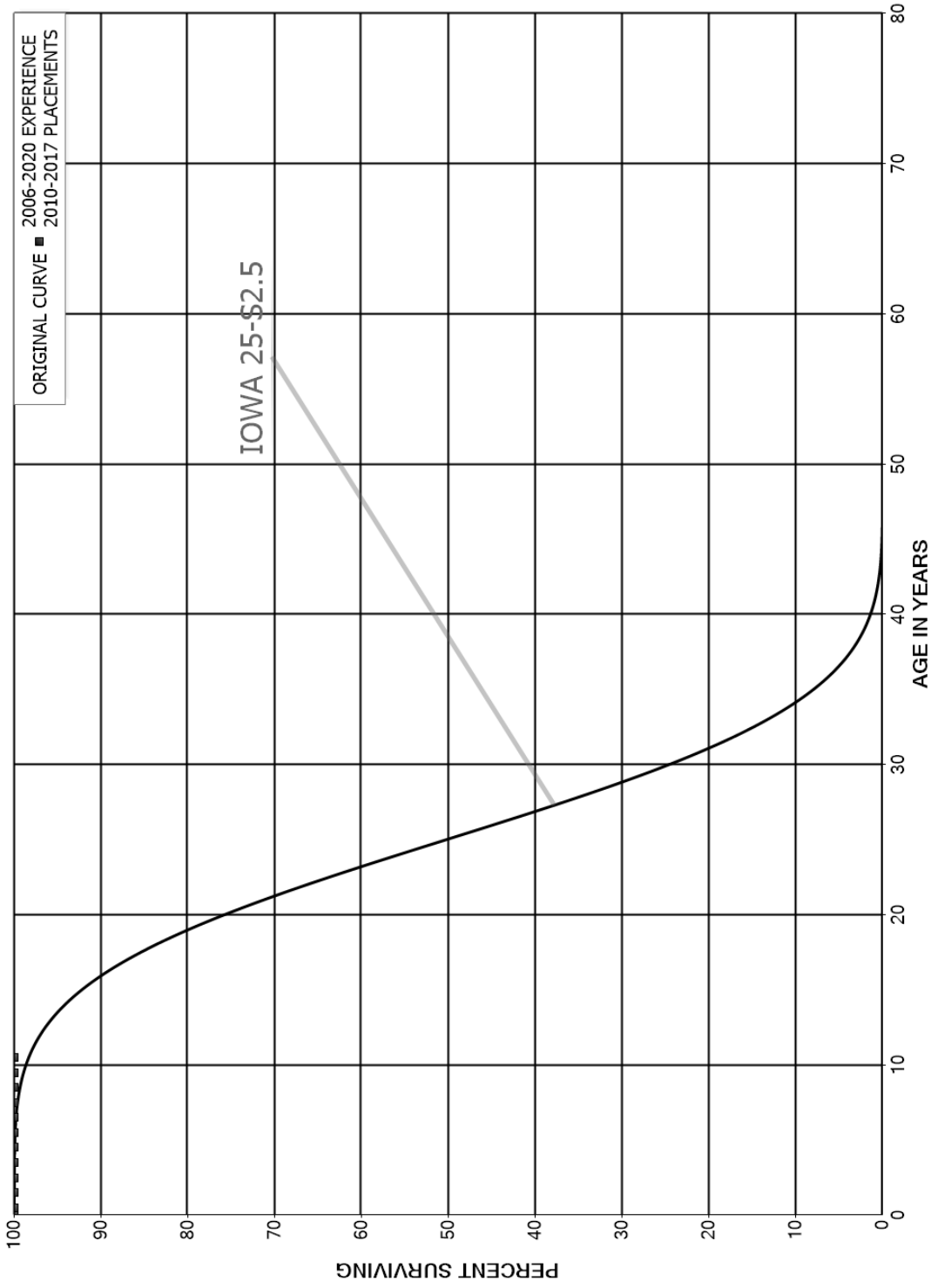
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	70,157,627	9,433	0.0001	0.9999	100.00
0.5	63,921,660	546,616	0.0086	0.9914	99.99
1.5	55,909,492	227,142	0.0041	0.9959	99.13
2.5	47,282,275	14,292	0.0003	0.9997	98.73
3.5	43,637,690	25,151	0.0006	0.9994	98.70
4.5	41,667,827	42,053	0.0010	0.9990	98.64
5.5	38,497,844	1,699	0.0000	1.0000	98.54
6.5	35,827,853	20,792	0.0006	0.9994	98.54
7.5	33,894,931	10,322	0.0003	0.9997	98.48
8.5	32,635,475	26,017	0.0008	0.9992	98.45
9.5	31,427,238	19,773	0.0006	0.9994	98.37
10.5	30,676,029	4,092	0.0001	0.9999	98.31
11.5	30,249,025	5,477	0.0002	0.9998	98.30
12.5	29,021,925	4,531	0.0002	0.9998	98.28
13.5	28,970,811	37,775	0.0013	0.9987	98.26
14.5	29,428,747	25,558	0.0009	0.9991	98.14
15.5	28,505,640	30,406	0.0011	0.9989	98.05
16.5	28,043,183	77,800	0.0028	0.9972	97.95
17.5	27,298,468	42,766	0.0016	0.9984	97.67
18.5	26,604,141	104,923	0.0039	0.9961	97.52
19.5	25,828,066	82,862	0.0032	0.9968	97.14
20.5	24,309,633	303,295	0.0125	0.9875	96.83
21.5	22,460,935	85,411	0.0038	0.9962	95.62
22.5	21,614,209	27,766	0.0013	0.9987	95.25
23.5	20,687,079	32,820	0.0016	0.9984	95.13
24.5	19,763,460	43,955	0.0022	0.9978	94.98
25.5	18,951,243	70,540	0.0037	0.9963	94.77
26.5	17,502,892	20,108	0.0011	0.9989	94.42
27.5	16,608,917	18,220	0.0011	0.9989	94.31
28.5	15,535,956	71,367	0.0046	0.9954	94.20
29.5	14,443,014	56,172	0.0039	0.9961	93.77
30.5	14,589,290	9,233	0.0006	0.9994	93.41
31.5	14,281,443	27,217	0.0019	0.9981	93.35
32.5	13,610,242	39,966	0.0029	0.9971	93.17
33.5	13,413,151	99,359	0.0074	0.9926	92.90
34.5	12,889,742	67,853	0.0053	0.9947	92.21
35.5	13,165,581	115,053	0.0087	0.9913	91.72
36.5	13,162,327	195,977	0.0149	0.9851	90.92
37.5	12,662,855	167,344	0.0132	0.9868	89.57
38.5	11,871,069	71,532	0.0060	0.9940	88.38

PLACEMENT BAND 1928-2020 EXPERIENCE BAND 2006-2020

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	11,037,908	160,159	0.0145	0.9855	87.85
40.5	10,567,534	73,461	0.0070	0.9930	86.58
41.5	9,897,546	72,379	0.0073	0.9927	85.97
42.5	9,360,660	146,052	0.0156	0.9844	85.35
43.5	8,713,627	190,180	0.0218	0.9782	84.01
44.5	8,211,047	245,708	0.0299	0.9701	82.18
45.5	7,111,234	113,068	0.0159	0.9841	79.72
46.5	6,195,133	335,843	0.0542	0.9458	78.45
47.5	5,468,965	376,921	0.0689	0.9311	74.20
48.5	4,589,087	58,490	0.0127	0.9873	69.09
49.5	4,203,891	67,619	0.0161	0.9839	68.21
50.5	3,311,911	57,237	0.0173	0.9827	67.11
51.5	2,779,419	71,371	0.0257	0.9743	65.95
52.5	2,503,837	90,496	0.0361	0.9639	64.26
53.5	2,063,336	57,756	0.0280	0.9720	61.93
54.5	1,938,282	49,900	0.0257	0.9743	60.20
55.5	1,731,903	185,282	0.1070	0.8930	58.65
56.5	1,487,336	12,916	0.0087	0.9913	52.38
57.5	1,489,104	23,229	0.0156	0.9844	51.92
58.5	1,375,371	31,714	0.0231	0.9769	51.11
59.5	924,632	19,478	0.0211	0.9789	49.93
60.5	838,465	21,786	0.0260	0.9740	48.88
61.5	749,111	25,807	0.0345	0.9655	47.61
62.5	663,780	38,141	0.0575	0.9425	45.97
63.5	520,015	13,067	0.0251	0.9749	43.33
64.5	400,602	15,901	0.0397	0.9603	42.24
65.5	322,946	8,139	0.0252	0.9748	40.56
66.5	271,429	14,121	0.0520	0.9480	39.54
67.5	201,798	5,351	0.0265	0.9735	37.48
68.5	194,923	6,344	0.0325	0.9675	36.49
69.5	142,178	6,510	0.0458	0.9542	35.30
70.5	106,843	14,953	0.1400	0.8600	33.69
71.5	76,296	10,237	0.1342	0.8658	28.97
72.5	22,736	3,337	0.1468	0.8532	25.08
73.5	14,007	1,160	0.0828	0.9172	21.40
74.5	16,549	1,654	0.1000	0.9000	19.63
75.5	82,964	4,216	0.0508	0.9492	17.67
76.5	91,460	2,122	0.0232	0.9768	16.77
77.5	107,009	6,832	0.0638	0.9362	16.38
78.5	99,735	6,889	0.0691	0.9309	15.34

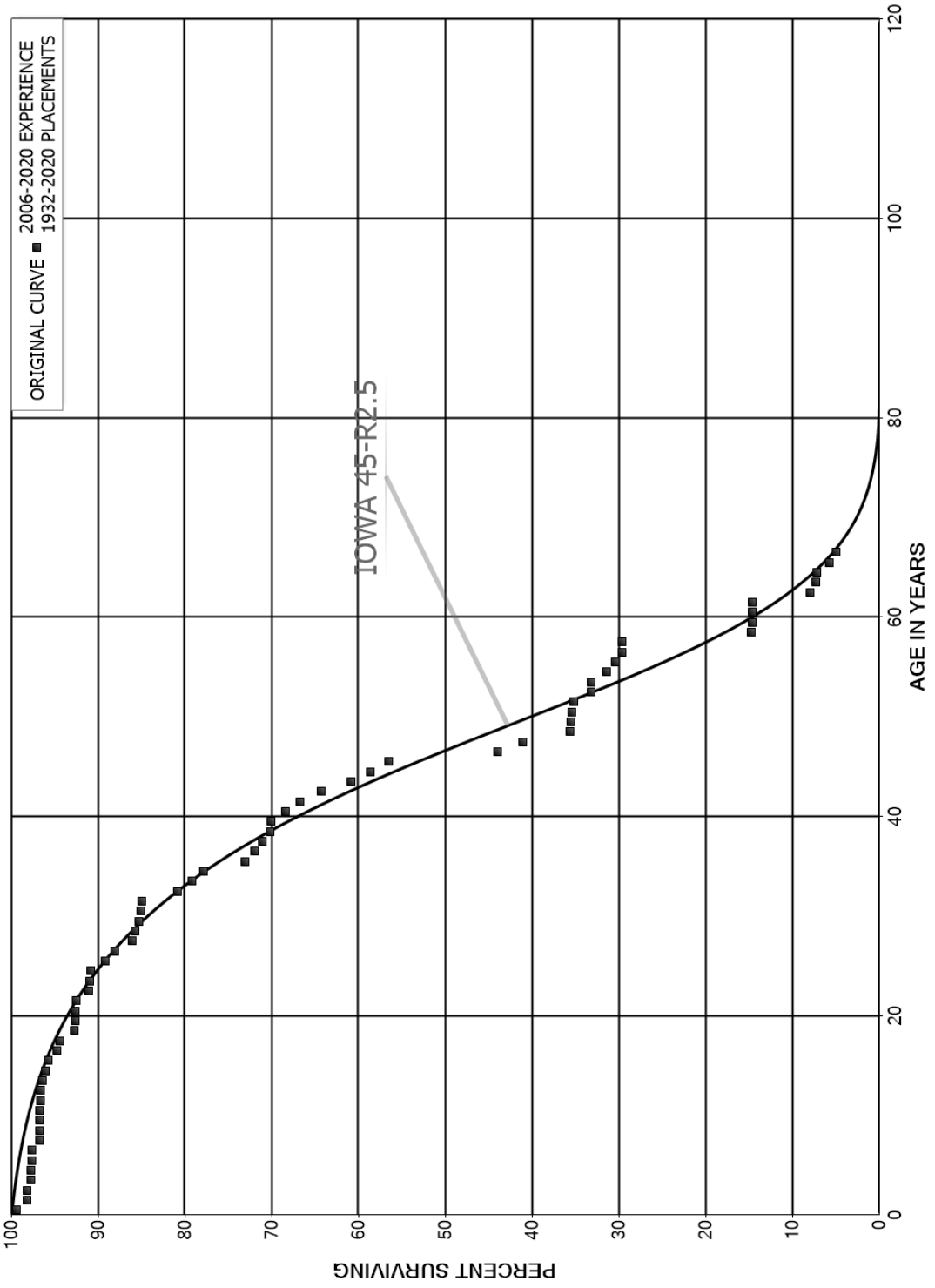
PLACEMENT BAND 1928-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	92,481	9,893	0.1070	0.8930	14.28
80.5	82,166	8,461	0.1030	0.8970	12.75
81.5	73,451	43,337	0.5900	0.4100	11.44
82.5	30,104	2,796	0.0929	0.9071	4.69
83.5	27,307	6,788	0.2486	0.7514	4.25
84.5	20,382	7,073	0.3470	0.6530	3.20
85.5	13,309	944	0.0710	0.9290	2.09
86.5	12,329	3,008	0.2439	0.7561	1.94
87.5	9,307	3,091	0.3321	0.6679	1.47
88.5	6,216	2,509	0.4036	0.5964	0.98
89.5	3,688	1,813	0.4916	0.5084	0.58
90.5	1,071		0.0000	1.0000	0.30
91.5	42		0.0000	1.0000	0.30
92.5					0.30


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
2010-2017 PLACEMENTS
IOWA 25-S2.5
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
AGE IN YEARS

PLACEMENT BAND 2010-2017 EXPERIENCE BAND 2006-2020

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	645		0.0000	1.0000	100.00
0.5	645		0.0000	1.0000	100.00
1.5	645		0.0000	1.0000	100.00
2.5	175,304		0.0000	1.0000	100.00
3.5	174,659		0.0000	1.0000	100.00
4.5	174,659		0.0000	1.0000	100.00
5.5	174,659		0.0000	1.0000	100.00
6.5	174,659		0.0000	1.0000	100.00
7.5	174,659		0.0000	1.0000	100.00
8.5	174,659		0.0000	1.0000	100.00
9.5	174,659		0.0000	1.0000	100.00
10.5					100.00


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1932-2020 PLACEMENTS
IOWA 45-R2.5
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
AGE IN YEARS
0
20
40
60
80
100
120

PLACEMENT BAND 1932-2020 EXPERIENCE BAND 2006-2020

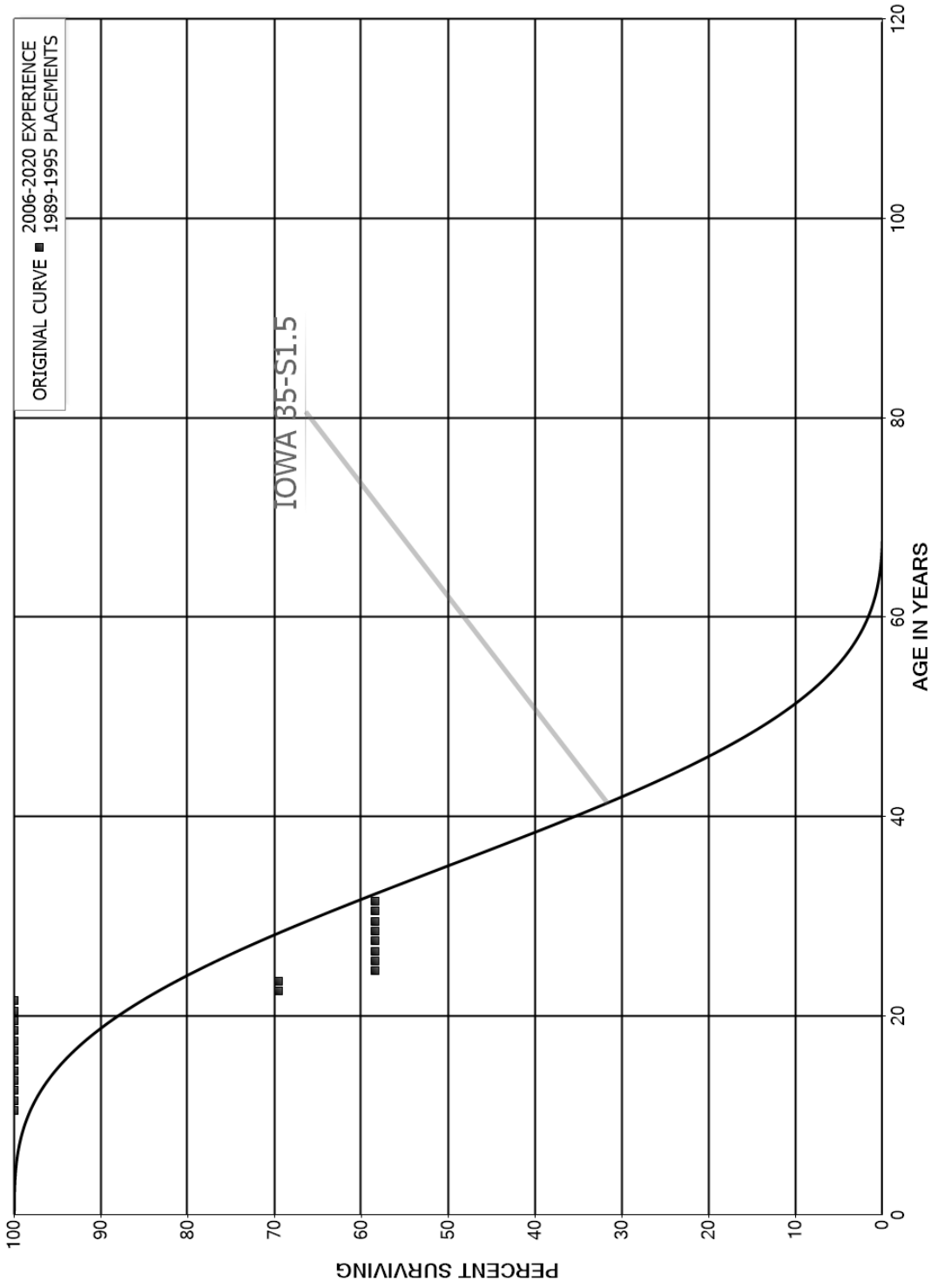
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	3,984,297	22,025	0.0055	0.9945	100.00
0.5	3,820,879	48,144	0.0126	0.9874	99.45
1.5	3,675,736		0.0000	1.0000	98.19
2.5	3,514,095	18,147	0.0052	0.9948	98.19
3.5	3,218,326		0.0000	1.0000	97.69
4.5	2,877,387	938	0.0003	0.9997	97.69
5.5	2,635,949	1,634	0.0006	0.9994	97.66
6.5	1,712,103	15,320	0.0089	0.9911	97.59
7.5	1,085,156		0.0000	1.0000	96.72
8.5	961,878		0.0000	1.0000	96.72
9.5	944,636		0.0000	1.0000	96.72
10.5	874,017	1,362	0.0016	0.9984	96.72
11.5	811,893		0.0000	1.0000	96.57
12.5	915,411	1,764	0.0019	0.9981	96.57
13.5	1,040,242	3,062	0.0029	0.9971	96.38
14.5	1,248,136	4,267	0.0034	0.9966	96.10
15.5	1,335,079	14,949	0.0112	0.9888	95.77
16.5	1,296,582	3,449	0.0027	0.9973	94.70
17.5	1,283,943	23,280	0.0181	0.9819	94.45
18.5	1,332,480	1,421	0.0011	0.9989	92.74
19.5	1,303,591		0.0000	1.0000	92.64
20.5	1,263,611	2,164	0.0017	0.9983	92.64
21.5	1,230,233	18,928	0.0154	0.9846	92.48
22.5	1,157,598	1,951	0.0017	0.9983	91.06
23.5	1,197,510	1,277	0.0011	0.9989	90.90
24.5	1,143,050	20,593	0.0180	0.9820	90.80
25.5	1,084,898	13,051	0.0120	0.9880	89.17
26.5	1,002,815	23,371	0.0233	0.9767	88.10
27.5	902,235	3,326	0.0037	0.9963	86.04
28.5	780,579	3,977	0.0051	0.9949	85.73
29.5	633,251	1,675	0.0026	0.9974	85.29
30.5	583,877	903	0.0015	0.9985	85.06
31.5	587,781	28,135	0.0479	0.9521	84.93
32.5	539,409	11,377	0.0211	0.9789	80.87
33.5	461,355	8,009	0.0174	0.9826	79.16
34.5	452,368	27,430	0.0606	0.9394	77.79
35.5	388,386	5,706	0.0147	0.9853	73.07
36.5	380,125	5,148	0.0135	0.9865	72.00
37.5	378,522	4,564	0.0121	0.9879	71.02
38.5	309,421	407	0.0013	0.9987	70.17

PLACEMENT BAND 1932-2020 EXPERIENCE BAND 2006-2020

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	258,575	6,151	0.0238	0.9762	70.07
40.5	218,620	5,285	0.0242	0.9758	68.41
41.5	217,441	8,089	0.0372	0.9628	66.75
42.5	182,654	9,855	0.0540	0.9460	64.27
43.5	171,479	6,081	0.0355	0.9645	60.80
44.5	129,718	4,726	0.0364	0.9636	58.65
45.5	92,629	20,500	0.2213	0.7787	56.51
46.5	57,115	3,863	0.0676	0.9324	44.00
47.5	51,955	6,797	0.1308	0.8692	41.03
48.5	35,478	195	0.0055	0.9945	35.66
49.5	28,184	37	0.0013	0.9987	35.46
50.5	27,389	197	0.0072	0.9928	35.42
51.5	15,141	832	0.0550	0.9450	35.16
52.5	14,551		0.0000	1.0000	33.23
53.5	11,736	657	0.0560	0.9440	33.23
54.5	11,577	347	0.0300	0.9700	31.37
55.5	10,654	275	0.0258	0.9742	30.43
56.5	10,420		0.0000	1.0000	29.64
57.5	9,801	4,939	0.5039	0.4961	29.64
58.5	4,863	16	0.0032	0.9968	14.71
59.5	3,787		0.0000	1.0000	14.66
60.5	3,349		0.0000	1.0000	14.66
61.5	3,349	1,523	0.4546	0.5454	14.66
62.5	1,827	154	0.0843	0.9157	8.00
63.5	2,233	60	0.0268	0.9732	7.32
64.5	2,156	426	0.1978	0.8022	7.12
65.5	1,709	236	0.1380	0.8620	5.71
66.5	1,493		0.0000	1.0000	4.93
67.5	1,321	56	0.0424	0.9576	4.93
68.5	1,005		0.0000	1.0000	4.72
69.5	1,005	564	0.5611	0.4389	4.72
70.5	543	68	0.1259	0.8741	2.07
71.5	540	18	0.0325	0.9675	1.81
72.5	606		0.0000	1.0000	1.75
73.5	680	34	0.0494	0.9506	1.75
74.5	647	82	0.1275	0.8725	1.66
75.5	502	2	0.0033	0.9967	1.45
76.5	500		0.0000	1.0000	1.45
77.5	500	66	0.1313	0.8687	1.45
78.5	434	364	0.8385	0.1615	1.26

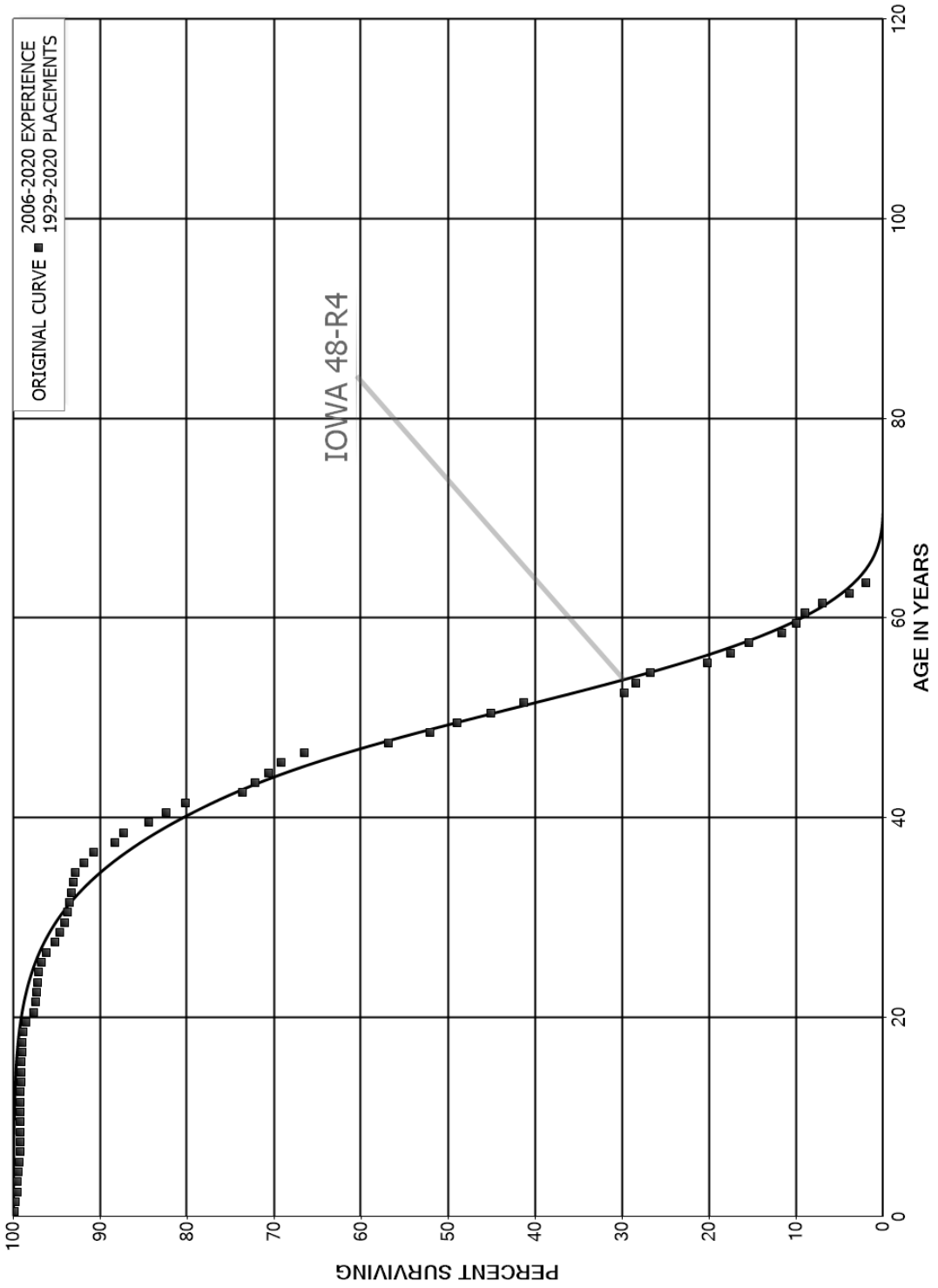
PLACEMENT BAND 1932-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	406	364	0.8962	0.1038	0.20
80.5	406		0.0000	1.0000	0.02
81.5	392		0.0000	1.0000	0.02
82.5	287		0.0000	1.0000	0.02
83.5	287		0.0000	1.0000	0.02
84.5	287		0.0000	1.0000	0.02
85.5	185		0.0000	1.0000	0.02
86.5	185		0.0000	1.0000	0.02
87.5	74		0.0000	1.0000	0.02
88.5					0.02


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1989-1995 PLACEMENTS
IOWA 35-S1.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

PLACEMENT BAND 1989-1995 EXPERIENCE BAND 2006-2020

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					
0.5					
1.5					
2.5					
3.5					
4.5					
5.5					
6.5					
7.5					
8.5					
9.5					
10.5	10,097		0.0000	1.0000	100.00
11.5	10,097		0.0000	1.0000	100.00
12.5	10,097		0.0000	1.0000	100.00
13.5	10,097		0.0000	1.0000	100.00
14.5	56,838		0.0000	1.0000	100.00
15.5	56,838		0.0000	1.0000	100.00
16.5	104,711		0.0000	1.0000	100.00
17.5	104,711		0.0000	1.0000	100.00
18.5	104,711		0.0000	1.0000	100.00
19.5	104,711		0.0000	1.0000	100.00
20.5	104,711		0.0000	1.0000	100.00
21.5	104,711	31,915	0.3048	0.6952	100.00
22.5	72,796		0.0000	1.0000	69.52
23.5	72,796	11,685	0.1605	0.8395	69.52
24.5	61,111		0.0000	1.0000	58.36
25.5	51,013		0.0000	1.0000	58.36
26.5	51,013		0.0000	1.0000	58.36
27.5	51,013		0.0000	1.0000	58.36
28.5	51,013		0.0000	1.0000	58.36
29.5	15,957		0.0000	1.0000	58.36
30.5	15,957		0.0000	1.0000	58.36
31.5					58.36


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1929-2020 PLACEMENTS
IOWA 48-R4
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
AGE IN YEARS

PLACEMENT BAND 1929-2020 EXPERIENCE BAND 2006-2020

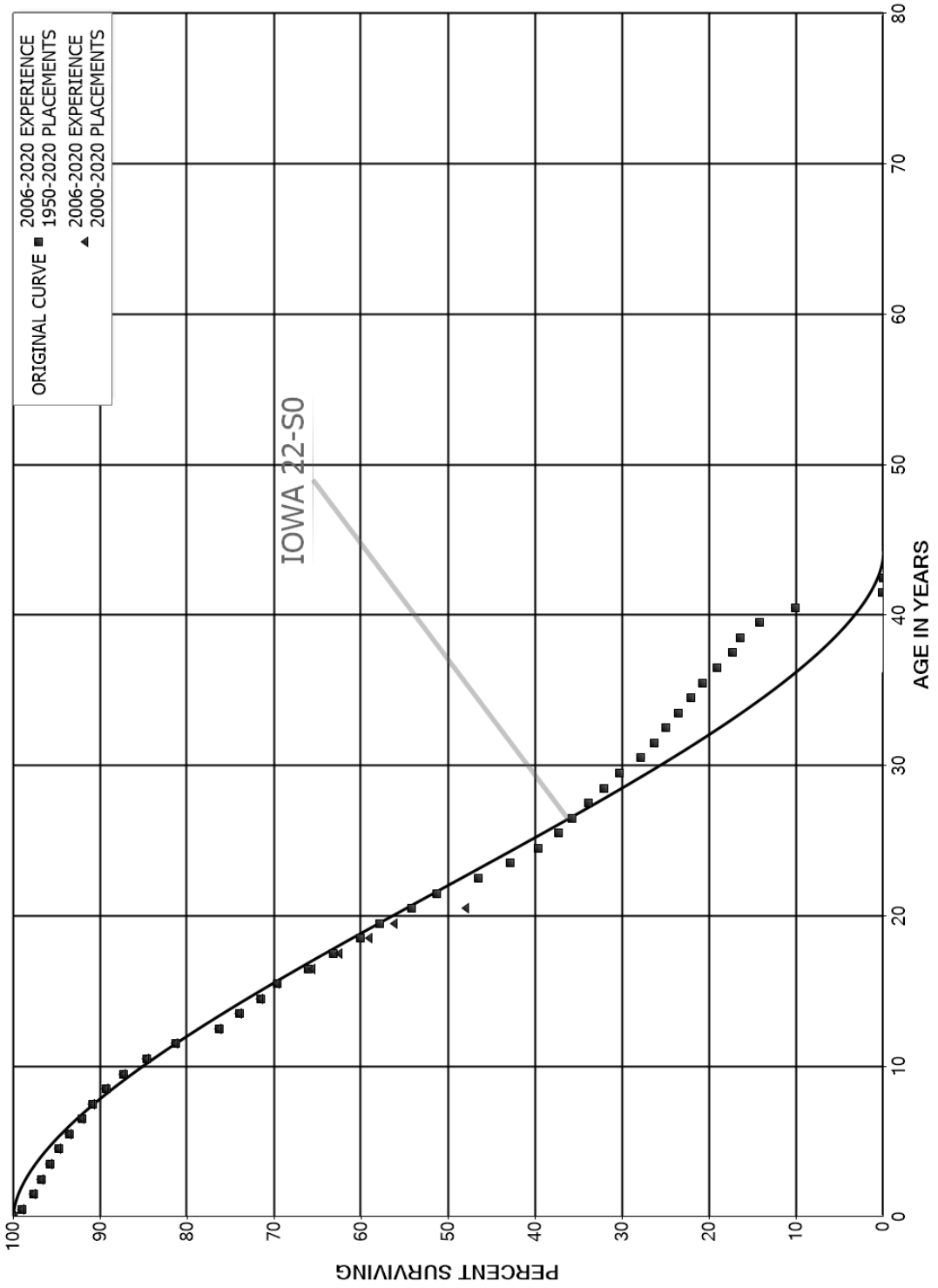
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	36,362,864	59,473	0.0016	0.9984	100.00
0.5	30,454,538	30,993	0.0010	0.9990	99.84
1.5	24,873,663	45,371	0.0018	0.9982	99.73
2.5	24,887,489	17,338	0.0007	0.9993	99.55
3.5	23,643,881	30,692	0.0013	0.9987	99.48
4.5	22,267,608	14,013	0.0006	0.9994	99.35
5.5	21,346,836	13,694	0.0006	0.9994	99.29
6.5	20,685,211	4,441	0.0002	0.9998	99.23
7.5	19,997,677	2,537	0.0001	0.9999	99.21
8.5	20,220,580	1,145	0.0001	0.9999	99.19
9.5	20,793,198	6,356	0.0003	0.9997	99.19
10.5	21,105,574	3,634	0.0002	0.9998	99.16
11.5	21,446,125	1,615	0.0001	0.9999	99.14
12.5	22,228,438	7,836	0.0004	0.9996	99.13
13.5	23,149,561	3,507	0.0002	0.9998	99.10
14.5	23,721,824	2,761	0.0001	0.9999	99.08
15.5	24,297,066	18,707	0.0008	0.9992	99.07
16.5	24,544,878	24,637	0.0010	0.9990	99.00
17.5	24,188,681	24,723	0.0010	0.9990	98.90
18.5	23,515,951	79,529	0.0034	0.9966	98.80
19.5	23,120,206	204,670	0.0089	0.9911	98.46
20.5	22,355,495	47,602	0.0021	0.9979	97.59
21.5	21,821,076	21,565	0.0010	0.9990	97.38
22.5	21,297,566	30,084	0.0014	0.9986	97.29
23.5	19,985,660	16,017	0.0008	0.9992	97.15
24.5	18,535,130	60,594	0.0033	0.9967	97.07
25.5	17,213,516	102,225	0.0059	0.9941	96.75
26.5	15,605,570	168,827	0.0108	0.9892	96.18
27.5	13,853,842	79,234	0.0057	0.9943	95.14
28.5	11,969,606	67,796	0.0057	0.9943	94.59
29.5	10,327,145	35,489	0.0034	0.9966	94.06
30.5	8,714,235	19,467	0.0022	0.9978	93.74
31.5	7,567,212	20,154	0.0027	0.9973	93.53
32.5	6,820,652	18,147	0.0027	0.9973	93.28
33.5	6,494,151	16,741	0.0026	0.9974	93.03
34.5	6,035,099	60,534	0.0100	0.9900	92.79
35.5	5,706,519	66,999	0.0117	0.9883	91.86
36.5	5,204,927	141,876	0.0273	0.9727	90.78
37.5	4,766,055	53,892	0.0113	0.9887	88.30
38.5	4,294,733	141,085	0.0329	0.9671	87.31

PLACEMENT BAND 1929-2020 EXPERIENCE BAND 2006-2020

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	3,602,861	85,719	0.0238	0.9762	84.44
40.5	3,189,493	86,101	0.0270	0.9730	82.43
41.5	2,675,584	219,622	0.0821	0.9179	80.20
42.5	2,012,143	39,949	0.0199	0.9801	73.62
43.5	1,647,955	34,056	0.0207	0.9793	72.16
44.5	1,420,356	29,717	0.0209	0.9791	70.67
45.5	1,220,721	47,272	0.0387	0.9613	69.19
46.5	978,373	141,955	0.1451	0.8549	66.51
47.5	759,763	64,589	0.0850	0.9150	56.86
48.5	589,631	35,255	0.0598	0.9402	52.03
49.5	468,259	36,827	0.0786	0.9214	48.92
50.5	362,727	30,507	0.0841	0.9159	45.07
51.5	322,737	90,138	0.2793	0.7207	41.28
52.5	229,956	10,479	0.0456	0.9544	29.75
53.5	191,679	11,250	0.0587	0.9413	28.39
54.5	177,436	43,179	0.2433	0.7567	26.73
55.5	135,099	18,108	0.1340	0.8660	20.22
56.5	122,272	15,028	0.1229	0.8771	17.51
57.5	110,362	27,264	0.2470	0.7530	15.36
58.5	81,326	11,495	0.1413	0.8587	11.57
59.5	44,252	4,424	0.1000	0.9000	9.93
60.5	32,119	7,107	0.2213	0.7787	8.94
61.5	21,592	9,595	0.4444	0.5556	6.96
62.5	11,623	5,900	0.5077	0.4923	3.87
63.5	3,670	1,992	0.5429	0.4571	1.90
64.5	1,767	389	0.2203	0.7797	0.87
65.5	1,605	412	0.2570	0.7430	0.68
66.5	1,203	379	0.3146	0.6854	0.50
67.5	1,228	213	0.1735	0.8265	0.35
68.5	1,161	263	0.2266	0.7734	0.29
69.5	1,044	54	0.0513	0.9487	0.22
70.5	1,090	225	0.2065	0.7935	0.21
71.5	1,182	109	0.0923	0.9077	0.17
72.5	1,573	650	0.4130	0.5870	0.15
73.5	1,059	545	0.5140	0.4860	0.09
74.5	2,374	939	0.3953	0.6047	0.04
75.5	2,297	512	0.2228	0.7772	0.03
76.5	1,994	373	0.1871	0.8129	0.02
77.5	1,621	600	0.3699	0.6301	0.02
78.5	1,022	358	0.3502	0.6498	0.01

PLACEMENT BAND 1929-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	664	430	0.6477	0.3523	0.01
80.5	234	131	0.5601	0.4399	0.00
81.5	103	71	0.6885	0.3115	0.00
82.5	32	25	0.7694	0.2306	0.00
83.5	7		0.0000	1.0000	0.00
84.5	7	7	1.0000		0.00
85.5					


ORIGINAL CURVE
2006-2020 EXPERIENCE
1950-2020 PLACEMENTS
2006-2020 EXPERIENCE
2000-2020 PLACEMENTS
IOWA 22-S0
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80

PLACEMENT BAND 1950-2020 EXPERIENCE BAND 2006-2020

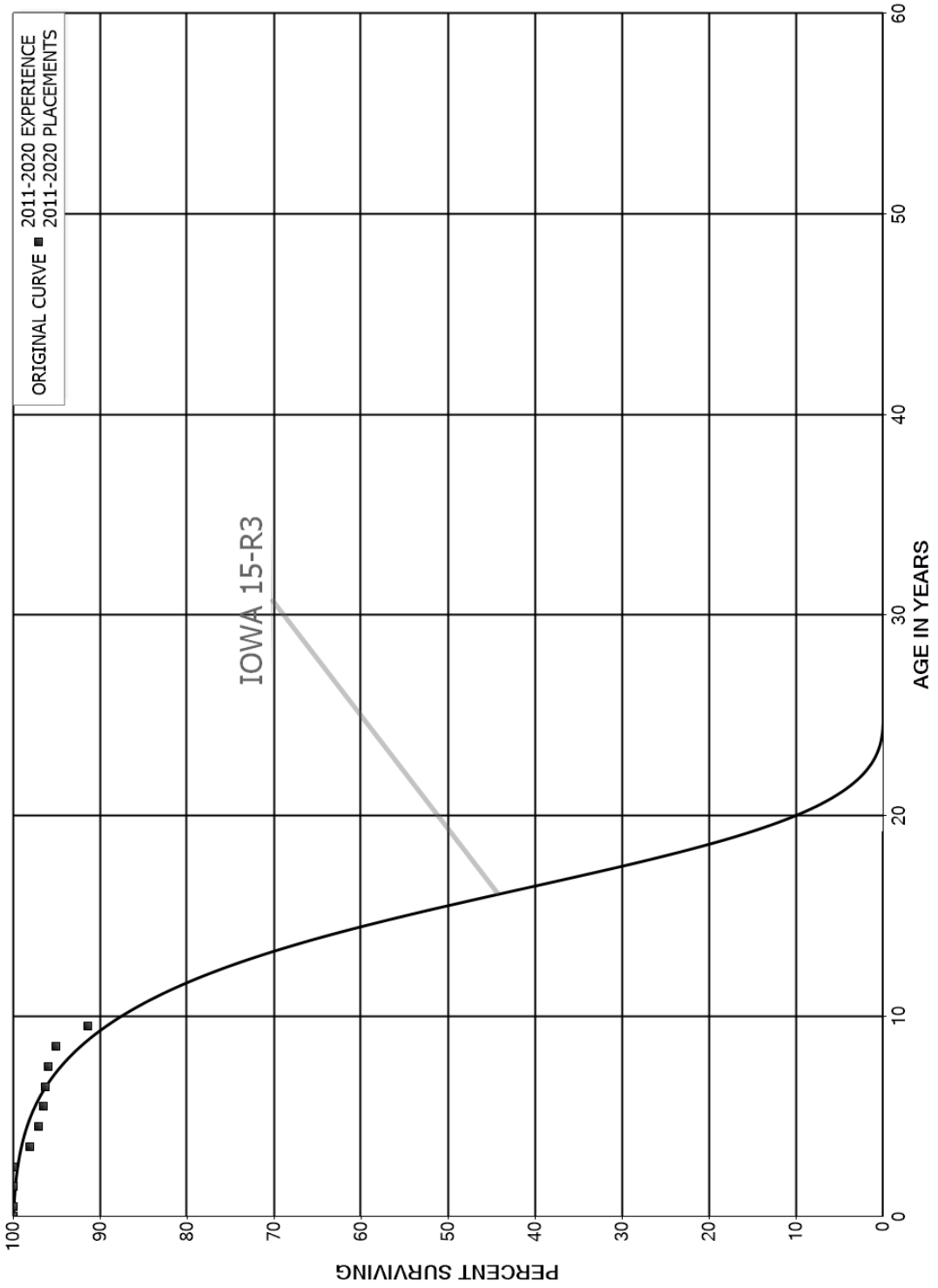
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	1,017,321	10,165	0.0100	0.9900	100.00
0.5	3,196,487	45,977	0.0144	0.9856	99.00
1.5	4,037,262	37,417	0.0093	0.9907	97.58
2.5	4,042,668	38,581	0.0095	0.9905	96.67
3.5	3,884,749	42,479	0.0109	0.9891	95.75
4.5	3,705,489	46,447	0.0125	0.9875	94.70
5.5	3,617,618	56,802	0.0157	0.9843	93.52
6.5	3,223,027	40,650	0.0126	0.9874	92.05
7.5	2,624,910	45,423	0.0173	0.9827	90.89
8.5	2,487,008	54,996	0.0221	0.9779	89.31
9.5	1,796,236	55,587	0.0309	0.9691	87.34
10.5	1,567,606	61,721	0.0394	0.9606	84.64
11.5	2,456,177	151,848	0.0618	0.9382	81.30
12.5	2,201,772	68,532	0.0311	0.9689	76.28
13.5	2,273,724	74,187	0.0326	0.9674	73.90
14.5	2,184,960	58,791	0.0269	0.9731	71.49
15.5	2,280,553	116,144	0.0509	0.9491	69.57
16.5	2,458,994	105,306	0.0428	0.9572	66.03
17.5	2,236,009	110,946	0.0496	0.9504	63.20
18.5	1,159,779	42,218	0.0364	0.9636	60.06
19.5	1,314,116	84,200	0.0641	0.9359	57.88
20.5	1,185,639	62,250	0.0525	0.9475	54.17
21.5	1,203,633	113,963	0.0947	0.9053	51.32
22.5	928,534	73,440	0.0791	0.9209	46.46
23.5	641,942	47,717	0.0743	0.9257	42.79
24.5	658,956	38,942	0.0591	0.9409	39.61
25.5	639,581	27,251	0.0426	0.9574	37.27
26.5	485,943	25,614	0.0527	0.9473	35.68
27.5	622,573	31,793	0.0511	0.9489	33.80
28.5	632,942	35,401	0.0559	0.9441	32.07
29.5	631,502	51,163	0.0810	0.9190	30.28
30.5	570,401	32,287	0.0566	0.9434	27.83
31.5	485,904	23,492	0.0483	0.9517	26.25
32.5	609,283	35,319	0.0580	0.9420	24.98
33.5	1,027,509	64,824	0.0631	0.9369	23.53
34.5	1,572,166	92,035	0.0585	0.9415	22.05
35.5	1,444,062	115,290	0.0798	0.9202	20.76
36.5	1,247,576	120,174	0.0963	0.9037	19.10
37.5	1,097,539	55,254	0.0503	0.9497	17.26
38.5	1,034,050	142,793	0.1381	0.8619	16.39

PLACEMENT BAND 1950-2020 EXPERIENCE BAND 2006-2020

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	767,615	221,752	0.2889	0.7111	14.13
40.5	215,212	212,856	0.9891	0.0109	10.05
41.5	2,356	2,356	1.0000		0.11
42.5					
43.5					
44.5	5,516	5,516	1.0000		
45.5					
46.5					
47.5	9,062	3,732	0.4118		
48.5	16,348	6,723	0.4112		
49.5	9,625	6,412	0.6662		
50.5	3,844	3,213	0.8360		
51.5	4,374	3,654	0.8354		
52.5	720	720	1.0000		
53.5	2,645	3,551	1.3422		
54.5	5,309	5,309	1.0000		
55.5	881		0.0000		
56.5	881	881	1.0000		
57.5	1,571	1,571	1.0000		
58.5					
59.5					
60.5	2,200		0.0000		
61.5	2,200	2,200	1.0000		
62.5	6,050	7,934	1.3114		
63.5	2,560	2,560	1.0000		
64.5					

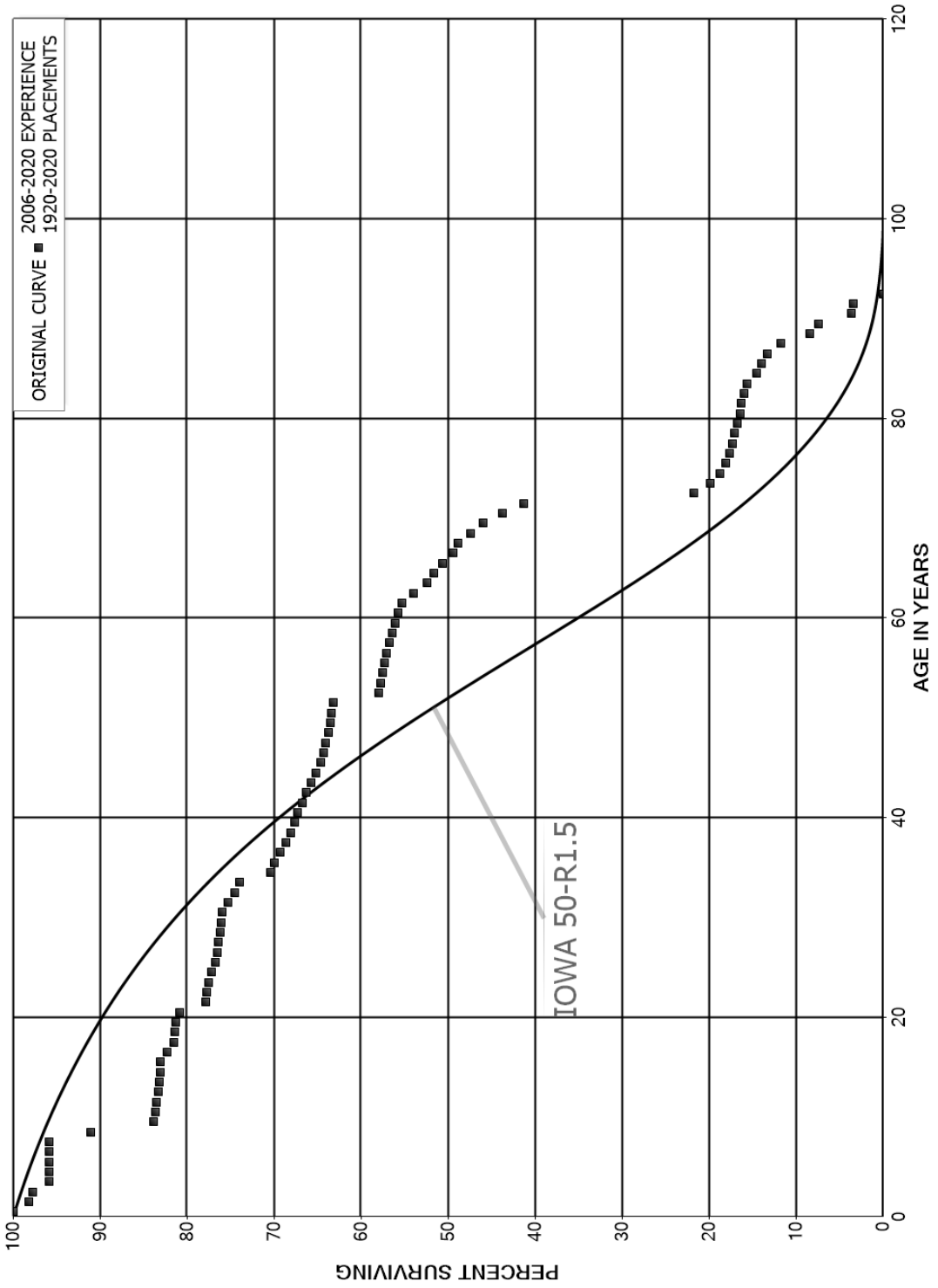
PLACEMENT BAND 2000-2020 EXPERIENCE BAND 2006-2020

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	1,017,321	10,165	0.0100	0.9900	100.00
0.5	3,196,487	45,977	0.0144	0.9856	99.00
1.5	4,037,262	37,417	0.0093	0.9907	97.58
2.5	4,042,668	38,581	0.0095	0.9905	96.67
3.5	3,884,749	42,479	0.0109	0.9891	95.75
4.5	3,705,489	46,447	0.0125	0.9875	94.70
5.5	3,617,618	56,802	0.0157	0.9843	93.52
6.5	3,223,027	40,650	0.0126	0.9874	92.05
7.5	2,624,910	45,423	0.0173	0.9827	90.89
8.5	2,487,008	54,996	0.0221	0.9779	89.31
9.5	1,796,236	55,587	0.0309	0.9691	87.34
10.5	1,567,606	61,721	0.0394	0.9606	84.64
11.5	2,456,177	151,848	0.0618	0.9382	81.30
12.5	2,201,772	68,532	0.0311	0.9689	76.28
13.5	2,273,724	74,187	0.0326	0.9674	73.90
14.5	2,184,960	57,791	0.0264	0.9736	71.49
15.5	1,832,361	108,443	0.0592	0.9408	69.60
16.5	1,640,978	76,869	0.0468	0.9532	65.48
17.5	1,338,307	73,641	0.0550	0.9450	62.41
18.5	248,934	12,408	0.0498	0.9502	58.98
19.5	150,124	22,045	0.1468	0.8532	56.04
20.5					47.81


ORIGINAL CURVE ■ 2011-2020 EXPERIENCE
2011-2020 PLACEMENTS
IOWA 15-R3
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60

PLACEMENT BAND 2011-2020 EXPERIENCE BAND 2011-2020

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	9,400,714		0.0000	1.0000	100.00
0.5	9,793,331	5,833	0.0006	0.9994	100.00
1.5	10,317,398	2,597	0.0003	0.9997	99.94
2.5	10,039,040	190,267	0.0190	0.9810	99.92
3.5	9,479,678	91,369	0.0096	0.9904	98.02
4.5	8,770,877	49,136	0.0056	0.9944	97.08
5.5	8,614,873	23,623	0.0027	0.9973	96.53
6.5	8,390,358	29,851	0.0036	0.9964	96.27
7.5	7,301,414	64,676	0.0089	0.9911	95.93
8.5	4,329,572	167,732	0.0387	0.9613	95.08
9.5					91.39


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1920-2020 PLACEMENTS
IOWA 50-R1.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120

PLACEMENT BAND 1920-2020 EXPERIENCE BAND 2006-2020

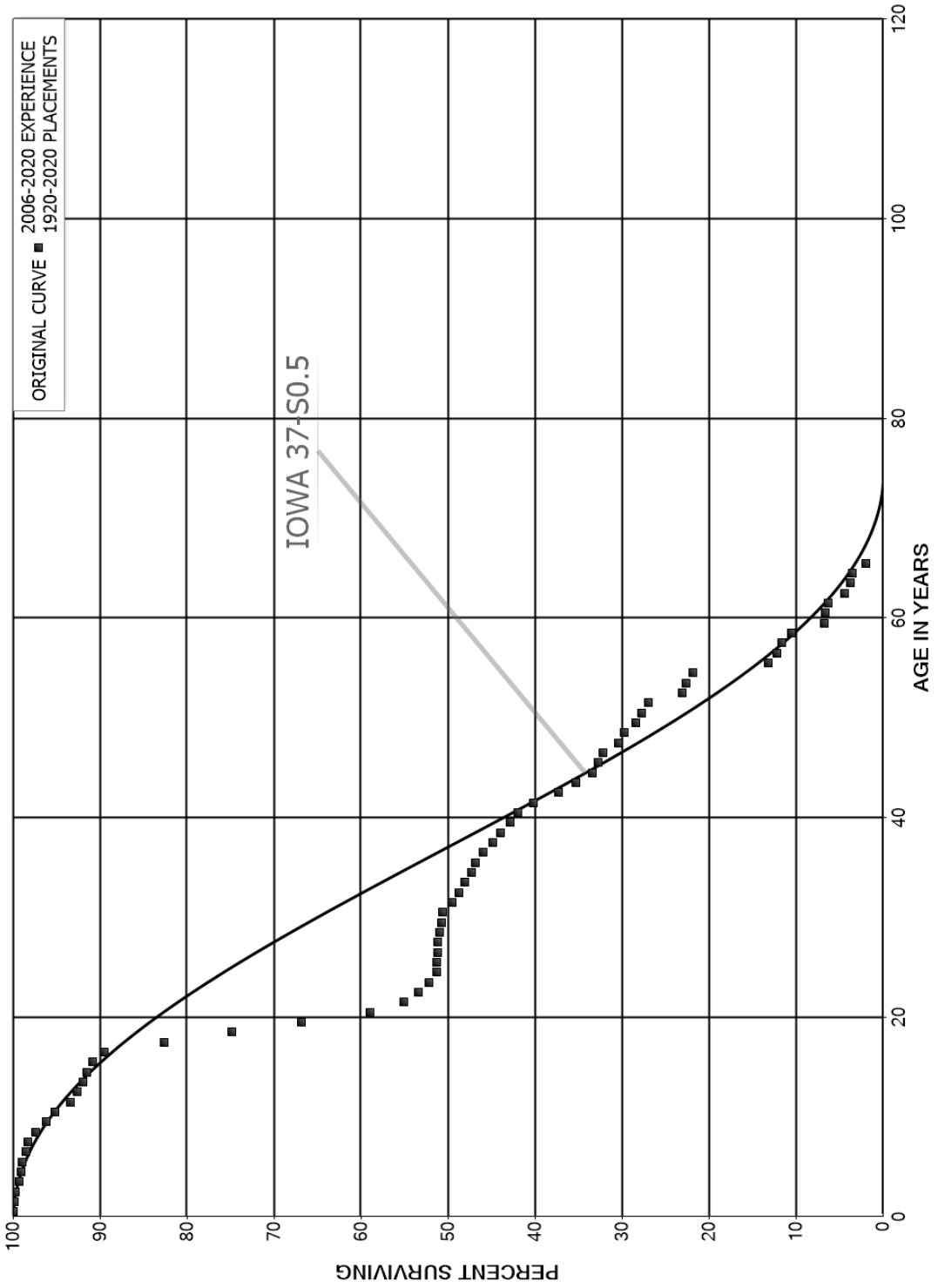
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	338,074		0.0000	1.0000	100.00
0.5	350,091	6,539	0.0187	0.9813	100.00
1.5	314,396	1,197	0.0038	0.9962	98.13
2.5	298,510	5,745	0.0192	0.9808	97.76
3.5	292,765	58	0.0002	0.9998	95.88
4.5	256,179		0.0000	1.0000	95.86
5.5	233,174		0.0000	1.0000	95.86
6.5	191,285		0.0000	1.0000	95.86
7.5	154,725	7,680	0.0496	0.9504	95.86
8.5	290,766	23,207	0.0798	0.9202	91.10
9.5	405,441	1,032	0.0025	0.9975	83.83
10.5	467,361	472	0.0010	0.9990	83.62
11.5	531,597	1,420	0.0027	0.9973	83.53
12.5	574,799	1,104	0.0019	0.9981	83.31
13.5	628,321	480	0.0008	0.9992	83.15
14.5	672,018		0.0000	1.0000	83.08
15.5	697,483	6,331	0.0091	0.9909	83.08
16.5	727,605	7,458	0.0103	0.9897	82.33
17.5	763,727	790	0.0010	0.9990	81.49
18.5	800,607	993	0.0012	0.9988	81.40
19.5	848,366	4,445	0.0052	0.9948	81.30
20.5	874,620	32,762	0.0375	0.9625	80.88
21.5	909,853	1,583	0.0017	0.9983	77.85
22.5	995,243	2,879	0.0029	0.9971	77.71
23.5	952,328	4,163	0.0044	0.9956	77.49
24.5	869,177	5,290	0.0061	0.9939	77.15
25.5	863,685	1,955	0.0023	0.9977	76.68
26.5	840,404	1,704	0.0020	0.9980	76.50
27.5	836,077	1,517	0.0018	0.9982	76.35
28.5	792,414	1,441	0.0018	0.9982	76.21
29.5	767,189	1,750	0.0023	0.9977	76.07
30.5	747,199	6,350	0.0085	0.9915	75.90
31.5	720,946	6,734	0.0093	0.9907	75.25
32.5	648,798	5,175	0.0080	0.9920	74.55
33.5	615,726	29,867	0.0485	0.9515	73.96
34.5	536,108	3,147	0.0059	0.9941	70.37
35.5	583,491	5,277	0.0090	0.9910	69.96
36.5	520,614	5,086	0.0098	0.9902	69.32
37.5	442,035	3,858	0.0087	0.9913	68.65
38.5	374,338	2,485	0.0066	0.9934	68.05

PLACEMENT BAND 1920-2020 EXPERIENCE BAND 2006-2020

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	332,648	1,689	0.0051	0.9949	67.59
40.5	305,995	2,262	0.0074	0.9926	67.25
41.5	295,727	2,047	0.0069	0.9931	66.75
42.5	285,717	2,412	0.0084	0.9916	66.29
43.5	269,910	2,225	0.0082	0.9918	65.73
44.5	258,150	2,396	0.0093	0.9907	65.19
45.5	244,537	1,143	0.0047	0.9953	64.59
46.5	237,109	963	0.0041	0.9959	64.28
47.5	232,925	1,213	0.0052	0.9948	64.02
48.5	231,846	553	0.0024	0.9976	63.69
49.5	265,257	532	0.0020	0.9980	63.54
50.5	151,036	588	0.0039	0.9961	63.41
51.5	147,359	12,057	0.0818	0.9182	63.16
52.5	133,648	619	0.0046	0.9954	57.99
53.5	127,851	509	0.0040	0.9960	57.73
54.5	125,864	540	0.0043	0.9957	57.50
55.5	100,785	394	0.0039	0.9961	57.25
56.5	102,942	537	0.0052	0.9948	57.03
57.5	100,925	578	0.0057	0.9943	56.73
58.5	97,858	559	0.0057	0.9943	56.40
59.5	94,358	541	0.0057	0.9943	56.08
60.5	90,397	697	0.0077	0.9923	55.76
61.5	87,840	2,269	0.0258	0.9742	55.33
62.5	83,875	2,262	0.0270	0.9730	53.90
63.5	72,415	1,135	0.0157	0.9843	52.45
64.5	30,093	611	0.0203	0.9797	51.62
65.5	30,616	718	0.0235	0.9765	50.58
66.5	27,093	310	0.0114	0.9886	49.39
67.5	24,248	715	0.0295	0.9705	48.82
68.5	21,355	673	0.0315	0.9685	47.39
69.5	18,536	863	0.0466	0.9534	45.89
70.5	15,050	863	0.0573	0.9427	43.76
71.5	10,179	4,807	0.4722	0.5278	41.25
72.5	3,183	277	0.0869	0.9131	21.77
73.5	2,587	151	0.0582	0.9418	19.88
74.5	3,082	107	0.0349	0.9651	18.72
75.5	4,502	108	0.0241	0.9759	18.07
76.5	7,106	139	0.0196	0.9804	17.63
77.5	6,312	94	0.0148	0.9852	17.29
78.5	6,218	127	0.0205	0.9795	17.03

PLACEMENT BAND 1920-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	6,091	101	0.0166	0.9834	16.68
80.5	5,990	62	0.0103	0.9897	16.41
81.5	5,928	92	0.0156	0.9844	16.24
82.5	5,836	118	0.0202	0.9798	15.98
83.5	5,718	439	0.0767	0.9233	15.66
84.5	5,280	192	0.0364	0.9636	14.46
85.5	6,706	293	0.0437	0.9563	13.93
86.5	6,413	771	0.1202	0.8798	13.33
87.5	5,643	1,614	0.2861	0.7139	11.72
88.5	4,028	479	0.1189	0.8811	8.37
89.5	3,549	1,833	0.5163	0.4837	7.37
90.5	1,717	108	0.0629	0.9371	3.57
91.5	1,511	1,511	1.0000		3.34
92.5					


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1920-2020 PLACEMENTS
IOWA 37-S0.5
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
AGE IN YEARS

PLACEMENT BAND 1920-2020 EXPERIENCE BAND 2006-2020

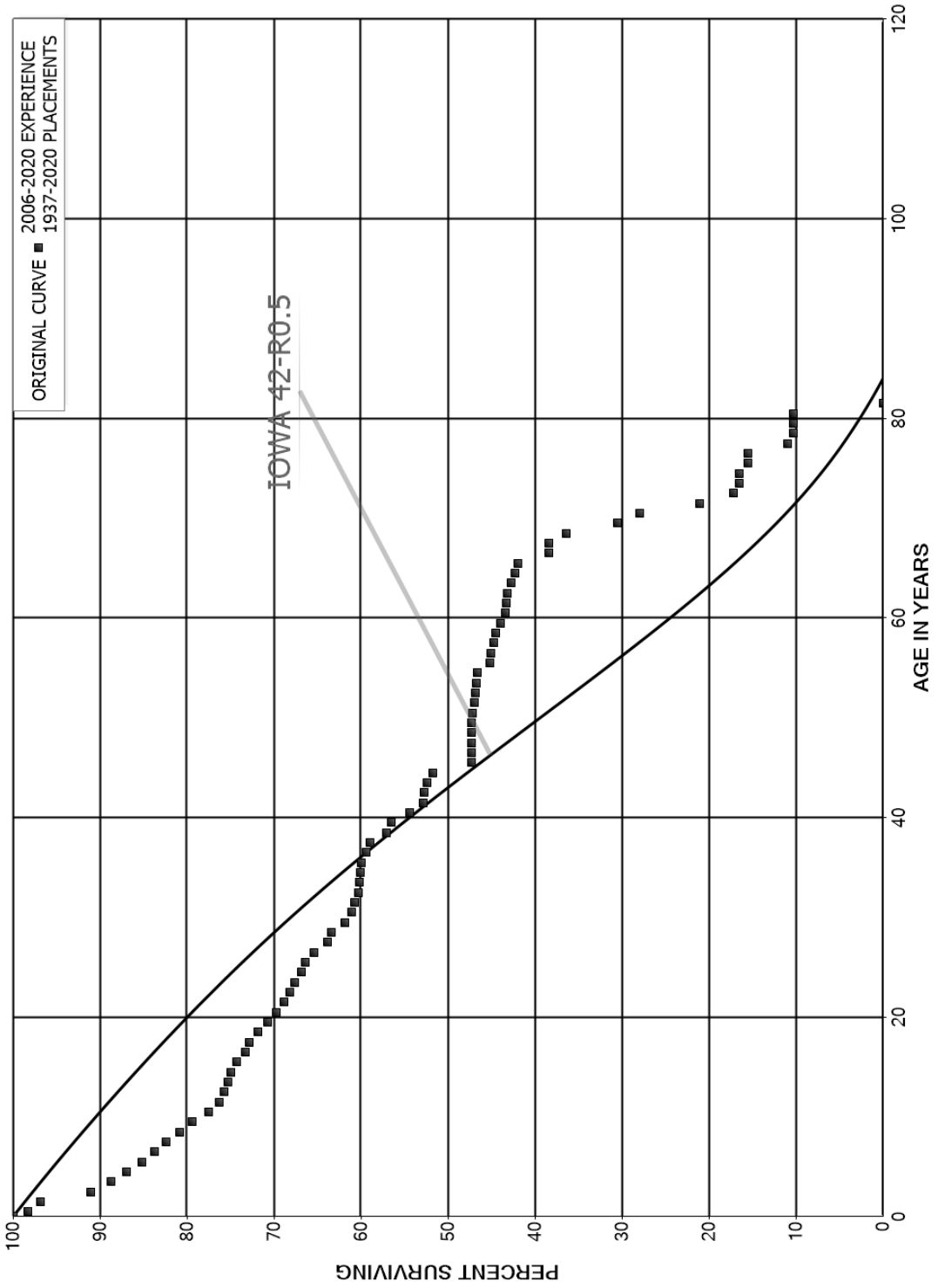
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	27,295,633	9,845	0.0004	0.9996	100.00
0.5	25,210,797	20,007	0.0008	0.9992	99.96
1.5	18,622,455	34,990	0.0019	0.9981	99.88
2.5	15,267,794	63,359	0.0041	0.9959	99.70
3.5	14,593,764	27,376	0.0019	0.9981	99.28
4.5	13,668,656	27,924	0.0020	0.9980	99.10
5.5	12,674,408	47,087	0.0037	0.9963	98.89
6.5	12,036,528	33,391	0.0028	0.9972	98.53
7.5	11,391,589	102,951	0.0090	0.9910	98.25
8.5	10,430,128	127,942	0.0123	0.9877	97.37
9.5	9,928,916	105,394	0.0106	0.9894	96.17
10.5	9,211,929	173,757	0.0189	0.9811	95.15
11.5	8,361,467	63,589	0.0076	0.9924	93.36
12.5	7,550,995	58,448	0.0077	0.9923	92.65
13.5	6,437,065	28,759	0.0045	0.9955	91.93
14.5	5,743,711	41,274	0.0072	0.9928	91.52
15.5	4,654,243	70,290	0.0151	0.9849	90.86
16.5	3,366,738	258,676	0.0768	0.9232	89.49
17.5	2,441,984	229,568	0.0940	0.9060	82.61
18.5	1,684,305	180,675	0.1073	0.8927	74.85
19.5	1,489,261	175,791	0.1180	0.8820	66.82
20.5	1,234,698	80,727	0.0654	0.9346	58.93
21.5	1,084,690	32,418	0.0299	0.9701	55.08
22.5	888,482	21,170	0.0238	0.9762	53.43
23.5	881,912	14,151	0.0160	0.9840	52.16
24.5	799,059	419	0.0005	0.9995	51.32
25.5	832,589	1,780	0.0021	0.9979	51.29
26.5	808,642	397	0.0005	0.9995	51.18
27.5	799,528	2,464	0.0031	0.9969	51.16
28.5	757,880	3,335	0.0044	0.9956	51.00
29.5	725,840	3,098	0.0043	0.9957	50.78
30.5	710,345	14,937	0.0210	0.9790	50.56
31.5	679,382	10,388	0.0153	0.9847	49.50
32.5	622,949	8,260	0.0133	0.9867	48.74
33.5	594,496	10,122	0.0170	0.9830	48.09
34.5	549,923	5,703	0.0104	0.9896	47.28
35.5	630,607	10,940	0.0173	0.9827	46.79
36.5	584,282	15,012	0.0257	0.9743	45.97
37.5	520,875	10,200	0.0196	0.9804	44.79
38.5	460,020	11,416	0.0248	0.9752	43.92

PLACEMENT BAND 1920-2020 EXPERIENCE BAND 2006-2020

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	415,123	8,840	0.0213	0.9787	42.83
40.5	384,286	16,212	0.0422	0.9578	41.91
41.5	348,501	25,290	0.0726	0.9274	40.15
42.5	307,587	15,982	0.0520	0.9480	37.23
43.5	276,913	14,961	0.0540	0.9460	35.30
44.5	251,503	5,303	0.0211	0.9789	33.39
45.5	240,425	3,534	0.0147	0.9853	32.69
46.5	224,102	12,613	0.0563	0.9437	32.21
47.5	206,413	4,363	0.0211	0.9789	30.39
48.5	222,985	10,531	0.0472	0.9528	29.75
49.5	208,279	4,829	0.0232	0.9768	28.35
50.5	107,916	2,999	0.0278	0.9722	27.69
51.5	102,717	14,612	0.1423	0.8577	26.92
52.5	87,550	1,861	0.0213	0.9787	23.09
53.5	80,360	2,576	0.0321	0.9679	22.60
54.5	67,725	27,100	0.4002	0.5998	21.87
55.5	22,403	1,674	0.0747	0.9253	13.12
56.5	21,157	894	0.0422	0.9578	12.14
57.5	20,343	1,947	0.0957	0.9043	11.63
58.5	18,334	6,560	0.3578	0.6422	10.52
59.5	11,776	212	0.0180	0.9820	6.75
60.5	11,451	601	0.0525	0.9475	6.63
61.5	10,767	3,298	0.3063	0.6937	6.28
62.5	7,958	1,169	0.1469	0.8531	4.36
63.5	5,979	396	0.0662	0.9338	3.72
64.5	5,502	2,334	0.4242	0.5758	3.47
65.5	8,818	589	0.0668	0.9332	2.00
66.5	8,043	299	0.0371	0.9629	1.87
67.5	7,355	306	0.0417	0.9583	1.80
68.5	6,450		0.0000	1.0000	1.72
69.5	6,450		0.0000	1.0000	1.72
70.5	6,432		0.0000	1.0000	1.72
71.5	6,667	5,777	0.8665	0.1335	1.72
72.5	890		0.0000	1.0000	0.23
73.5	890		0.0000	1.0000	0.23
74.5	1,151		0.0000	1.0000	0.23
75.5	2,282		0.0000	1.0000	0.23
76.5	4,928		0.0000	1.0000	0.23
77.5	4,434	52	0.0116	0.9884	0.23
78.5	4,382	76	0.0173	0.9827	0.23

PLACEMENT BAND 1920-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	4,306	148	0.0344	0.9656	0.22
80.5	4,158	79	0.0189	0.9811	0.22
81.5	4,080	252	0.0617	0.9383	0.21
82.5	3,828	164	0.0427	0.9573	0.20
83.5	3,664	46	0.0124	0.9876	0.19
84.5	3,619	56	0.0154	0.9846	0.19
85.5	8,912	62	0.0070	0.9930	0.18
86.5	8,615	164	0.0190	0.9810	0.18
87.5	8,451	89	0.0105	0.9895	0.18
88.5	8,362	274	0.0328	0.9672	0.18
89.5	7,880	249	0.0316	0.9684	0.17
90.5	6,606	909	0.1376	0.8624	0.17
91.5	5,349	5,349	1.0000		0.14
92.5					


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1937-2020 PLACEMENTS
IOWA 42-R0.5
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
AGE IN YEARS
0
20
40
60
80
100
120

PLACEMENT BAND 1937-2020 EXPERIENCE BAND 2006-2020

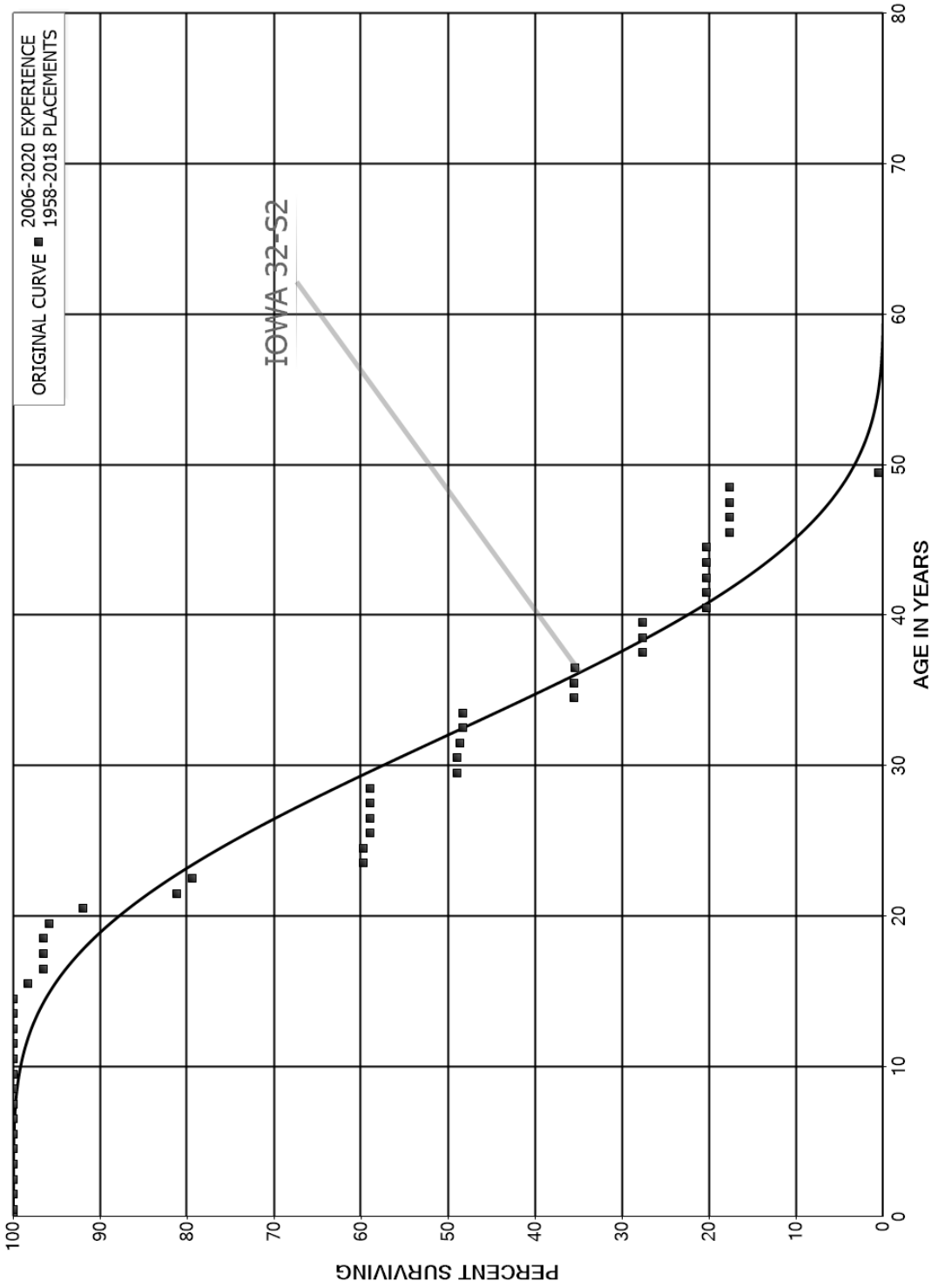
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	1,257,151	21,535	0.0171	0.9829	100.00
0.5	2,009,050	29,742	0.0148	0.9852	98.29
1.5	2,331,918	138,028	0.0592	0.9408	96.83
2.5	2,446,382	63,882	0.0261	0.9739	91.10
3.5	2,371,725	48,618	0.0205	0.9795	88.72
4.5	2,254,017	44,952	0.0199	0.9801	86.90
5.5	2,184,574	36,980	0.0169	0.9831	85.17
6.5	2,324,066	37,025	0.0159	0.9841	83.73
7.5	2,184,490	40,734	0.0186	0.9814	82.39
8.5	2,224,300	41,738	0.0188	0.9812	80.86
9.5	2,272,795	53,726	0.0236	0.9764	79.34
10.5	2,043,892	32,172	0.0157	0.9843	77.46
11.5	2,269,209	15,261	0.0067	0.9933	76.25
12.5	2,101,069	12,245	0.0058	0.9942	75.73
13.5	1,986,222	8,748	0.0044	0.9956	75.29
14.5	1,962,404	18,789	0.0096	0.9904	74.96
15.5	1,841,386	22,766	0.0124	0.9876	74.24
16.5	1,821,826	12,419	0.0068	0.9932	73.32
17.5	1,792,202	23,626	0.0132	0.9868	72.82
18.5	1,674,284	27,026	0.0161	0.9839	71.86
19.5	1,683,348	22,846	0.0136	0.9864	70.70
20.5	1,584,597	20,242	0.0128	0.9872	69.74
21.5	1,473,654	13,947	0.0095	0.9905	68.85
22.5	1,677,116	14,526	0.0087	0.9913	68.20
23.5	1,596,699	18,561	0.0116	0.9884	67.61
24.5	1,460,403	8,979	0.0061	0.9939	66.83
25.5	1,343,950	21,354	0.0159	0.9841	66.41
26.5	1,296,579	30,432	0.0235	0.9765	65.36
27.5	1,236,557	7,869	0.0064	0.9936	63.83
28.5	1,156,317	28,143	0.0243	0.9757	63.42
29.5	1,017,494	12,844	0.0126	0.9874	61.88
30.5	950,767	5,659	0.0060	0.9940	61.09
31.5	897,152	6,792	0.0076	0.9924	60.73
32.5	865,058	834	0.0010	0.9990	60.27
33.5	765,664	1,928	0.0025	0.9975	60.21
34.5	756,990	1,555	0.0021	0.9979	60.06
35.5	801,918	7,764	0.0097	0.9903	59.94
36.5	826,040	5,375	0.0065	0.9935	59.36
37.5	659,178	20,958	0.0318	0.9682	58.97
38.5	601,029	6,473	0.0108	0.9892	57.10

PLACEMENT BAND 1937-2020 EXPERIENCE BAND 2006-2020

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	507,650	18,904	0.0372	0.9628	56.48
40.5	469,379	12,979	0.0277	0.9723	54.38
41.5	417,530	1,226	0.0029	0.9971	52.87
42.5	399,840	2,054	0.0051	0.9949	52.72
43.5	374,101	5,023	0.0134	0.9866	52.45
44.5	371,743	31,760	0.0854	0.9146	51.74
45.5	329,957	282	0.0009	0.9991	47.32
46.5	302,691	41	0.0001	0.9999	47.28
47.5	287,534	104	0.0004	0.9996	47.28
48.5	256,843	51	0.0002	0.9998	47.26
49.5	220,323	411	0.0019	0.9981	47.25
50.5	159,943	528	0.0033	0.9967	47.16
51.5	107,369	272	0.0025	0.9975	47.01
52.5	88,561	368	0.0042	0.9958	46.89
53.5	60,523	58	0.0010	0.9990	46.69
54.5	53,890	1,661	0.0308	0.9692	46.65
55.5	48,673	199	0.0041	0.9959	45.21
56.5	46,239	356	0.0077	0.9923	45.03
57.5	43,101	162	0.0038	0.9962	44.68
58.5	39,351	541	0.0137	0.9863	44.51
59.5	23,815	256	0.0108	0.9892	43.90
60.5	22,726	94	0.0041	0.9959	43.43
61.5	21,695	62	0.0029	0.9971	43.25
62.5	8,805	75	0.0085	0.9915	43.12
63.5	7,881	87	0.0110	0.9890	42.76
64.5	6,828	52	0.0077	0.9923	42.29
65.5	5,169	434	0.0840	0.9160	41.96
66.5	3,953		0.0000	1.0000	38.44
67.5	2,109	114	0.0539	0.9461	38.44
68.5	2,010	324	0.1613	0.8387	36.37
69.5	904	75	0.0832	0.9168	30.50
70.5	806	200	0.2482	0.7518	27.96
71.5	580	107	0.1846	0.8154	21.02
72.5	473	17	0.0360	0.9640	17.14
73.5	456		0.0000	1.0000	16.52
74.5	437	28	0.0631	0.9369	16.52
75.5	410		0.0000	1.0000	15.48
76.5	410	121	0.2955	0.7045	15.48
77.5	289	15	0.0520	0.9480	10.91
78.5	274		0.0000	1.0000	10.34

PLACEMENT BAND 1937-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	274		0.0000	1.0000	10.34
80.5	15	15	1.0000		10.34
81.5					

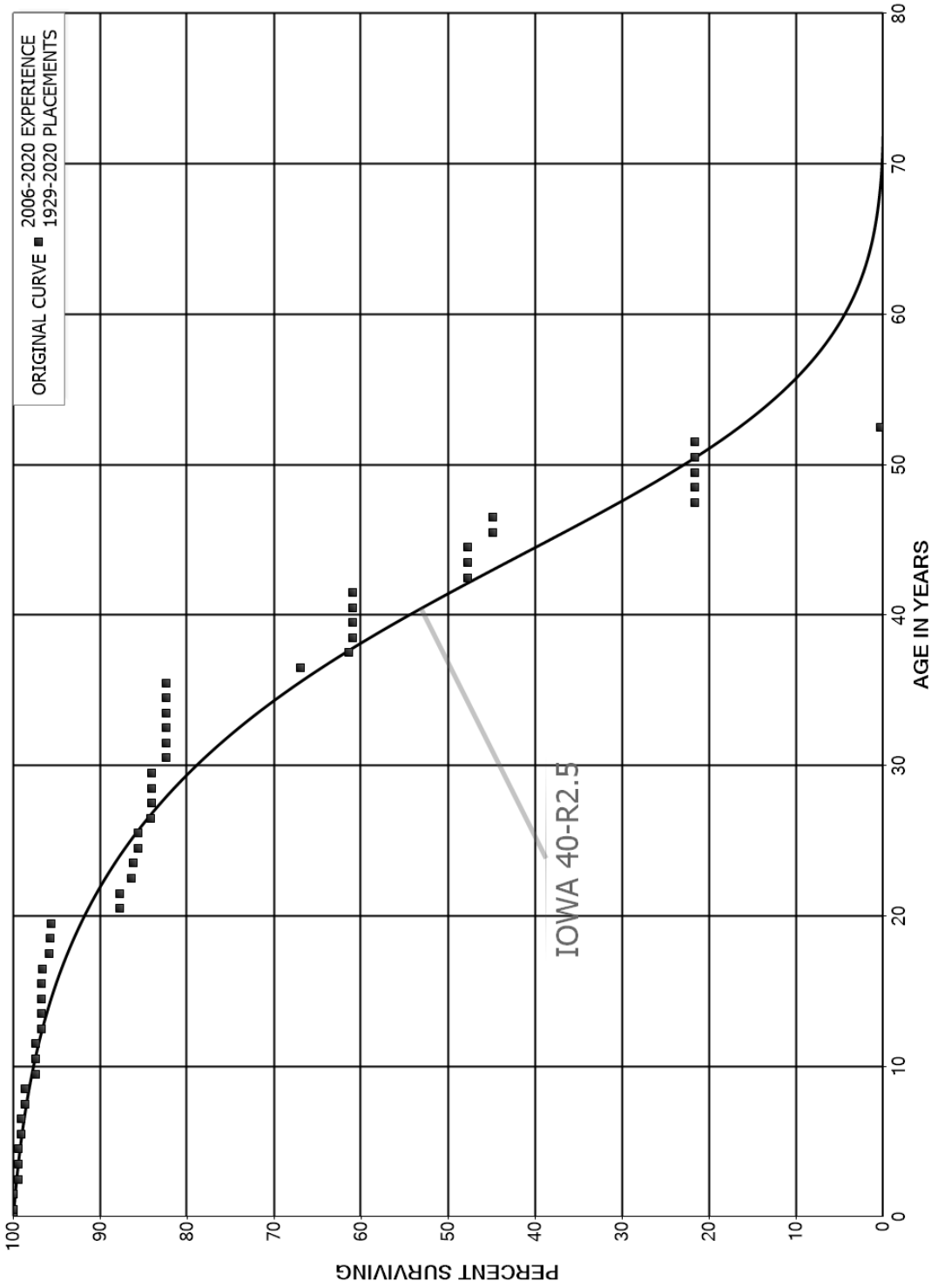

ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1958-2018 PLACEMENTS
IOWA 32-S2
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80

PLACEMENT BAND 1958-2018 EXPERIENCE BAND 2006-2020

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	284,777		0.0000	1.0000	100.00
0.5	321,038		0.0000	1.0000	100.00
1.5	316,545		0.0000	1.0000	100.00
2.5	236,326		0.0000	1.0000	100.00
3.5	101,827		0.0000	1.0000	100.00
4.5	47,701		0.0000	1.0000	100.00
5.5	37,186		0.0000	1.0000	100.00
6.5	37,186		0.0000	1.0000	100.00
7.5	53,103		0.0000	1.0000	100.00
8.5	55,549		0.0000	1.0000	100.00
9.5	58,116		0.0000	1.0000	100.00
10.5	68,298		0.0000	1.0000	100.00
11.5	71,209		0.0000	1.0000	100.00
12.5	40,405		0.0000	1.0000	100.00
13.5	56,185		0.0000	1.0000	100.00
14.5	138,882	2,446	0.0176	0.9824	100.00
15.5	142,463	2,567	0.0180	0.9820	98.24
16.5	191,218		0.0000	1.0000	96.47
17.5	197,552		0.0000	1.0000	96.47
18.5	198,372	1,276	0.0064	0.9936	96.47
19.5	186,915	7,540	0.0403	0.9597	95.85
20.5	177,337	20,861	0.1176	0.8824	91.98
21.5	156,150	3,310	0.0212	0.9788	81.16
22.5	129,433	32,119	0.2482	0.7518	79.44
23.5	36,318		0.0000	1.0000	59.73
24.5	34,286	418	0.0122	0.9878	59.73
25.5	22,192		0.0000	1.0000	59.00
26.5	38,663		0.0000	1.0000	59.00
27.5	107,948		0.0000	1.0000	59.00
28.5	107,948	18,349	0.1700	0.8300	59.00
29.5	91,497		0.0000	1.0000	48.97
30.5	90,437	686	0.0076	0.9924	48.97
31.5	89,003	492	0.0055	0.9945	48.60
32.5	88,879		0.0000	1.0000	48.33
33.5	88,879	23,555	0.2650	0.7350	48.33
34.5	57,797		0.0000	1.0000	35.52
35.5	34,992	93	0.0027	0.9973	35.52
36.5	6,177	1,365	0.2211	0.7789	35.43
37.5	5,466		0.0000	1.0000	27.60
38.5	8,873		0.0000	1.0000	27.60

PLACEMENT BAND 1958-2018 EXPERIENCE BAND 2006-2020

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	8,873	2,355	0.2654	0.7346	27.60
40.5	6,518		0.0000	1.0000	20.27
41.5	4,385		0.0000	1.0000	20.27
42.5	11,625		0.0000	1.0000	20.27
43.5	11,625		0.0000	1.0000	20.27
44.5	11,708	1,525	0.1302	0.8698	20.27
45.5	10,183		0.0000	1.0000	17.63
46.5	9,529		0.0000	1.0000	17.63
47.5	7,464		0.0000	1.0000	17.63
48.5	7,464	7,241	0.9701	0.0299	17.63
49.5	223		0.0000	1.0000	0.53
50.5	223	83	0.3705	0.6295	0.53
51.5	140		0.0000	1.0000	0.33
52.5	140		0.0000	1.0000	0.33
53.5	140		0.0000	1.0000	0.33
54.5	140		0.0000	1.0000	0.33
55.5	140		0.0000	1.0000	0.33
56.5	140		0.0000	1.0000	0.33
57.5	140		0.0000	1.0000	0.33
58.5	140		0.0000	1.0000	0.33
59.5	140		0.0000	1.0000	0.33
60.5	140		0.0000	1.0000	0.33
61.5	140		0.0000	1.0000	0.33
62.5					0.33


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1929-2020 PLACEMENTS
IOWA 40-R2.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80

PLACEMENT BAND 1929-2020 EXPERIENCE BAND 2006-2020

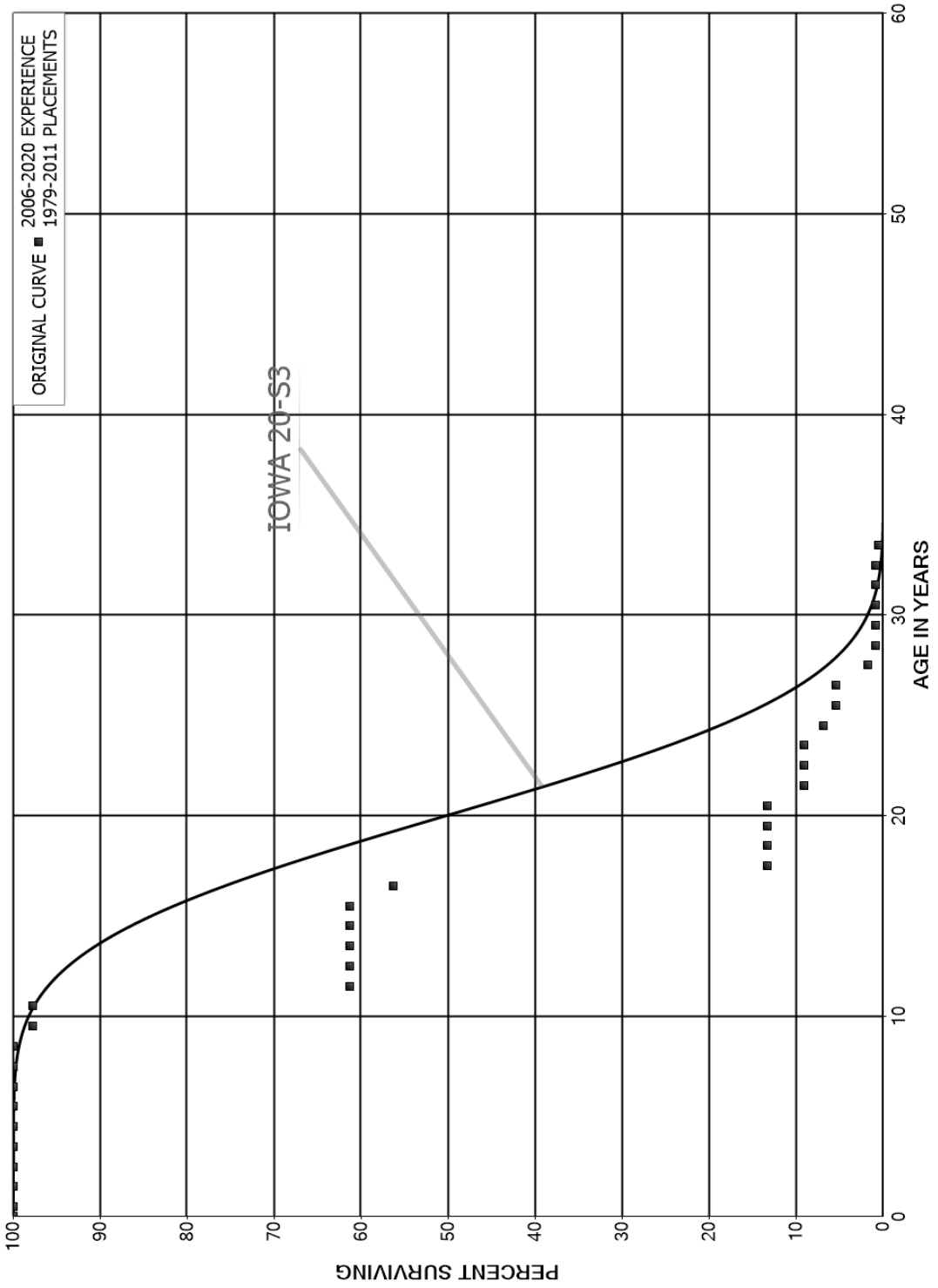
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	9,746,654		0.0000	1.0000	100.00
0.5	8,335,923		0.0000	1.0000	100.00
1.5	7,637,055	48,825	0.0064	0.9936	100.00
2.5	7,397,874		0.0000	1.0000	99.36
3.5	7,248,776		0.0000	1.0000	99.36
4.5	7,130,875	22,702	0.0032	0.9968	99.36
5.5	6,539,734		0.0000	1.0000	99.04
6.5	6,276,933	30,107	0.0048	0.9952	99.04
7.5	5,958,421		0.0000	1.0000	98.57
8.5	3,498,817	41,282	0.0118	0.9882	98.57
9.5	2,815,327		0.0000	1.0000	97.41
10.5	1,853,583		0.0000	1.0000	97.41
11.5	1,897,252	13,746	0.0072	0.9928	97.41
12.5	292,513		0.0000	1.0000	96.70
13.5	422,041		0.0000	1.0000	96.70
14.5	447,180		0.0000	1.0000	96.70
15.5	1,188,548	952	0.0008	0.9992	96.70
16.5	1,236,808	9,706	0.0078	0.9922	96.62
17.5	1,283,945	2,515	0.0020	0.9980	95.86
18.5	1,343,413	232	0.0002	0.9998	95.68
19.5	1,315,036	108,716	0.0827	0.9173	95.66
20.5	1,125,748		0.0000	1.0000	87.75
21.5	1,119,784	16,769	0.0150	0.9850	87.75
22.5	533,894	1,772	0.0033	0.9967	86.44
23.5	691,604	4,200	0.0061	0.9939	86.15
24.5	429,419		0.0000	1.0000	85.63
25.5	421,356	7,138	0.0169	0.9831	85.63
26.5	292,144	441	0.0015	0.9985	84.18
27.5	304,520		0.0000	1.0000	84.05
28.5	268,089		0.0000	1.0000	84.05
29.5	201,206	3,956	0.0197	0.9803	84.05
30.5	52,217		0.0000	1.0000	82.40
31.5	55,757		0.0000	1.0000	82.40
32.5	55,757		0.0000	1.0000	82.40
33.5	52,583		0.0000	1.0000	82.40
34.5	52,583		0.0000	1.0000	82.40
35.5	19,317	3,610	0.1869	0.8131	82.40
36.5	15,706	1,310	0.0834	0.9166	67.00
37.5	43,308	366	0.0084	0.9916	61.41
38.5	46,008		0.0000	1.0000	60.89

PLACEMENT BAND 1929-2020 EXPERIENCE BAND 2006-2020

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	46,008		0.0000	1.0000	60.89
40.5	64,943		0.0000	1.0000	60.89
41.5	64,943	14,031	0.2160	0.7840	60.89
42.5	50,913		0.0000	1.0000	47.74
43.5	50,913		0.0000	1.0000	47.74
44.5	50,913	3,058	0.0601	0.9399	47.74
45.5	47,854		0.0000	1.0000	44.87
46.5	47,854	24,782	0.5179	0.4821	44.87
47.5	23,400		0.0000	1.0000	21.63
48.5	23,400		0.0000	1.0000	21.63
49.5	85,796		0.0000	1.0000	21.63
50.5	85,796		0.0000	1.0000	21.63
51.5	23,400	23,066	0.9857	0.0143	21.63
52.5	334		0.0000	1.0000	0.31
53.5	327		0.0000	1.0000	0.31
54.5	478		0.0000	1.0000	0.31
55.5	478		0.0000	1.0000	0.31
56.5	4,872		0.0000	1.0000	0.31
57.5	4,872		0.0000	1.0000	0.31
58.5	4,872		0.0000	1.0000	0.31
59.5	4,872		0.0000	1.0000	0.31
60.5	4,872	151	0.0311	0.9689	0.31
61.5	4,720	327	0.0693	0.9307	0.30
62.5	4,393	4,393	1.0000		0.28
63.5					
64.5					
65.5					
66.5					
67.5					
68.5					
69.5					
70.5					
71.5					
72.5					
73.5					
74.5					
75.5	225		0.0000		
76.5	5,119		0.0000		
77.5	4,894		0.0000		
78.5	4,894		0.0000		

PLACEMENT BAND 1929-2020 EXPERIENCE BAND 2006-2020

AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
79.5	4,894		0.0000		
80.5	4,894		0.0000		
81.5	4,894		0.0000		
82.5	4,894	4,894	1.0000		
83.5					

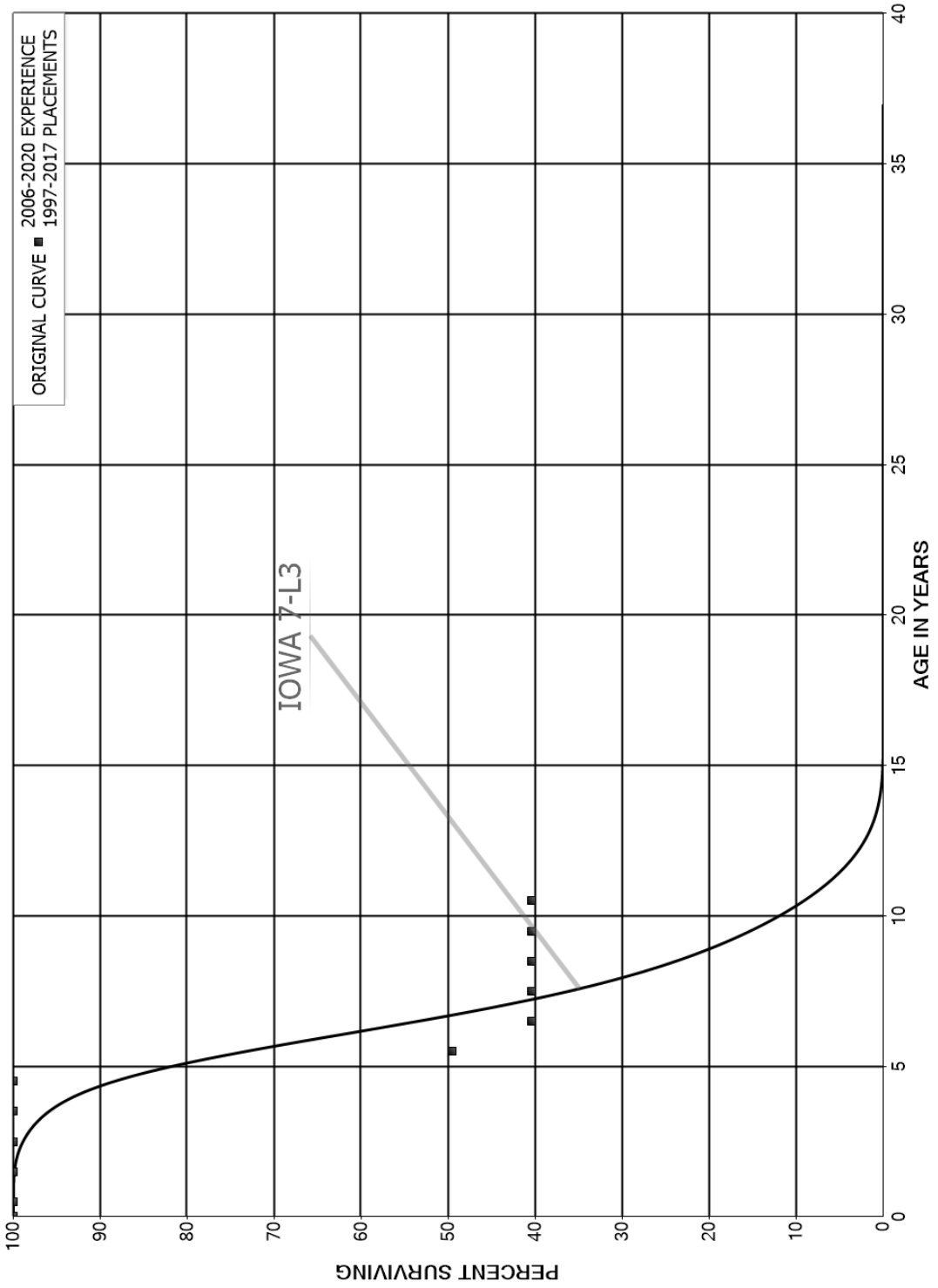

ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1979-2011 PLACEMENTS
IOWA 20-S3
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60

PLACEMENT BAND 1979-2011 EXPERIENCE BAND 2006-2020

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	36,348		0.0000	1.0000	100.00
0.5	53,830		0.0000	1.0000	100.00
1.5	53,830		0.0000	1.0000	100.00
2.5	53,830		0.0000	1.0000	100.00
3.5	53,830		0.0000	1.0000	100.00
4.5	53,830		0.0000	1.0000	100.00
5.5	53,830		0.0000	1.0000	100.00
6.5	53,830		0.0000	1.0000	100.00
7.5	55,102		0.0000	1.0000	100.00
8.5	55,102	1,273	0.0231	0.9769	100.00
9.5	53,672		0.0000	1.0000	97.69
10.5	75,517	28,130	0.3725	0.6275	97.69
11.5	47,712		0.0000	1.0000	61.30
12.5	42,051		0.0000	1.0000	61.30
13.5	42,051		0.0000	1.0000	61.30
14.5	46,606		0.0000	1.0000	61.30
15.5	29,125	2,400	0.0824	0.9176	61.30
16.5	26,725	20,422	0.7642	0.2358	56.25
17.5	9,078		0.0000	1.0000	13.27
18.5	9,078		0.0000	1.0000	13.27
19.5	9,078		0.0000	1.0000	13.27
20.5	14,423	4,555	0.3158	0.6842	13.27
21.5	11,241		0.0000	1.0000	9.08
22.5	11,241		0.0000	1.0000	9.08
23.5	11,241	2,775	0.2468	0.7532	9.08
24.5	8,466	1,748	0.2064	0.7936	6.84
25.5	7,502		0.0000	1.0000	5.42
26.5	7,870	5,345	0.6792	0.3208	5.42
27.5	2,525	1,373	0.5438	0.4562	1.74
28.5	1,152		0.0000	1.0000	0.79
29.5	1,152		0.0000	1.0000	0.79
30.5	1,152		0.0000	1.0000	0.79
31.5	1,152		0.0000	1.0000	0.79
32.5	1,152	368	0.3199	0.6801	0.79
33.5	783		0.0000	1.0000	0.54
34.5	783		0.0000	1.0000	0.54
35.5	783		0.0000	1.0000	0.54
36.5	783		0.0000	1.0000	0.54
37.5	783		0.0000	1.0000	0.54
38.5	783		0.0000	1.0000	0.54

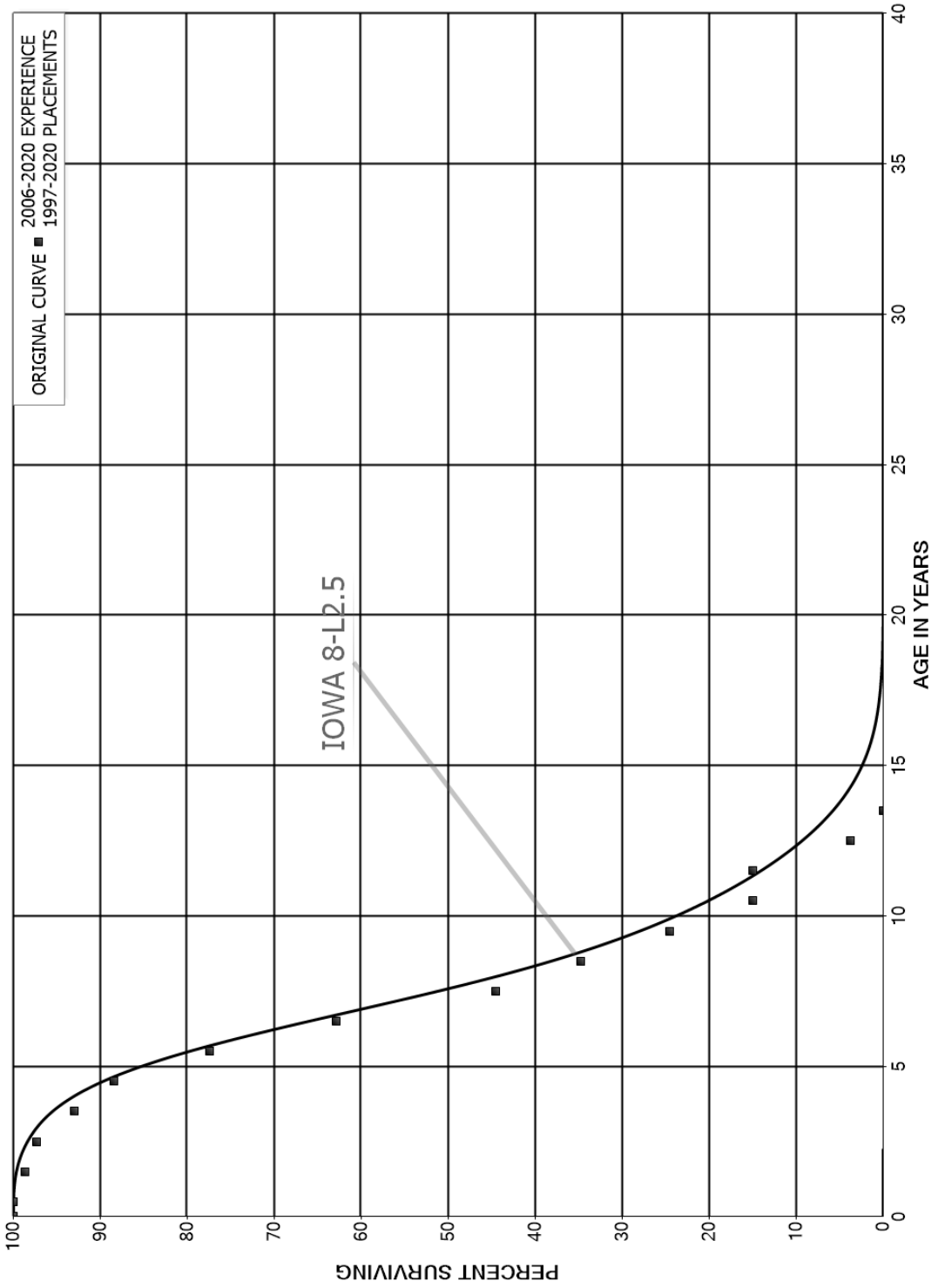
PLACEMENT BAND 1979-2011 EXPERIENCE BAND 2006-2020

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	783		0.0000	1.0000	0.54
40.5					0.54


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1997-2017 PLACEMENTS
IOWA 7-L3
PERCENT SURVIVING
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
AGE IN YEARS

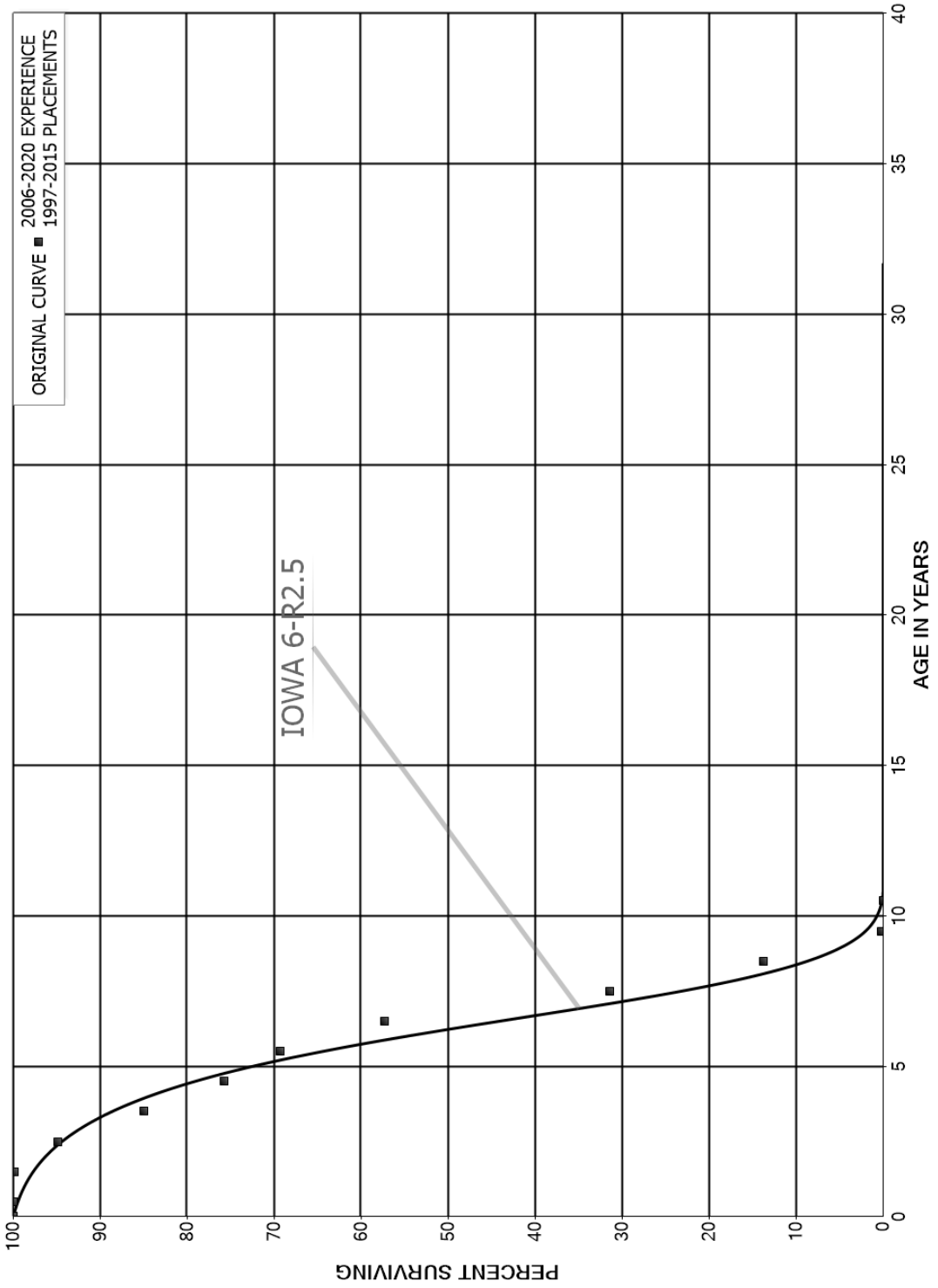
PLACEMENT BAND 1997-2017 EXPERIENCE BAND 2006-2020

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	63,648		0.0000	1.0000	100.00
0.5	63,648		0.0000	1.0000	100.00
1.5	63,648		0.0000	1.0000	100.00
2.5	63,648		0.0000	1.0000	100.00
3.5	54,121		0.0000	1.0000	100.00
4.5	54,121	27,324	0.5049	0.4951	100.00
5.5	32,871	6,074	0.1848	0.8152	49.51
6.5	18,678		0.0000	1.0000	40.36
7.5	8,560		0.0000	1.0000	40.36
8.5	8,560		0.0000	1.0000	40.36
9.5	8,560		0.0000	1.0000	40.36
10.5					40.36
11.5					
12.5					
13.5					
14.5					
15.5					
16.5					
17.5					
18.5					
19.5	5,142		0.0000		
20.5	5,142		0.0000		
21.5	5,142		0.0000		
22.5	5,142		0.0000		
23.5					


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1997-2020 PLACEMENTS
IOWA 8-L2.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40

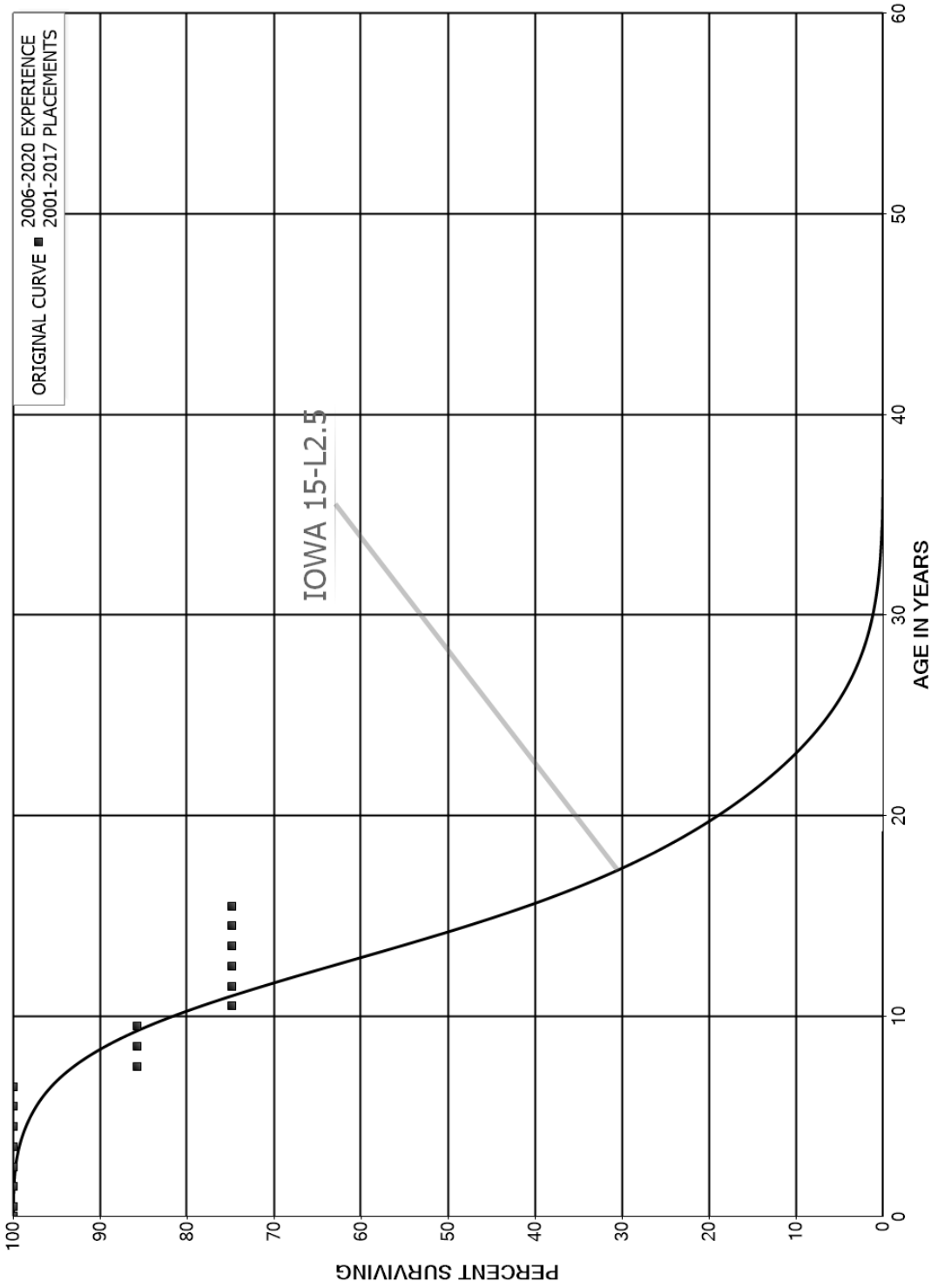
PLACEMENT BAND 1997-2020 EXPERIENCE BAND 2006-2020

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	9,088,554		0.0000	1.0000	100.00
0.5	7,112,464	99,991	0.0141	0.9859	100.00
1.5	6,529,421	87,237	0.0134	0.9866	98.59
2.5	5,755,315	258,127	0.0449	0.9551	97.28
3.5	4,822,639	236,683	0.0491	0.9509	92.91
4.5	3,814,023	475,231	0.1246	0.8754	88.35
5.5	2,793,406	523,200	0.1873	0.8127	77.35
6.5	1,881,145	549,278	0.2920	0.7080	62.86
7.5	1,052,585	230,258	0.2188	0.7812	44.50
8.5	790,900	232,648	0.2942	0.7058	34.77
9.5	285,817	112,403	0.3933	0.6067	24.54
10.5	78,436		0.0000	1.0000	14.89
11.5	38,717	28,926	0.7471	0.2529	14.89
12.5	204	204	1.0000		3.77
13.5					


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1997-2015 PLACEMENTS
IOWA 6-R2.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40

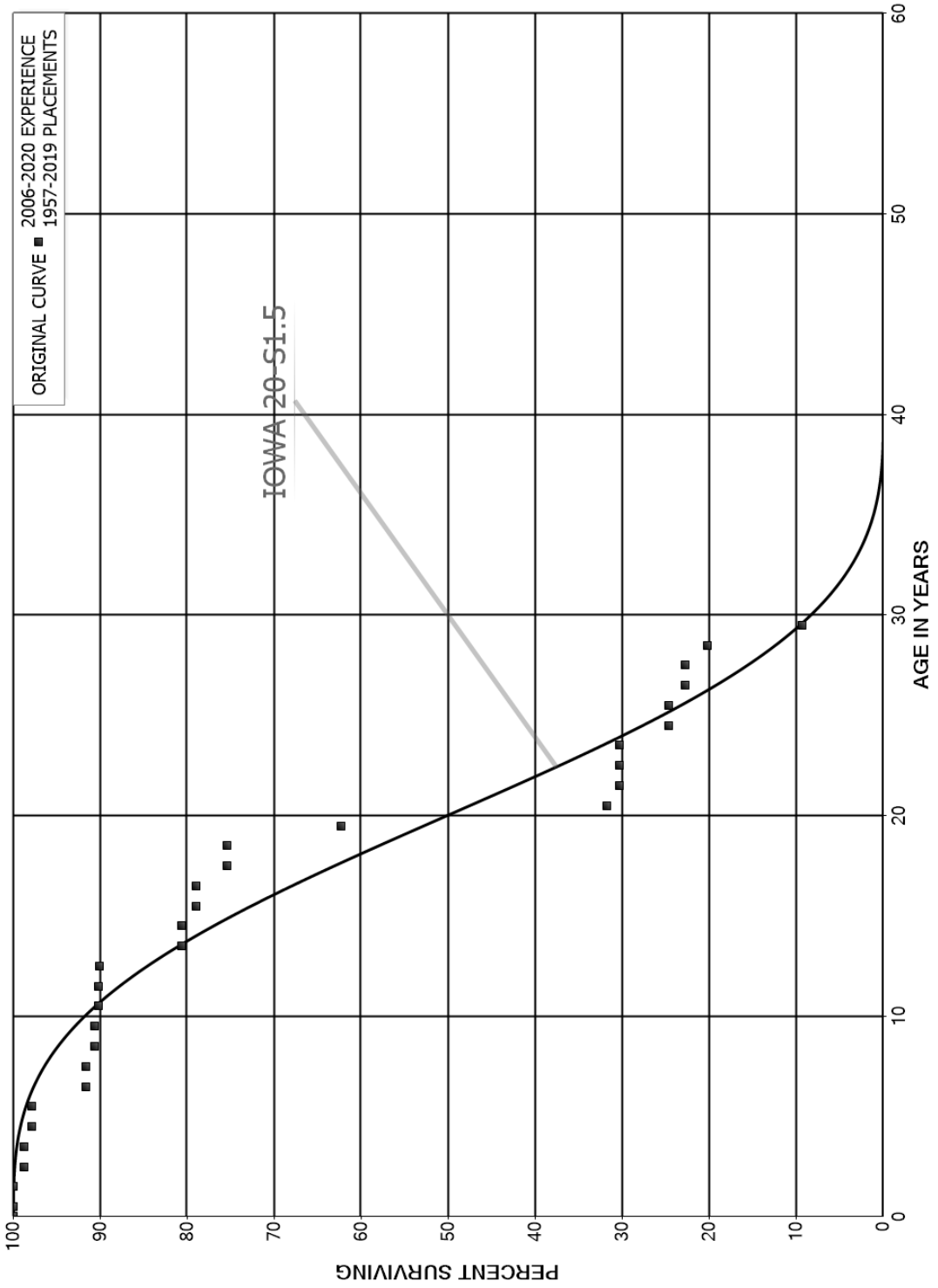
PLACEMENT BAND 1997-2015 EXPERIENCE BAND 2006-2020

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	2,336,098		0.0000	1.0000	100.00
0.5	2,336,098	5,091	0.0022	0.9978	100.00
1.5	2,393,558	119,778	0.0500	0.9500	99.78
2.5	2,030,270	211,303	0.1041	0.8959	94.79
3.5	1,788,542	193,124	0.1080	0.8920	84.92
4.5	1,491,569	128,305	0.0860	0.9140	75.75
5.5	1,032,895	178,459	0.1728	0.8272	69.24
6.5	536,731	242,297	0.4514	0.5486	57.27
7.5	251,144	141,309	0.5627	0.4373	31.42
8.5	21,969	21,762	0.9906	0.0094	13.74
9.5	207	207	1.0000		0.13
10.5					


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
2001-2017 PLACEMENTS
IOWA 15-L2.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60

PLACEMENT BAND 2001-2017 EXPERIENCE BAND 2006-2020

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	423,352		0.0000	1.0000	100.00
0.5	423,352		0.0000	1.0000	100.00
1.5	381,167		0.0000	1.0000	100.00
2.5	381,167		0.0000	1.0000	100.00
3.5	282,302		0.0000	1.0000	100.00
4.5	205,737		0.0000	1.0000	100.00
5.5	205,737		0.0000	1.0000	100.00
6.5	347,442	49,436	0.1423	0.8577	100.00
7.5	234,596		0.0000	1.0000	85.77
8.5	236,591		0.0000	1.0000	85.77
9.5	236,591	30,143	0.1274	0.8726	85.77
10.5	114,179		0.0000	1.0000	74.84
11.5	114,179		0.0000	1.0000	74.84
12.5	7,667		0.0000	1.0000	74.84
13.5	6,738		0.0000	1.0000	74.84
14.5	6,738		0.0000	1.0000	74.84
15.5					74.84

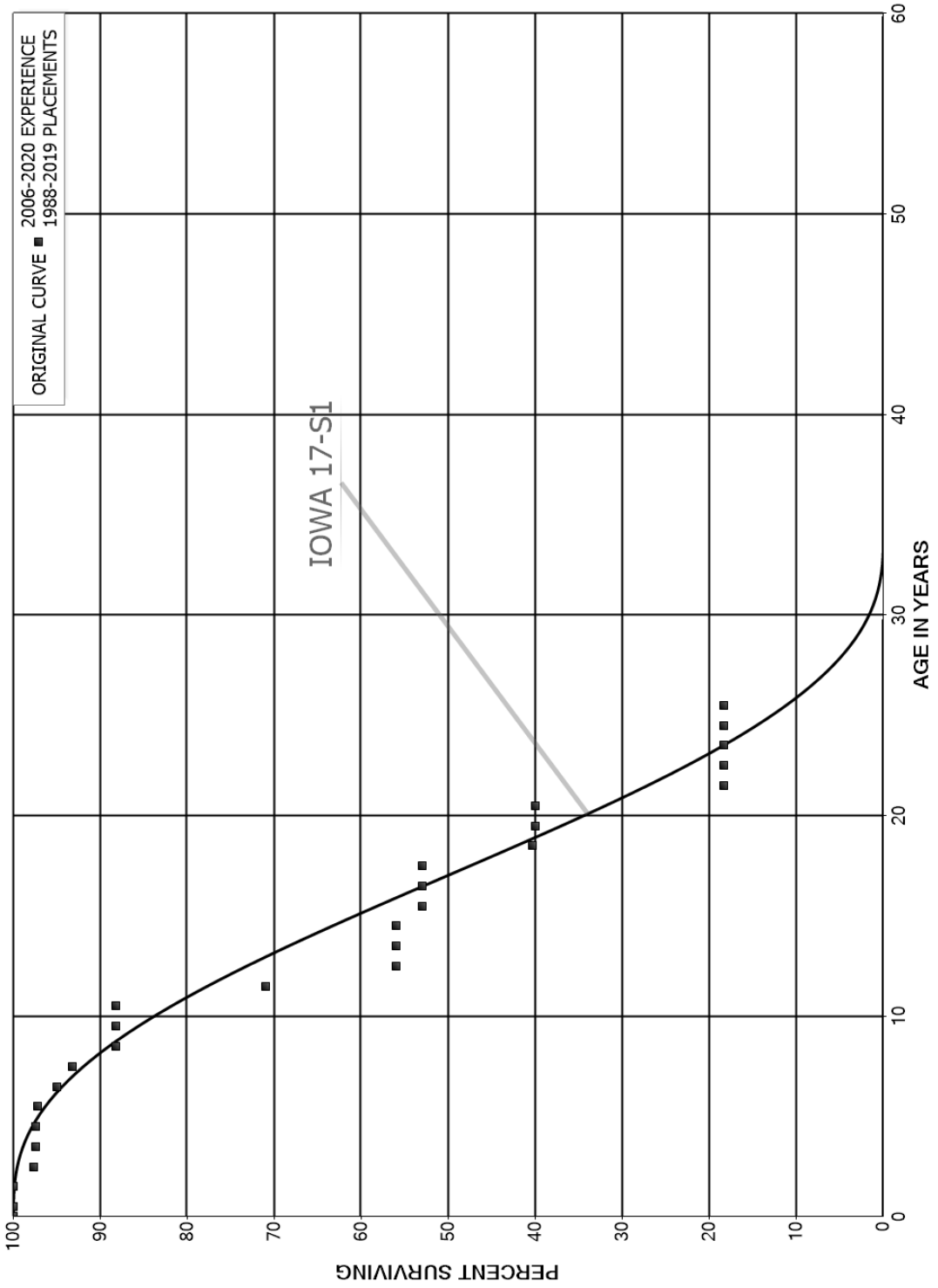

ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1957-2019 PLACEMENTS
IOWA 20-S1.5
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60

PLACEMENT BAND 1957-2019 EXPERIENCE BAND 2006-2020

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	177,836		0.0000	1.0000	100.00
0.5	177,836		0.0000	1.0000	100.00
1.5	168,856	2,186	0.0129	0.9871	100.00
2.5	166,670		0.0000	1.0000	98.71
3.5	155,344	1,428	0.0092	0.9908	98.71
4.5	153,916		0.0000	1.0000	97.80
5.5	152,139	9,686	0.0637	0.9363	97.80
6.5	72,181		0.0000	1.0000	91.57
7.5	72,181	773	0.0107	0.9893	91.57
8.5	69,030	10	0.0001	0.9999	90.59
9.5	79,564	358	0.0045	0.9955	90.58
10.5	58,557		0.0000	1.0000	90.17
11.5	61,591	70	0.0011	0.9989	90.17
12.5	57,895	6,108	0.1055	0.8945	90.07
13.5	99,839		0.0000	1.0000	80.57
14.5	112,877	2,262	0.0200	0.9800	80.57
15.5	119,412		0.0000	1.0000	78.95
16.5	134,062	6,067	0.0453	0.9547	78.95
17.5	127,995	11	0.0001	0.9999	75.38
18.5	127,984	22,166	0.1732	0.8268	75.37
19.5	93,937	46,190	0.4917	0.5083	62.32
20.5	47,748	2,058	0.0431	0.9569	31.68
21.5	37,601		0.0000	1.0000	30.31
22.5	37,601		0.0000	1.0000	30.31
23.5	37,601	7,093	0.1886	0.8114	30.31
24.5	33,069		0.0000	1.0000	24.59
25.5	33,069	2,561	0.0774	0.9226	24.59
26.5	30,508		0.0000	1.0000	22.69
27.5	30,508	3,451	0.1131	0.8869	22.69
28.5	27,057	14,643	0.5412	0.4588	20.12
29.5	1,526		0.0000	1.0000	9.23
30.5	2,459		0.0000	1.0000	9.23
31.5	2,459		0.0000	1.0000	9.23
32.5	2,459		0.0000	1.0000	9.23
33.5	2,459	7	0.0027	0.9973	9.23
34.5	2,452		0.0000	1.0000	9.21
35.5	2,452		0.0000	1.0000	9.21
36.5	2,452		0.0000	1.0000	9.21
37.5	2,452		0.0000	1.0000	9.21
38.5	2,452		0.0000	1.0000	9.21

PLACEMENT BAND 1957-2019 EXPERIENCE BAND 2006-2020

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	2,452	2,452	1.0000		9.21
40.5	108		0.0000	1.0000	
41.5	208		0.0000		
42.5	208		0.0000		
43.5	208	4	0.0188		
44.5	204		0.0000		
45.5	204	100	0.4904		
46.5	104		0.0000		
47.5	104		0.0000		
48.5	304		0.0000		
49.5	304		0.0000		
50.5	304	104	0.3419		
51.5	200		0.0000		
52.5	200	200	1.0000		
53.5					


ORIGINAL CURVE ■ 2006-2020 EXPERIENCE
1988-2019 PLACEMENTS
IOWA 17-S1
PERCENT SURVIVING
AGE IN YEARS
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60

PLACEMENT BAND 1988-2019 EXPERIENCE BAND 2006-2020

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	955,467		0.0000	1.0000	100.00
0.5	955,467		0.0000	1.0000	100.00
1.5	950,695	23,054	0.0242	0.9758	100.00
2.5	996,493	1,618	0.0016	0.9984	97.58
3.5	964,295		0.0000	1.0000	97.42
4.5	1,053,308	2,628	0.0025	0.9975	97.42
5.5	971,493	21,676	0.0223	0.9777	97.17
6.5	817,465	15,404	0.0188	0.9812	95.01
7.5	523,133	28,281	0.0541	0.9459	93.22
8.5	452,449		0.0000	1.0000	88.18
9.5	378,319		0.0000	1.0000	88.18
10.5	290,921	56,835	0.1954	0.8046	88.18
11.5	221,258	46,845	0.2117	0.7883	70.95
12.5	118,118		0.0000	1.0000	55.93
13.5	107,755		0.0000	1.0000	55.93
14.5	107,755	5,710	0.0530	0.9470	55.93
15.5	73,048		0.0000	1.0000	52.96
16.5	73,048		0.0000	1.0000	52.96
17.5	115,631	27,730	0.2398	0.7602	52.96
18.5	101,605	827	0.0081	0.9919	40.26
19.5	100,779		0.0000	1.0000	39.94
20.5	100,779	54,704	0.5428	0.4572	39.94
21.5	46,075		0.0000	1.0000	18.26
22.5	46,075		0.0000	1.0000	18.26
23.5	42,583		0.0000	1.0000	18.26
24.5	42,583		0.0000	1.0000	18.26
25.5	42,583		0.0000	1.0000	18.26
26.5	42,583		0.0000	1.0000	18.26
27.5	42,583	42,583	1.0000		18.26
28.5					

PART VIII. NET SALVAGE STATISTICS

2006	669		0	0		0
2007						
2008						
2009						
2010						
2011						
2012	28,020		0	0		0
2013						
2014						
2015						
2016						
2017						
2018						
2019	1,615	810	50	0	810-	50-
2020						
TOTAL	30,304	810	3	0	810-	3-
THREE-YEAR MOVING AVERAGES						
06-08	223		0	0		0
07-09						
08-10						
09-11						
10-12	9,340		0	0		0
11-13	9,340		0	0		0
12-14	9,340		0	0		0
13-15						
14-16						
15-17						
16-18						
17-19	538	270	50	0	270-	50-
18-20	538	270	50	0	270-	50-
FIVE-YEAR AVERAGE						
16-20	323	162	50	0	162-	50-

2006	353,513	11,735	3	0	11,735-	3-
2007	36,647	1,751	5	0	1,751-	5-
2008	12,513	11,048	88	0	11,048-	88-
2009	28,319	20,758	73	0	20,758-	73-
2010	30,121	4,805	16	0	4,805-	16-
2011	33,647	583	2	0	583-	2-
2012	716,984	10,714	1	0	10,714-	1-
2013	4,935	352	7	0	352-	7-
2014	603,077	31,769	5	0	31,769-	5-
2015	178,351	97,884	55	0	97,884-	55-
2016	117,156	3,000	3	0	3,000-	3-
2017	119,974	7,006	6	0	7,006-	6-
2018		2,500			2,500-	
2019	501,001	3,568	1	0	3,568-	1-
2020	93,569	5,781	6	0	5,781-	6-
TOTAL	2,829,806	213,255	8	0	213,255-	8-
THREE-YEAR MOVING AVERAGES						
06-08	134,224	8,178	6	0	8,178-	6-
07-09	25,826	11,186	43	0	11,186-	43-
08-10	23,651	12,204	52	0	12,204-	52-
09-11	30,696	8,715	28	0	8,715-	28-
10-12	260,251	5,367	2	0	5,367-	2-
11-13	251,855	3,883	2	0	3,883-	2-
12-14	441,665	14,278	3	0	14,278-	3-
13-15	262,121	43,335	17	0	43,335-	17-
14-16	299,528	44,218	15	0	44,218-	15-
15-17	138,494	35,963	26	0	35,963-	26-
16-18	79,043	4,169	5	0	4,169-	5-
17-19	206,992	4,358	2	0	4,358-	2-
18-20	198,190	3,950	2	0	3,950-	2-
FIVE-YEAR AVERAGE						
16-20	166,340	4,371	3	0	4,371-	3-

2010	3,290	58	2	0	58-	2-
2011						
2012	580,969		0	0		0
2013						
2014	19,009		0	0		0
2015						
2016						
2017						
2018						
2019						
2020						
TOTAL	603,268	58	0	0	58-	0
THREE-YEAR MOVING AVERAGES						
10-12	194,753	19	0	0	19-	0
11-13	193,656		0	0		0
12-14	199,993		0	0		0
13-15	6,336		0	0		0
14-16	6,336		0	0		0
15-17						
16-18						
17-19						
18-20						
FIVE-YEAR AVERAGE						
16-20						

2006	51,121	1,927	4	0	1,927-	4-
2007	17,087	830	5	0	830-	5-
2008	15,698	867	6	0	867-	6-
2009	53,741	204	0	0	204-	0
2010	20,857	289	1	0	289-	1-
2011	13,062	1,257	10	0	1,257-	10-
2012	293,189	101	0	0	101-	0
2013	1,526	506	33	0	506-	33-
2014	161,399	9,910	6	0	9,910-	6-
2015	22,552		0	0		0
2016						
2017	12,400		0	0		0
2018	3,949		0	0		0
2019	31,655	7,975	25	0	7,975-	25-
2020						
TOTAL	698,236	23,866	3	0	23,866-	3-
THREE-YEAR MOVING AVERAGES						
06-08	27,969	1,208	4	0	1,208-	4-
07-09	28,842	634	2	0	634-	2-
08-10	30,099	453	2	0	453-	2-
09-11	29,220	583	2	0	583-	2-
10-12	109,036	549	1	0	549-	1-
11-13	102,592	622	1	0	622-	1-
12-14	152,038	3,506	2	0	3,506-	2-
13-15	61,826	3,472	6	0	3,472-	6-
14-16	61,317	3,303	5	0	3,303-	5-
15-17	11,651		0	0		0
16-18	5,450		0	0		0
17-19	16,001	2,658	17	0	2,658-	17-
18-20	11,868	2,658	22	0	2,658-	22-
FIVE-YEAR AVERAGE						
16-20	9,601	1,595	17	0	1,595-	17-

2011	1,100	693	63	0	693-	63-
2012	162,613	92	0	0	92-	0
2013	1,444	130	9	0	130-	9-
2014						
2015						
2016						
2017						
2018						
2019						
2020						
TOTAL	165,158	915	1	0	915-	1-
THREE-YEAR MOVING AVERAGES						
11-13	55,053	305	1	0	305-	1-
12-14	54,686	74	0	0	74-	0
13-15	481	43	9	0	43-	9-
14-16						
15-17						
16-18						
17-19						
18-20						
FIVE-YEAR AVERAGE						
16-20						

2008	26,315	25,679	98		0	25,679-	98-
2009	452		0		0		0
2010							
2011							
2012	53,858		0		0		0
2013	12,786		0		0		0
2014	1,068	1	0		0	1-	0
2015							
2016							
2017							
2018							
2019							
2020	7,918	134	2	2,636	33	2,502	32
TOTAL	102,395	25,814	25	2,636	3	23,178-	23-
THREE-YEAR MOVING AVERAGES							
08-10	8,922	8,560	96		0	8,560-	96-
09-11	151		0		0		0
10-12	17,953		0		0		0
11-13	22,215		0		0		0
12-14	22,570		0		0		0
13-15	4,618		0		0		0
14-16	356		0		0		0
15-17							
16-18							
17-19							
18-20	2,639	45	2	879	33	834	32
FIVE-YEAR AVERAGE							
16-20	1,584	27	2	527	33	500	32

2006	56,402	43,825	78		0	43,825-	78-
2007	58,666	34,790	59		0	34,790-	59-
2008	167,608	57,458	34	4,388	3	53,070-	32-
2009	264,064	42,600	16	142	0	42,458-	16-
2010	80,685	40,036	50		0	40,036-	50-
2011	196,664	26,939	14		0	26,939-	14-
2012	1,970,943	8,329	0		0	8,329-	0
2013	171,995	56	0		0	56-	0
2014	158,030	15,636	10		0	15,636-	10-
2015	679,964	8,032	1	2,920	0	5,112-	1-
2016	172,848	5,443	3		0	5,443-	3-
2017	438,311	14,916	3		0	14,916-	3-
2018	35,547	4,664	13		0	4,664-	13-
2019	786,100	9,099	1		0	9,099-	1-
2020	376,072	5,180	1		0	5,180-	1-
TOTAL	5,613,899	317,003	6	7,450	0	309,553-	6-
THREE-YEAR MOVING AVERAGES							
06-08	94,225	45,358	48	1,463	2	43,895-	47-
07-09	163,446	44,949	28	1,510	1	43,439-	27-
08-10	170,786	46,698	27	1,510	1	45,188-	26-
09-11	180,471	36,525	20	47	0	36,478-	20-
10-12	749,431	25,101	3		0	25,101-	3-
11-13	779,867	11,775	2		0	11,775-	2-
12-14	766,990	8,007	1		0	8,007-	1-
13-15	336,663	7,908	2	973	0	6,935-	2-
14-16	336,947	9,704	3	973	0	8,730-	3-
15-17	430,374	9,464	2	973	0	8,490-	2-
16-18	215,568	8,341	4		0	8,341-	4-
17-19	419,986	9,560	2		0	9,560-	2-
18-20	399,240	6,314	2		0	6,314-	2-
FIVE-YEAR AVERAGE							
16-20	361,776	7,860	2		0	7,860-	2-

2006	1,634		0	0		0
2007	18,465	61	0	0	61-	0
2008	9,301	6,549	70	0	6,549-	70-
2009	16,324	2,931	18	0	2,931-	18-
2010	2,472	424	17	0	424-	17-
2011	39,053	6,601	17	0	6,601-	17-
2012	133,035	368	0	0	368-	0
2013	17,178	394	2	0	394-	2-
2014	16,356		0	0		0
2015	69,488	3,700	5	0	3,700-	5-
2016	72,808	13,693	19	0	13,693-	19-
2017	28,341		0	0		0
2018	23,371	493	2	0	493-	2-
2019	10,249	6,504	63	0	6,504-	63-
2020	9,922	1,960	20	0	1,960-	20-
TOTAL	467,997	43,677	9	0	43,677-	9-
THREE-YEAR MOVING AVERAGES						
06-08	9,800	2,203	22	0	2,203-	22-
07-09	14,697	3,180	22	0	3,180-	22-
08-10	9,366	3,301	35	0	3,301-	35-
09-11	19,283	3,319	17	0	3,319-	17-
10-12	58,187	2,464	4	0	2,464-	4-
11-13	63,089	2,454	4	0	2,454-	4-
12-14	55,523	254	0	0	254-	0
13-15	34,341	1,365	4	0	1,365-	4-
14-16	52,884	5,798	11	0	5,798-	11-
15-17	56,879	5,798	10	0	5,798-	10-
16-18	41,506	4,729	11	0	4,729-	11-
17-19	20,654	2,332	11	0	2,332-	11-
18-20	14,514	2,986	21	0	2,986-	21-
FIVE-YEAR AVERAGE						
16-20	28,938	4,530	16	0	4,530-	16-

2006	19,330	49,413	256	2	0	49,411-	256-
2007	36,391	45,430	125	333	1	45,097-	124-
2008	40,621	81,461	201		0	81,461-	201-
2009	42,454	52,206	123		0	52,206-	123-
2010	40,819	44,635	109		0	44,635-	109-
2011	83,609	40,197	48		0	40,197-	48-
2012	721,596	18,060	3		0	18,060-	3-
2013	176,973	2,890	2		0	2,890-	2-
2014	104,454	5,658	5		0	5,658-	5-
2015	85,916	7,053	8		0	7,053-	8-
2016	103,144	6,746	7		0	6,746-	7-
2017	286,869	56,872	20		0	56,872-	20-
2018	139,056	8,811	6		0	8,811-	6-
2019	974,316	29,918	3		0	29,918-	3-
2020	113,027	320	0		0	320-	0
TOTAL	2,968,576	449,670	15	336	0	449,335-	15-
THREE-YEAR MOVING AVERAGES							
06-08	32,114	58,768	183	112	0	58,656-	183-
07-09	39,822	59,699	150	111	0	59,588-	150-
08-10	41,298	59,434	144		0	59,434-	144-
09-11	55,627	45,679	82		0	45,679-	82-
10-12	282,008	34,297	12		0	34,297-	12-
11-13	327,393	20,382	6		0	20,382-	6-
12-14	334,341	8,869	3		0	8,869-	3-
13-15	122,448	5,201	4		0	5,201-	4-
14-16	97,838	6,486	7		0	6,486-	7-
15-17	158,643	23,557	15		0	23,557-	15-
16-18	176,357	24,143	14		0	24,143-	14-
17-19	466,747	31,867	7		0	31,867-	7-
18-20	408,800	13,016	3		0	13,016-	3-
FIVE-YEAR AVERAGE							
16-20	323,283	20,533	6		0	20,533-	6-

2013	67,313	0	0	0
2014	329,185	0	0	0
2015	348,408	0	0	0
2016	367,031	0	0	0
2017	232,541	0	0	0
2018	417,304	0	0	0
2019	427,404	0	0	0
2020	840,126	0	0	0
TOTAL	3,029,312	0	0	0

THREE-YEAR MOVING AVERAGES

13-15	248,302	0	0	0
14-16	348,208	0	0	0
15-17	315,993	0	0	0
16-18	338,959	0	0	0
17-19	359,083	0	0	0
18-20	561,611	0	0	0

FIVE-YEAR AVERAGE

16-20	456,881	0	0	0

2012	4,640	0	0	0
2013	526	0	0	0
2014	187,943	0	0	0
2015	90,118	0	0	0
2016	47,222	0	0	0
2017	11,627	0	0	0
2018	17,960	0	0	0
2019	43,434	0	0	0
2020	221,614	0	0	0
TOTAL	625,084	0	0	0
THREE-YEAR MOVING AVERAGES				
12-14	64,370	0	0	0
13-15	92,862	0	0	0
14-16	108,428	0	0	0
15-17	49,655	0	0	0
16-18	25,603	0	0	0
17-19	24,340	0	0	0
18-20	94,336	0	0	0
FIVE-YEAR AVERAGE				
16-20	68,371	0	0	0

2008	2,196	1,402	64	0	1,402-	64-
2009	50		0	0		0
2010						
2011	160	3,687		0	3,687-	
2012	95,656		0	0		0
2013	32,608		0	0		0
2014	3,452		0	0		0
2015						
2016						
2017	147,070		0	0		0
2018	184,113	19-	0	0	19	0
2019	2,933		0	0		0
2020						
TOTAL	468,239	5,071	1	0	5,071-	1-
THREE-YEAR MOVING AVERAGES						
08-10	749	467	62	0	467-	62-
09-11	70	1,229		0	1,229-	
10-12	31,939	1,229	4	0	1,229-	4-
11-13	42,808	1,229	3	0	1,229-	3-
12-14	43,905		0	0		0
13-15	12,020		0	0		0
14-16	1,151		0	0		0
15-17	49,023		0	0		0
16-18	110,394	6-	0	0	6	0
17-19	111,372	6-	0	0	6	0
18-20	62,349	6-	0	0	6	0
FIVE-YEAR AVERAGE						
16-20	66,823	4-	0	0	4	0

2006	93,479	11,573	12	2	0	11,572-	12-
2007	75,833	11,899	16	52	0	11,847-	16-
2008	32,795	16,061	49		0	16,061-	49-
2009	80,768	23,109	29		0	23,109-	29-
2010	65,735	13,109	20		0	13,109-	20-
2011	58,073	15,098	26		0	15,098-	26-
2012	219,241	4,540	2		0	4,540-	2-
2013	16,466	14	0		0	14-	0
2014	33,871	2,154	6		0	2,154-	6-
2015	33,308	1,316	4		0	1,316-	4-
2016	34,101	35	0		0	35-	0
2017	45,944	7,202	16		0	7,202-	16-
2018	213,154	8,918	4		0	8,918-	4-
2019	1,002,918	35,305	4		0	35,305-	4-
2020	325,772	916	0		0	916-	0
TOTAL	2,331,458	151,247	6	54	0	151,194-	6-
THREE-YEAR MOVING AVERAGES							
06-08	67,369	13,178	20	18	0	13,160-	20-
07-09	63,132	17,023	27	17	0	17,006-	27-
08-10	59,766	17,426	29		0	17,426-	29-
09-11	68,192	17,105	25		0	17,105-	25-
10-12	114,350	10,915	10		0	10,915-	10-
11-13	97,927	6,551	7		0	6,551-	7-
12-14	89,859	2,236	2		0	2,236-	2-
13-15	27,882	1,161	4		0	1,161-	4-
14-16	33,760	1,168	3		0	1,168-	3-
15-17	37,785	2,851	8		0	2,851-	8-
16-18	97,733	5,385	6		0	5,385-	6-
17-19	420,672	17,141	4		0	17,141-	4-
18-20	513,948	15,046	3		0	15,046-	3-
FIVE-YEAR AVERAGE							
16-20	324,378	10,475	3		0	10,475-	3-

2008	91,334	9,316	10	0	9,316-	10-
2009	1,816		0	0		0
2010	369		0	0		0
2011		674			674-	
2012	11,996		0	0		0
2013	19,810		0	0		0
2014	160,720		0	0		0
2015	164,805		0	0		0
2016	136,955		0	0		0
2017	122,603	350	0	0	350-	0
2018	167,886	17,130	10	0	17,130-	10-
2019	73,250	28	0	0	28-	0
2020	114,603		0	0		0
TOTAL	1,066,148	27,499	3	0	27,499-	3-
THREE-YEAR MOVING AVERAGES						
08-10	31,173	3,105	10	0	3,105-	10-
09-11	728	225	31	0	225-	31-
10-12	4,122	225	5	0	225-	5-
11-13	10,602	225	2	0	225-	2-
12-14	64,175		0	0		0
13-15	115,112		0	0		0
14-16	154,160		0	0		0
15-17	141,455	117	0	0	117-	0
16-18	142,482	5,827	4	0	5,827-	4-
17-19	121,246	5,836	5	0	5,836-	5-
18-20	118,580	5,720	5	0	5,720-	5-
FIVE-YEAR AVERAGE						
16-20	123,060	3,502	3	0	3,502-	3-

2007	21,196	0	0	0
2008				
2009				
2010				
2011				
2012	105,085	0	0	0
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
TOTAL	126,281	0	0	0
THREE-YEAR MOVING AVERAGES				
07-09	7,065	0	0	0
08-10				
09-11				
10-12	35,028	0	0	0
11-13	35,028	0	0	0
12-14	35,028	0	0	0
13-15				
14-16				
15-17				
16-18				
17-19				
18-20				
FIVE-YEAR AVERAGE				
16-20				

2008	7,138		0		0		0
2009							
2010							
2011	242,807		0		0		0
2012	221,844		0		0		0
2013	5,756		0		0		0
2014							
2015	13,249		0		0		0
2016							
2017	739	23,531			0	23,531-	
2018	40,543		0		0		0
2019	30,107		0		0		0
2020	73,671	1,033	1	20,328	28	19,295	26
TOTAL	635,852	24,564	4	20,328	3	4,236-	1-
THREE-YEAR MOVING AVERAGES							
08-10	2,379		0		0		0
09-11	80,936		0		0		0
10-12	154,883		0		0		0
11-13	156,802		0		0		0
12-14	75,867		0		0		0
13-15	6,335		0		0		0
14-16	4,416		0		0		0
15-17	4,663	7,844	168		0	7,844-	168-
16-18	13,761	7,844	57		0	7,844-	57-
17-19	23,796	7,844	33		0	7,844-	33-
18-20	48,107	344	1	6,776	14	6,432	13
FIVE-YEAR AVERAGE							
16-20	29,012	4,913	17	4,066	14	847-	3-

2009	1,273-	0	0	0
2010				
2011				
2012	37,239	0	0	0
2013				
2014				
2015				
2016	1,273	0	0	0
2017				
2018	28,130	0	0	0
2019	325	0	0	0
2020	1,423	0	0	0
TOTAL	67,116	0	0	0

THREE-YEAR MOVING AVERAGES

09-11	424-	0	0	0
10-12	12,413	0	0	0
11-13	12,413	0	0	0
12-14	12,413	0	0	0
13-15				
14-16	424	0	0	0
15-17	424	0	0	0
16-18	9,801	0	0	0
17-19	9,485	0	0	0
18-20	9,959	0	0	0

FIVE-YEAR AVERAGE

16-20	6,230	0	0	0

2006	26,660		0	4,810	18	4,810	18
2007	3,085		0	19,593	635	19,593	635
2008							
2009	28,047		0	6,857	24	6,857	24
2010	244,674		0	112,893	46	112,893	46
2011	360,635		0	164,776	46	164,776	46
2012	376,465	1,500-	0	140,830	37	142,330	38
2013	99,568		0	20,950	21	20,950	21
2014	208,198		0	81,935	39	81,935	39
2015	389,942		0	123,505	32	123,505	32
2016	748,394		0	204,630	27	204,630	27
2017	504,861		0	149,888	30	149,888	30
2018	346,828		0	81,651	24	81,651	24
2019	731,699		0	141,581	19	141,581	19
2020	424,394		0	22,557	5	22,557	5
TOTAL	4,493,450	1,500-	0	1,276,456	28	1,277,956	28
THREE-YEAR MOVING AVERAGES							
06-08	9,915		0	8,134	82	8,134	82
07-09	10,377		0	8,817	85	8,817	85
08-10	90,907		0	39,917	44	39,917	44
09-11	211,119		0	94,842	45	94,842	45
10-12	327,258	500-	0	139,500	43	140,000	43
11-13	278,889	500-	0	108,852	39	109,352	39
12-14	228,077	500-	0	81,238	36	81,738	36
13-15	232,569		0	75,463	32	75,463	32
14-16	448,845		0	136,690	30	136,690	30
15-17	547,733		0	159,341	29	159,341	29
16-18	533,361		0	145,390	27	145,390	27
17-19	527,796		0	124,373	24	124,373	24
18-20	500,973		0	81,930	16	81,930	16
FIVE-YEAR AVERAGE							
16-20	551,235		0	120,061	22	120,061	22

2006	43,155	0	2,426	6	2,426	6
2007	13,705	0		0		0
2008						
2009						
2010	23,029	0	14,943	65	14,943	65
2011	1,618	0	1,500	93	1,500	93
2012						
2013						
2014	30,358	0	8,075	27	8,075	27
2015	10,527	0	2,577	24	2,577	24
2016	103,953	0	21,533	21	21,533	21
2017						
2018	54,704	0	3,100	6	3,100	6
2019						
2020	46,845	0		0		0
TOTAL	327,895	0	54,154	17	54,154	17
THREE-YEAR MOVING AVERAGES						
06-08	18,953	0	809	4	809	4
07-09	4,568	0		0		0
08-10	7,676	0	4,981	65	4,981	65
09-11	8,216	0	5,481	67	5,481	67
10-12	8,216	0	5,481	67	5,481	67
11-13	539	0	500	93	500	93
12-14	10,119	0	2,692	27	2,692	27
13-15	13,628	0	3,551	26	3,551	26
14-16	48,279	0	10,728	22	10,728	22
15-17	38,160	0	8,037	21	8,037	21
16-18	52,886	0	8,211	16	8,211	16
17-19	18,235	0	1,033	6	1,033	6
18-20	33,850	0	1,033	3	1,033	3
FIVE-YEAR AVERAGE						
16-20	41,101	0	4,927	12	4,927	12

PART IX. DETAILED DEPRECIATION CALCULATIONS

SURVIVOR CURVE.. 30-SQUARE
NET SALVAGE PERCENT.. 0

1948	9,246.00	9,246	9,246			
1957	10,162.23	10,162	10,162			
1964	204.46	204	204			
1965	16,200.74	16,201	16,201			
1967	9,021.66	9,022	9,022			
1978	137.60	138	138			
1979	1,245.42	1,245	1,245			
1981	2,896.24	2,896	2,896			
1982	160.17	160	160			
1984	1,655.00	1,655	1,655			
1985	6,569.00	6,569	6,569			
1991	974.29	950	974			
1992	1,086.51	1,023	1,087			
1994	5,807.38	5,081	5,420	387	3.75	103
1995	535.50	451	481	54	4.75	11
1996	373.53	302	322	52	5.75	9
1998	8,714.02	6,463	6,894	1,820	7.75	235
	74,989.75	71,768	72,676	2,314		358

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 6.5 0.48

SURVIVOR CURVE.. 30-SQUARE
NET SALVAGE PERCENT.. 0

1965	5,908.54	5,909	5,909			
1967	509.81	510	510			
1968	40,522.81	40,523	40,523			
1969	37,276.60	37,277	37,277			
1970	44,584.91	44,585	44,585			
1971	34,830.50	34,830	34,830			
1972	23,219.70	23,220	23,220			
1973	7,753.99	7,754	7,754			
1974	17,752.61	17,753	17,753			
1975	34,679.86	34,680	34,680			
1976	24,697.12	24,697	24,697			
1977	12,250.81	12,251	12,251			
1978	3,429.07	3,429	3,429			
1979	1,755.71	1,756	1,756			
1980	113,319.23	113,319	113,319			
1981	142,648.05	142,648	142,648			
1982	38,833.96	38,834	38,834			
1983	4,000.00	4,000	4,000			
1984	12,858.74	12,859	12,859			
1985	45,562.53	45,563	45,563			
1986	4,794.00	4,794	4,794			
1988	14,408.24	14,408	14,408			
1989	3,810.00	3,810	3,810			
1990	242,963.21	242,963	242,963			
1991	1,755.00	1,711	1,141	614	0.75	614
1992	12,674.50	11,935	7,957	4,718	1.75	2,696
1994	7,534.00	6,592	4,395	3,139	3.75	837
1996	97,706.00	78,979	52,657	45,049	5.75	7,835
2008	303,466.59	123,915	82,616	220,850	17.75	12,442
	1,335,506.09	1,135,504	1,061,138	274,368		24,424

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 11.2 1.83

SURVIVOR CURVE.. 20-SQUARE
NET SALVAGE PERCENT.. 0

2008	1,730,332.20	1,059,828	1,051,552	678,781	7.75	87,585
	1,730,332.20	1,059,828	1,051,552	678,781		87,585

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 7.7 5.06

SURVIVOR CURVE.. IOWA 30-S2
NET SALVAGE PERCENT.. 0

1999	18,718.78	11,337	12,618	6,101	11.83	516
	18,718.78	11,337	12,618	6,101		516

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 11.8 2.76

SURVIVOR CURVE.. IOWA 50-R2
NET SALVAGE PERCENT.. -5

1933	150.00	153	158			
1953	3,302.59	2,967	3,468			
1954	375.00	334	394			
1955	4,740.00	4,195	4,977			
1956	4,775.08	4,194	5,014			
1957	375.00	327	394			
1958	6,091.00	5,264	6,396			
1961	398.96	336	419			
1962	110.00	92	116			
1964	91.83	75	96			
1965	191.56	155	201			
1967	695.00	550	729	1	12.35	
1968	660.00	516	684	9	12.79	1
1969	3,910.00	3,018	3,998	108	13.25	8
1970	4,846.25	3,693	4,893	196	13.71	14
1971	6,378.00	4,796	6,354	343	14.19	24
1972	473.00	351	465	32	14.68	2
1976	8,833.94	6,166	8,169	1,107	16.76	66
1979	335.11	222	294	58	18.45	3
1980	1,419.58	923	1,223	268	19.03	14
1981	5,677.57	3,621	4,797	1,164	19.63	59
1982	28,985.61	18,121	24,007	6,428	20.23	318
1983	3,402.90	2,083	2,760	813	20.85	39
1984	6,682.07	4,002	5,302	1,714	21.48	80
1985	5,173.68	3,029	4,013	1,419	22.12	64
1986	6.22	4	5	2	22.77	
1987	4,246.35	2,369	3,138	1,321	23.43	56
1994	1,088.37	496	657	486	28.31	17
1996	6,129.47	2,603	3,449	2,987	29.78	100
1997	8,436.61	3,449	4,569	4,289	30.53	140
2010	522.49	99	131	418	40.99	10
2018	12,898.45	550	729	12,814	47.97	267
	131,401.69	78,753	101,999	35,973		1,282

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 28.1 0.98

SURVIVOR CURVE.. IOWA 70-R1
NET SALVAGE PERCENT.. -10

1928	1,680.06	1,425	1,724	124	16.02	8
1929	150,824.27	127,013	153,660	12,247	16.41	746
1932	20,133.44	16,578	20,056	2,091	17.60	119
1933	1,609.88	1,315	1,591	180	18.01	10
1934	95,380.39	77,310	93,530	11,388	18.42	618
1935	3,113.86	2,503	3,028	397	18.84	21
1936	49,514.37	39,488	47,773	6,693	19.25	348
1937	16,648.81	13,165	15,927	2,387	19.68	121
1939	1,260.31	980	1,186	200	20.54	10
1942	5,198.61	3,933	4,758	960	21.86	44
1943	1,284.02	962	1,164	248	22.31	11
1945	1,065.70	783	947	225	23.22	10
1946	1,095.16	797	964	241	23.68	10
1947	2,940.92	2,119	2,564	671	24.15	28
1948	419,008.13	298,734	361,408	99,501	24.63	4,040
1949	517.62	365	442	127	25.10	5
1950	3,046.01	2,126	2,572	779	25.59	30
1951	3,516.54	2,428	2,937	931	26.07	36
1952	2,255.48	1,539	1,862	619	26.57	23
1953	14,308.65	9,655	11,681	4,059	27.06	150
1954	36,872.47	24,591	29,750	10,810	27.56	392
1955	361,052.38	237,897	287,808	109,350	28.07	3,896
1956	86,742.70	56,459	68,304	27,113	28.58	949
1957	37,151.86	23,878	28,888	11,979	29.10	412
1958	14,112.07	8,955	10,834	4,689	29.62	158
1959	935.86	586	709	320	30.15	11
1960	89,523.02	55,315	66,920	31,555	30.68	1,029
1961	943,997.36	575,272	695,964	342,433	31.22	10,968
1962	30,960.07	18,604	22,507	11,549	31.76	364
1963	301,093.84	178,330	215,744	115,459	32.31	3,573
1964	189,998.02	110,888	134,152	74,846	32.86	2,278
1965	241,921.31	139,100	168,283	97,830	33.41	2,928
1966	176,706.80	100,021	121,005	73,372	33.98	2,159
1967	152,736.60	85,109	102,965	65,045	34.54	1,883
1968	198,440.35	108,799	131,625	86,659	35.11	2,468
1969	55,965.35	30,174	36,505	25,057	35.69	702
1970	40,348.54	21,387	25,874	18,509	36.27	510
1971	148,783.78	77,483	93,739	69,923	36.86	1,897
1972	25,253.47	12,917	15,627	12,152	37.45	324
1973	149,784.56	75,226	91,008	73,755	38.04	1,939
1974	172,027.54	84,775	102,561	86,669	38.64	2,243

SURVIVOR CURVE.. IOWA 70-R1
NET SALVAGE PERCENT.. -10

1975	205,561.90	99,331	120,171	105,947	39.25	2,699
1976	80,234.22	38,001	45,974	42,284	39.86	1,061
1977	126,619.37	58,757	71,084	68,197	40.47	1,685
1978	88,536.76	40,222	48,661	48,729	41.09	1,186
1979	443,971.28	197,369	238,777	249,591	41.71	5,984
1980	130,882.85	56,889	68,824	75,147	42.34	1,775
1981	601,064.34	255,304	308,867	352,304	42.97	8,199
1982	951,447.91	394,712	477,523	569,070	43.60	13,052
1983	483,894.39	195,880	236,976	295,308	44.24	6,675
1984	298,858.76	117,973	142,724	186,021	44.88	4,145
1985	151,395.03	58,215	70,428	96,107	45.53	2,111
1986	130,554.69	48,889	59,146	84,464	46.17	1,829
1987	748,378.98	272,485	329,652	493,565	46.83	10,540
1988	527,503.53	186,673	225,837	354,417	47.48	7,465
1989	300,969.81	103,389	125,080	205,987	48.14	4,279
1990	370,442.16	123,411	149,303	258,183	48.80	5,291
1991	1,595,210.26	514,645	622,617	1,132,114	49.47	22,885
1992	141,294.04	44,118	53,374	102,049	50.13	2,036
1993	224,383.56	67,701	81,905	164,917	50.80	3,246
1994	389,414.85	113,330	137,107	291,249	51.48	5,658
1995	398,100.35	111,667	135,095	302,815	52.15	5,807
1996	167,985.06	45,326	54,835	129,949	52.83	2,460
1997	734,010.66	190,202	230,106	577,306	53.51	10,789
1998	1,545,089.24	383,871	464,407	1,235,191	54.19	22,794
1999	899,158.17	213,778	258,629	730,445	54.87	13,312
2000	276,304.75	62,699	75,853	228,082	55.56	4,105
2001	904,298.21	195,394	236,388	758,340	56.25	13,482
2002	126,384.30	25,937	31,379	107,644	56.94	1,890
2003	207,396.47	40,314	48,772	179,364	57.63	3,112
2004	265,308.57	48,653	58,860	232,979	58.33	3,994
2005	364,229.79	62,846	76,031	324,622	59.02	5,500
2006	77,049.39	12,447	15,058	69,696	59.72	1,167
2007	418,074.60	62,939	76,144	383,738	60.42	6,351
2008	156,359.06	21,793	26,365	145,630	61.13	2,382
2009	1,750,992.64	224,525	271,630	1,654,462	61.84	26,754
2010	933,433.16	109,280	132,207	894,569	62.55	14,302
2011	108,032.71	11,443	13,844	104,992	63.26	1,660
2012	1,386,953.30	131,206	158,733	1,366,916	63.98	21,365
2013	5,893,316.41	491,774	594,948	5,887,700	64.69	91,014
2014	1,797,517.73	129,373	156,515	1,820,755	65.42	27,832
2015	1,246,844.95	75,626	91,492	1,280,037	66.14	19,353

SURVIVOR CURVE.. IOWA 70-R1
NET SALVAGE PERCENT.. -10

2016	807,489.13	39,713	48,045	840,193	66.87	12,565
2017	1,839,527.77	69,385	83,942	1,939,539	67.60	28,691
2018	3,308,386.82	86,286	104,388	3,534,838	68.34	51,724
2019	788,038.35	11,520	13,937	852,905	69.07	12,348
2020	1,174,420.14	5,167	6,251	1,285,611	69.72	18,440
	39,814,130.60	8,479,442	10,258,430	33,537,113		582,465

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 57.6 1.46

SURVIVOR CURVE.. IOWA 25-S2.5
NET SALVAGE PERCENT.. -5

1961	1,057.00	1,110	1,110			
1992	525.51	452	217	335	4.53	74
1995	892.20	729	351	586	5.54	106
	2,474.71	2,291	1,678	921		180

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 5.1 7.27

SURVIVOR CURVE.. IOWA 40-R2
NET SALVAGE PERCENT.. -10

1933	65.04	72	72			
1952	1,428.48	1,509	1,472	99	1.58	63
1953	102.25	107	104	8	1.86	4
1954	6.88	7	7	1	2.14	
1955	3,025.70	3,127	3,050	278	2.42	115
1956	2,247.19	2,305	2,248	224	2.70	83
1957	2,659.18	2,706	2,640	285	2.99	95
1958	4,701.01	4,747	4,630	541	3.28	165
1959	2,012.66	2,016	1,966	248	3.57	69
1960	6.00	6	6	1	3.86	
1961	4,264.68	4,204	4,101	590	4.15	142
1962	695.48	680	663	102	4.45	23
1963	33,844.39	32,817	32,011	5,218	4.74	1,101
1964	9,193.42	8,839	8,622	1,491	5.04	296
1965	4,427.50	4,220	4,116	754	5.34	141
1966	1,701.96	1,608	1,568	304	5.64	54
1967	4,388.19	4,109	4,008	819	5.95	138
1968	3,288.53	3,050	2,975	642	6.27	102
1969	564.73	519	506	115	6.59	17
1970	1,724.73	1,569	1,530	367	6.93	53
1971	1,971.36	1,774	1,730	438	7.27	60
1972	10.62	9	9	3	7.63	
1973	1,788.53	1,574	1,535	432	8.00	54
1975	433.00	372	363	113	8.77	13
1976	7,778.87	6,593	6,431	2,126	9.18	232
1977	16,234.37	13,572	13,239	4,619	9.60	481
1978	2,568.25	2,117	2,065	760	10.03	76
1979	10,627.31	8,627	8,415	3,275	10.48	312
1980	6,535.22	5,221	5,093	2,096	10.95	191
1981	48,669.37	38,238	37,299	16,237	11.43	1,421
1982	207,632.53	160,334	156,395	72,001	11.92	6,040
1983	10,995.02	8,336	8,131	3,964	12.43	319
1984	64,886.52	48,267	47,081	24,294	12.95	1,876
1985	19,008.57	13,858	13,518	7,391	13.49	548
1986	4,934.00	3,521	3,434	1,993	14.05	142
1987	193,728.19	135,266	131,943	81,158	14.61	5,555
1988	19,527.99	13,318	12,991	8,490	15.20	559
1989	1,818.66	1,211	1,181	820	15.79	52
1990	50,217.04	32,591	31,790	23,449	16.40	1,430
1991	225,752.56	142,602	139,099	109,229	17.03	6,414
1992	34,664.55	21,296	20,773	17,358	17.66	983

SURVIVOR CURVE.. IOWA 40-R2
NET SALVAGE PERCENT.. -10

1993	31,476.31	18,775	18,314	16,310	18.31	891
1994	90,842.98	52,537	51,246	48,681	18.97	2,566
1995	128,038.16	71,653	69,893	70,949	19.65	3,611
1996	135,438.72	73,262	71,462	77,521	20.33	3,813
1997	208,462.95	108,750	106,078	123,231	21.03	5,860
1998	256,599.17	128,851	125,685	156,574	21.74	7,202
1999	5,547.08	2,676	2,610	3,492	22.46	155
2000	132,703.06	61,309	59,803	86,170	23.20	3,714
2001	24,044.83	10,619	10,358	16,091	23.94	672
2002	23,717.70	9,986	9,741	16,348	24.69	662
2003	7,420.92	2,967	2,894	5,269	25.46	207
2004	48,441.37	18,344	17,893	35,393	26.23	1,349
2005	16,071.78	5,741	5,600	12,079	27.01	447
2006	31,325.43	10,510	10,252	24,206	27.80	871
2007	37,833.95	11,851	11,560	30,057	28.61	1,051
2008	160,379.16	46,662	45,516	130,901	29.42	4,449
2009	176,593.34	47,398	46,233	148,020	30.24	4,895
2010	147,447.36	36,209	35,319	126,873	31.07	4,083
2011	94,008.95	20,940	20,426	82,984	31.90	2,601
2012	360,991.59	71,973	70,205	326,886	32.75	9,981
2013	164,472.00	28,947	28,236	152,683	33.60	4,544
2014	96,993.93	14,777	14,414	92,279	34.46	2,678
2015	24,101.78	3,095	3,019	23,493	35.33	665
2016	185,772.89	19,413	18,936	185,414	36.20	5,122
2017	116,790.64	9,346	9,116	119,354	37.09	3,218
2018	168,339.83	9,351	9,121	176,053	37.98	4,635
2019	118,462.94	3,681	3,591	126,719	38.87	3,260
	4,002,449.35	1,636,537	1,596,331	2,806,364		112,621

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 24.9 2.81

SURVIVOR CURVE.. IOWA 25-S1.5
NET SALVAGE PERCENT.. 0

1961	320.91	321	321			
1968	1,553.74	1,554	1,554			
1971	231.46	229	124	107	0.22	107
1976	838.69	789	427	412	1.49	277
1982	462.47	407	220	242	3.02	80
1985	9,597.80	8,131	4,400	5,198	3.82	1,361
1988	26,952.34	21,907	11,854	15,098	4.68	3,226
1989	5,483.15	4,389	2,375	3,108	4.99	623
1990	2,114.97	1,666	901	1,214	5.31	229
1992	7,314.94	5,565	3,011	4,304	5.98	720
1994	3,439.55	2,518	1,363	2,077	6.70	310
2008	50,034.40	21,815	11,804	38,231	14.10	2,711
	108,344.42	69,291	38,354	69,991		9,644

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 7.3 8.90

SURVIVOR CURVE.. IOWA 35-S0
NET SALVAGE PERCENT.. -5

1930	51.95	55	55			
1948	1,680.55	1,765	1,765			
1949	868.49	912	912			
1950	1,522.03	1,598	1,598			
1951	360.13	375	378			
1953	3,494.47	3,563	3,669			
1956	1,571.21	1,550	1,650			
1957	829.20	809	871			
1961	438.19	408	460			
1963	629.40	571	661			
1964	728.58	652	765			
1967	599.98	516	630			
1971	299.31	243	314			
1972	2,654.00	2,126	2,787			
1976	2,951.35	2,219	3,099			
1978	2,710.14	1,970	2,846			
1980	2,255.98	1,582	2,369			
1982	7,798.32	5,269	8,188			
1987	693.00	422	715	13	14.70	1
1988	12,081.28	7,191	12,186	499	15.16	33
1991	19,195.18	10,619	17,994	2,161	16.56	130
2001	14,907.26	5,979	10,132	5,521	21.63	255
2003	4,158.05	1,529	2,591	1,775	22.74	78
2008	7,373.08	2,057	3,486	4,256	25.70	166
2009	10,506.84	2,733	4,631	6,401	26.33	243
2012	51,267.87	10,259	17,384	36,447	28.33	1,287
2013	162,990.00	29,191	49,466	121,674	29.03	4,191
2014	485,124.11	76,259	129,225	380,155	29.76	12,774
2015	10,654.98	1,435	2,432	8,756	30.51	287
2016	30,296.91	3,381	5,729	26,083	31.28	834
2017	93,601.24	8,171	13,846	84,435	32.09	2,631
2018	3,302.89	205	347	3,121	32.93	95
	937,595.97	185,614	303,181	681,295		23,005

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 29.6 2.45

SURVIVOR CURVE.. IOWA 57-R3
NET SALVAGE PERCENT.. -10

1928	41.96	45	46			
1929	1,029.28	1,108	1,132			
1930	803.57	862	884			
1931	19.10	20	21			
1933	14.53	15	16			
1934	35.58	37	39			
1936	137.07	143	151			
1938	9.93	10	11			
1939	254.33	262	280			
1940	57.72	59	63			
1942	442.57	449	487			
1943	350.68	354	386			
1944	729.50	732	802			
1945	51.35	51	56			
1946	122.19	121	134			
1947	5,975.33	5,906	6,573			
1948	43,379.22	42,652	47,717			
1949	16,958.57	16,583	18,654			
1950	33,006.97	32,097	36,308			
1951	47,437.29	45,865	52,181			
1952	2,004.79	1,927	2,205			
1953	55,741.64	53,237	61,316			
1954	43,799.48	41,553	48,179			
1955	65,318.43	61,552	71,850			
1956	112,174.28	104,948	123,392			
1957	109,405.05	101,597	120,346			
1958	61,073.88	56,267	67,181			
1959	69,740.16	63,726	76,714			
1960	68,161.72	61,745	74,978			
1961	421,483.88	378,389	463,632			
1962	96,712.50	85,985	106,384			
1963	72,638.49	63,950	79,902			
1964	117,957.69	102,756	129,441	312	11.86	26
1965	215,720.99	185,879	234,150	3,143	12.35	254
1966	135,793.23	115,673	145,712	3,661	12.86	285
1967	393,020.81	330,839	416,754	15,569	13.38	1,164
1968	268,204.98	222,977	280,882	14,143	13.92	1,016
1969	521,624.85	428,022	539,175	34,612	14.48	2,390
1970	897,258.27	726,381	915,014	71,970	15.05	4,782
1971	458,172.06	365,700	460,668	43,321	15.64	2,770
1972	627,215.58	493,367	621,489	68,448	16.24	4,215

SURVIVOR CURVE.. IOWA 57-R3
NET SALVAGE PERCENT.. -10

1973	456,962.52	353,977	445,901	56,758	16.86	3,366
1974	880,263.47	671,180	845,478	122,812	17.49	7,022
1975	962,655.55	721,919	909,393	149,528	18.14	8,243
1976	1,213,219.80	894,383	1,126,644	207,898	18.80	11,058
1977	635,383.55	460,184	579,689	119,233	19.47	6,124
1978	589,074.92	418,914	527,701	120,281	20.15	5,969
1979	1,019,270.53	711,075	895,733	225,465	20.85	10,814
1980	892,639.17	610,498	769,038	212,865	21.56	9,873
1981	992,230.08	664,826	837,474	253,979	22.28	11,399
1982	1,112,346.48	729,646	919,127	304,454	23.01	13,231
1983	770,312.12	494,281	622,640	224,703	23.75	9,461
1984	589,774.74	369,906	465,966	182,786	24.50	7,461
1985	644,276.01	394,514	496,965	211,739	25.27	8,379
1986	967,224.67	577,894	727,967	335,980	26.04	12,902
1987	881,897.69	513,632	647,016	323,071	26.82	12,046
1988	1,205,611.97	683,788	861,360	464,813	27.61	16,835
1989	1,363,086.57	752,067	947,370	552,025	28.41	19,431
1990	1,062,470.24	569,598	717,516	451,201	29.22	15,442
1991	2,322,067.47	1,208,121	1,521,857	1,032,417	30.04	34,368
1992	1,832,516.26	924,068	1,164,038	851,730	30.87	27,591
1993	1,487,914.24	726,174	914,753	721,953	31.71	22,767
1994	2,506,943.28	1,182,889	1,490,072	1,267,566	32.55	38,942
1995	1,701,281.11	774,838	976,055	895,354	33.40	26,807
1996	1,948,904.73	855,267	1,077,370	1,066,425	34.26	31,127
1997	2,058,091.58	868,613	1,094,182	1,169,719	35.13	33,297
1998	1,554,576.11	629,720	793,251	916,783	36.01	25,459
1999	2,167,516.72	841,194	1,059,643	1,324,625	36.89	35,907
2000	2,092,581.58	775,766	977,224	1,324,616	37.79	35,052
2001	1,644,023.89	581,228	732,166	1,076,260	38.68	27,825
2002	1,407,729.57	472,975	595,801	952,702	39.59	24,064
2003	1,882,358.90	599,375	755,026	1,315,569	40.50	32,483
2004	1,824,221.45	548,476	690,909	1,315,735	41.42	31,766
2005	2,013,690.33	569,691	717,633	1,497,426	42.34	35,367
2006	2,013,604.16	533,541	672,096	1,542,869	43.27	35,657
2007	1,940,017.69	478,853	603,206	1,530,813	44.21	34,626
2008	2,750,926.81	629,079	792,444	2,233,575	45.15	49,470
2009	2,969,652.07	624,675	786,896	2,479,721	46.10	53,790
2010	2,455,619.38	471,518	593,966	2,107,215	47.05	44,787
2011	3,217,677.06	558,843	703,968	2,835,477	48.00	59,072
2012	3,383,051.14	524,897	661,207	3,060,149	48.96	62,503
2013	3,932,583.50	537,313	676,847	3,648,995	49.92	73,097

SURVIVOR CURVE.. IOWA 57-R3
NET SALVAGE PERCENT.. -10

2014	4,791,144.57	564,919	711,622	4,558,637	50.89	89,578
2015	5,316,772.74	527,413	664,377	5,184,073	51.86	99,963
2016	3,620,210.46	291,340	366,998	3,615,234	52.83	68,431
2017	5,038,869.82	310,173	390,722	5,152,035	53.81	95,745
2018	10,133,622.76	432,169	544,398	10,602,587	54.79	193,513
2019	9,278,099.32	220,244	277,439	9,928,470	55.77	178,025
2020	8,272,466.28	59,057	74,394	9,025,319	56.63	159,373
	118,761,514.56	33,108,552	41,628,843	89,008,823		1,966,410

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 45.3 1.66

SURVIVOR CURVE.. IOWA 25-S2.5
NET SALVAGE PERCENT.. -5

2010	174,659.15	73,283	56,001	127,391	15.01	8,487
2017	644.60	88	67	610	21.75	28
	175,303.75	73,371	56,068	128,001		8,515

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 15.0 4.86

SURVIVOR CURVE.. IOWA 45-R2.5
NET SALVAGE PERCENT.. -10

1932	73.95	81	81			
1933	111.21	122	122			
1935	101.51	112	112			
1938	105.39	115	116			
1939	14.33	16	16			
1941	27.94	30	31			
1945	62.66	66	69			
1948	109.82	113	121			
1952	260.00	261	284	2	3.87	1
1953	310.88	311	338	4	4.09	1
1955	37.54	37	40	1	4.53	
1956	113.37	112	122	3	4.75	1
1960	500.00	480	522	28	5.70	5
1961	1,296.46	1,238	1,347	79	5.94	13
1963	844.40	795	865	64	6.46	10
1964	112.60	105	114	10	6.73	1
1965	1,245.00	1,156	1,258	112	7.01	16
1967	3,075.09	2,811	3,060	323	7.60	42
1968	1,020.00	925	1,007	115	7.92	15
1969	12,300.04	11,046	12,023	1,507	8.26	182
1970	832.16	740	805	110	8.61	13
1971	7,487.45	6,593	7,176	1,060	8.98	118
1972	16,095.85	14,023	15,263	2,442	9.36	261
1973	1,497.13	1,289	1,403	244	9.77	25
1974	15,014.36	12,776	13,905	2,611	10.19	256
1975	32,864.02	27,603	30,043	6,107	10.64	574
1976	54,446.33	45,118	49,107	10,784	11.10	972
1977	1,319.67	1,078	1,173	279	11.59	24
1978	27,932.08	22,470	24,457	6,268	12.09	518
1979	5,586.88	4,423	4,814	1,332	12.61	106
1980	38,912.29	30,295	32,973	9,831	13.15	748
1981	54,811.38	41,923	45,629	14,664	13.71	1,070
1982	74,467.49	55,920	60,864	21,050	14.28	1,474
1983	3,361.93	2,476	2,695	1,003	14.87	67
1984	28,930.72	20,876	22,722	9,102	15.48	588
1985	41,504.00	29,310	31,901	13,753	16.11	854
1986	10,518.63	7,264	7,906	3,664	16.75	219
1987	83,341.97	56,228	61,199	30,477	17.40	1,752
1988	24,388.38	16,054	17,473	9,354	18.07	518
1989	11,327.22	7,268	7,911	4,549	18.75	243
1990	85,711.50	53,553	58,287	35,996	19.44	1,852

SURVIVOR CURVE.. IOWA 45-R2.5
NET SALVAGE PERCENT.. -10

1991	207,095.86	125,799	136,921	90,884	20.15	4,510
1992	123,313.52	72,735	79,165	56,480	20.87	2,706
1993	105,257.84	60,207	65,530	50,254	21.60	2,327
1994	74,618.90	41,333	44,987	37,094	22.34	1,660
1995	121,152.62	64,857	70,591	62,677	23.10	2,713
1996	108,896.86	56,273	61,248	58,539	23.86	2,453
1997	41,789.34	20,798	22,637	23,331	24.64	947
1998	67,078.20	32,105	34,943	38,843	25.42	1,528
1999	63,572.11	29,184	31,764	38,165	26.22	1,456
2000	81,484.18	35,814	38,980	50,653	27.02	1,875
2001	43,240.95	18,138	19,742	27,823	27.84	999
2002	18,148.65	7,249	7,890	12,074	28.66	421
2003	35,413.46	13,427	14,614	24,341	29.49	825
2004	34,875.33	12,498	13,603	24,760	30.34	816
2005	41,884.85	14,139	15,389	30,684	31.19	984
2006	24,927.09	7,897	8,595	18,825	32.04	588
2007	16,785.55	4,961	5,400	13,064	32.91	397
2008	128,189.10	35,127	38,232	102,776	33.79	3,042
2009	173,907.85	43,915	47,797	143,502	34.67	4,139
2010	197,418.28	45,556	49,583	167,577	35.56	4,713
2011	166,808.75	34,863	37,945	145,545	36.45	3,993
2012	152,044.05	28,432	30,946	136,302	37.35	3,649
2013	524,659.66	86,442	94,084	483,042	38.26	12,625
2014	976,997.51	139,238	151,548	923,149	39.17	23,568
2015	324,556.40	38,954	42,398	314,614	40.09	7,848
2016	388,291.64	37,775	41,114	386,007	41.02	9,410
2017	308,789.98	23,023	25,058	314,611	41.95	7,500
2018	206,438.70	10,698	11,644	215,439	42.88	5,024
2019	137,991.76	3,980	4,332	147,459	43.82	3,365
2020	187,016.18	1,600	1,741	203,977	44.65	4,568
	5,724,718.80	1,624,229	1,767,775	4,529,415		133,188

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 34.0 2.33

SURVIVOR CURVE.. IOWA 35-S1.5
NET SALVAGE PERCENT.. -10

1989	15,957.35	11,715	8,372	9,181	11.64	789
1991	35,055.96	24,723	17,667	20,895	12.56	1,664
1995	10,097.20	6,471	4,624	6,483	14.61	444
	61,110.51	42,909	30,663	36,558		2,897

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 12.6 4.74

SURVIVOR CURVE.. IOWA 48-R4
NET SALVAGE PERCENT.. -15

1952	121.51	137	140			
1957	2,210.17	2,426	2,542			
1958	703.94	768	810			
1959	3,771.00	4,093	4,337			
1960	7,508.94	8,103	8,635			
1961	28,769.36	30,858	33,085			
1962	4,691.45	5,002	5,395			
1963	684.29	725	786	1	3.78	
1964	878.77	925	1,003	8	4.06	2
1965	3,116.47	3,259	3,533	51	4.35	12
1966	8,610.88	8,941	9,692	211	4.66	45
1967	32,913.00	33,923	36,771	1,079	4.98	217
1968	6,930.27	7,087	7,682	288	5.32	54
1969	15,057.36	15,271	16,553	763	5.67	135
1970	76,330.27	76,698	83,137	4,643	6.06	766
1971	95,012.10	94,536	102,472	6,792	6.47	1,050
1972	159,623.72	157,141	170,333	13,234	6.91	1,915
1973	85,989.07	83,683	90,708	8,179	7.38	1,108
1974	203,824.53	195,868	212,312	22,086	7.89	2,799
1975	260,713.06	247,166	267,916	31,904	8.43	3,785
1976	287,129.30	268,217	290,734	39,465	9.01	4,380
1977	341,393.10	313,999	340,360	52,242	9.61	5,436
1978	454,106.38	410,707	445,187	77,035	10.25	7,516
1979	445,067.58	395,602	428,814	83,014	10.90	7,616
1980	465,755.42	406,513	440,641	94,978	11.57	8,209
1981	580,481.87	497,047	538,775	128,779	12.26	10,504
1982	512,337.65	430,107	466,215	122,973	12.96	9,489
1983	331,300.02	272,411	295,280	85,715	13.68	6,266
1984	511,111.88	411,322	445,853	141,926	14.41	9,849
1985	581,721.40	457,836	496,272	172,708	15.15	11,400
1986	647,395.15	497,731	539,517	204,987	15.91	12,884
1987	563,788.16	422,916	458,421	189,935	16.69	11,380
1988	865,762.81	633,050	686,196	309,431	17.48	17,702
1989	1,473,390.08	1,048,765	1,136,811	557,588	18.29	30,486
1990	1,880,447.55	1,301,120	1,410,352	752,163	19.12	39,339
1991	1,894,994.50	1,273,049	1,379,924	799,320	19.96	40,046
1992	2,175,545.48	1,417,213	1,536,191	965,686	20.81	46,405
1993	2,055,629.39	1,296,238	1,405,060	958,914	21.68	44,230
1994	1,964,256.89	1,197,689	1,298,238	960,657	22.55	42,601
1995	1,766,834.78	1,039,215	1,126,459	905,401	23.45	38,610
1996	2,055,680.05	1,164,782	1,262,568	1,101,464	24.35	45,235

SURVIVOR CURVE.. IOWA 48-R4
NET SALVAGE PERCENT.. -15

1997	1,855,938.86	1,011,139	1,096,026	1,038,304	25.26	41,105
1998	974,656.40	509,294	552,050	568,805	26.19	21,718
1999	1,073,404.21	536,970	582,050	652,365	27.12	24,055
2000	1,158,967.96	553,677	600,159	732,654	28.06	26,110
2001	979,396.16	445,589	482,997	643,309	29.01	22,175
2002	1,232,919.82	532,576	577,287	840,571	29.97	28,047
2003	1,249,116.82	510,843	553,730	882,754	30.93	28,540
2004	1,236,118.02	476,812	516,841	904,695	31.90	28,360
2005	1,366,737.34	495,431	537,024	1,034,724	32.87	31,479
2006	1,394,046.78	472,594	512,269	1,090,885	33.85	32,227
2007	1,401,199.60	442,130	479,248	1,132,132	34.83	32,505
2008	1,359,053.89	396,917	430,239	1,132,673	35.81	31,630
2009	1,625,142.65	436,074	472,684	1,396,230	36.80	37,941
2010	1,452,345.05	355,268	385,094	1,285,103	37.79	34,006
2011	1,492,327.09	329,643	357,317	1,358,859	38.78	35,040
2012	1,598,496.88	315,190	341,651	1,496,620	39.77	37,632
2013	1,682,271.97	291,391	315,854	1,618,759	40.77	39,705
2014	1,982,596.91	296,398	321,281	1,958,705	41.76	46,904
2015	2,098,724.47	263,485	285,605	2,127,928	42.76	49,764
2016	2,204,447.52	223,927	242,726	2,292,389	43.76	52,385
2017	2,485,610.24	193,546	209,795	2,648,657	44.75	59,188
2018	1,299,920.69	70,081	75,964	1,418,945	45.75	31,015
2019	6,788,702.28	203,294	220,361	7,586,647	46.75	162,281
2020	7,210,536.64	63,932	69,300	8,222,817	47.63	172,639
	70,054,267.85	25,558,340	27,703,262	52,859,146		1,567,922

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 33.7 2.24

SURVIVOR CURVE.. IOWA 22-S0
NET SALVAGE PERCENT.. 0

1980	338,674.38	317,429	79,001	259,673	1.38	188,169
1981	123,642.62	113,807	28,324	95,319	1.75	54,468
1982	17,476.70	15,785	3,929	13,548	2.13	6,361
1983	29,863.24	26,456	6,584	23,279	2.51	9,275
1984	85,929.76	74,642	18,577	67,353	2.89	23,306
1985	45,340.20	38,580	9,602	35,738	3.28	10,896
1986	144,872.87	120,772	30,057	114,816	3.66	31,370
1987	13,075.31	10,668	2,655	10,420	4.05	2,573
1988	43,621.87	34,798	8,660	34,962	4.45	7,857
1989	81,057.96	63,189	15,726	65,332	4.85	13,471
1990	62,560.08	47,631	11,854	50,706	5.25	9,658
1991	98,237.25	72,964	18,159	80,078	5.66	14,148
1992	58,492.04	42,354	10,541	47,951	6.07	7,900
1993	45,539.76	32,126	7,995	37,545	6.48	5,794
1994	147,186.18	101,023	25,142	122,044	6.90	17,688
1995	44,026.14	29,358	7,307	36,719	7.33	5,009
1996	48,710.39	31,529	7,847	40,863	7.76	5,266
1997	304,704.87	191,272	47,603	257,102	8.19	31,392
1998	290,765.86	176,573	43,945	246,821	8.64	28,567
2000	128,079.28	72,539	18,053	110,026	9.54	11,533
2001	86,401.90	47,128	11,729	74,673	10.00	7,467
2002	1,015,732.62	531,878	132,373	883,360	10.48	84,290
2003	225,802.13	113,312	28,201	197,601	10.96	18,029
2004	82,940.10	39,811	9,908	73,032	11.44	6,384
2005	294,808.62	134,807	33,551	261,258	11.94	21,881
2006	11,317.83	4,908	1,221	10,097	12.46	810
2007	48,199.64	19,762	4,918	43,282	12.98	3,335
2008	213,043.72	82,216	20,462	192,582	13.51	14,255
2009	247,016.95	89,151	22,188	224,829	14.06	15,991
2010	458,813.68	153,703	38,253	420,561	14.63	28,746
2011	894,372.70	276,039	68,700	825,673	15.21	54,285
2012	410,559.46	115,330	28,703	381,856	15.82	24,138
2013	644,807.53	162,962	40,558	604,250	16.44	36,755
2014	440,719.30	98,360	24,480	416,239	17.09	24,356
2015	390,757.39	75,311	18,743	372,014	17.76	20,947
2016	418,977.40	67,225	16,731	402,246	18.47	21,778
2017	636,312.65	80,697	20,084	616,229	19.21	32,079

SURVIVOR CURVE.. IOWA 22-S0
NET SALVAGE PERCENT.. 0

2018	733,047.31	66,641	16,585	716,462	20.00	35,823
2019	857,613.05	45,222	11,255	846,358	20.84	40,612
2020	634,355.56	10,378	2,583	631,773	21.64	29,195
	10,897,456.30	3,828,336	952,787	9,944,669		1,005,857

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 9.9 9.23

SURVIVOR CURVE.. IOWA 15-R3
NET SALVAGE PERCENT.. 0

2011	4,161,839.95	2,311,195	2,155,599	2,006,241	6.67	300,786
2012	2,907,166.70	1,461,345	1,362,963	1,544,204	7.46	206,998
2013	1,059,092.74	474,474	442,531	616,562	8.28	74,464
2014	213,711.94	83,632	78,002	135,710	9.13	14,864
2015	134,740.37	44,824	41,806	92,934	10.01	9,284
2016	304,760.65	82,895	77,314	227,447	10.92	20,828
2017	315,841.75	66,115	61,664	254,178	11.86	21,432
2018	173,780.11	25,372	23,664	150,116	12.81	11,719
2019	476,669.86	38,768	36,158	440,512	13.78	31,967
2020	9,135.26	225	209	8,926	14.63	610
	9,756,739.33	4,588,845	4,279,910	5,476,829		692,952

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 7.9 7.10

SURVIVOR CURVE.. IOWA 50-R1.5
NET SALVAGE PERCENT.. 0

1929	97.33	91	97			
1943	671.53	585	672			
1947	598.27	507	598			
1948	2,384.92	2,009	2,385			
1949	4,443.14	3,716	4,443			
1950	2,826.53	2,347	2,827			
1951	2,320.57	1,913	2,321			
1952	2,323.26	1,901	2,323			
1953	2,685.91	2,180	2,686			
1954	2,993.55	2,411	2,994			
1955	3,403.57	2,719	3,404			
1956	41,422.10	32,815	41,422			
1957	9,349.02	7,343	9,349			
1958	2,531.57	1,971	2,532			
1959	2,156.27	1,663	2,156			
1960	3,894.61	2,975	3,895			
1961	3,801.77	2,876	3,802			
1962	4,380.45	3,281	4,380			
1963	4,984.89	3,695	4,985			
1964	3,953.36	2,899	3,953			
1965	30,435.39	22,066	30,435			
1966	4,873.82	3,493	4,874			
1967	7,960.48	5,636	7,960			
1968	5,624.94	3,933	5,625			
1969	6,620.27	4,569	6,620			
1970	117,609.16	80,068	117,609			
1971	7,862.94	5,279	7,863			
1972	9,629.25	6,373	9,629			
1973	6,281.28	4,095	6,216	65	17.40	4
1974	9,106.51	5,845	8,873	234	17.91	13
1975	27,123.12	17,131	26,006	1,117	18.42	61
1976	13,929.34	8,650	13,131	798	18.95	42
1977	18,394.97	11,228	17,045	1,350	19.48	69
1978	13,564.27	8,130	12,342	1,222	20.03	61
1979	13,166.77	7,747	11,760	1,407	20.58	68
1980	56,232.99	32,446	49,255	6,978	21.15	330
1981	45,235.47	25,585	38,839	6,396	21.72	294
1982	73,388.75	40,657	61,719	11,670	22.30	523
1983	81,034.75	43,921	66,674	14,361	22.90	627
1984	66,510.14	35,250	53,511	12,999	23.50	553
1985	50,203.03	25,995	39,462	10,741	24.11	445

SURVIVOR CURVE.. IOWA 50-R1.5
NET SALVAGE PERCENT.. 0

1986	59,577.04	30,110	45,709	13,868	24.73	561
1987	39,266.52	19,351	29,376	9,891	25.36	390
1988	73,742.98	35,397	53,734	20,009	26.00	770
1989	32,351.15	15,108	22,935	9,416	26.65	353
1990	48,926.19	22,212	33,719	15,207	27.30	557
1991	42,631.67	18,784	28,515	14,117	27.97	505
1992	62,979.39	26,905	40,843	22,136	28.64	773
1993	41,471.29	17,161	26,051	15,420	29.31	526
1994	61,195.35	24,478	37,159	24,036	30.00	801
1995	61,056.01	23,580	35,796	25,260	30.69	823
1996	131,612.92	48,986	74,363	57,250	31.39	1,824
1997	113,905.06	40,778	61,903	52,002	32.10	1,620
1999	1,588.34	523	794	794	33.53	24
2000	22,795.85	7,181	10,901	11,895	34.25	347
2001	12,164.74	3,654	5,547	6,618	34.98	189
2005	25,396.58	6,115	9,283	16,114	37.96	424
2007	8,267.39	1,741	2,643	5,624	39.47	142
2015	504.21	43	65	439	45.73	10
2018	27,186.05	1,006	1,528	25,658	48.15	533
2019	26,304.03	542	823	25,481	48.97	520
2020	6,843.11	42	63	6,780	49.69	136
	1,665,776.13	821,691	1,218,422	447,354		14,918

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 30.0 0.90

SURVIVOR CURVE.. IOWA 37-S0.5
NET SALVAGE PERCENT.. -5

1929	348.56	366	366			
1930	1,024.33	1,076	1,076			
1931	208.80	219	219			
1934	234.50	246	246			
1943	655.50	688	688			
1950	17.83	18	12	7	1.33	5
1952	598.11	594	384	244	2.01	121
1953	389.91	383	248	161	2.35	69
1954	185.15	180	116	78	2.69	29
1955	127.09	123	80	53	3.02	18
1956	85.84	82	53	37	3.36	11
1957	809.36	765	495	355	3.69	96
1958	166.86	156	101	74	4.03	18
1959	82.15	76	49	37	4.36	8
1960	181.28	166	107	83	4.70	18
1961	31.00	28	18	15	5.04	3
1962	62.54	56	36	30	5.37	6
1963	10.55	9	6	5	5.71	1
1964	83.23	73	47	40	6.06	7
1965	19,285.68	16,747	10,829	9,421	6.40	1,472
1966	10,387.18	8,920	5,768	5,139	6.74	762
1967	6,892.68	5,850	3,783	3,454	7.09	487
1968	3,415.20	2,865	1,853	1,733	7.44	233
1969	2,770.05	2,295	1,484	1,425	7.80	183
1970	96,355.92	78,861	50,993	50,181	8.16	6,150
1971	5,285.53	4,272	2,762	2,788	8.52	327
1972	8,771.62	7,000	4,526	4,684	8.88	527
1973	5,935.97	4,675	3,023	3,210	9.25	347
1974	14,004.98	10,882	7,036	7,669	9.62	797
1975	24,457.84	18,740	12,118	13,563	10.00	1,356
1976	11,580.55	8,748	5,657	6,503	10.38	626
1977	16,393.43	12,207	7,893	9,320	10.76	866
1978	16,908.18	12,404	8,021	9,733	11.15	873
1979	21,653.65	15,639	10,112	12,624	11.55	1,093
1980	56,338.49	40,050	25,897	33,258	11.95	2,783
1981	45,765.46	32,001	20,692	27,362	12.36	2,214
1982	61,155.77	42,051	27,191	37,023	12.77	2,899
1983	57,185.59	38,639	24,985	35,060	13.19	2,658
1984	45,967.27	30,512	19,730	28,536	13.61	2,097
1985	37,281.56	24,281	15,700	23,446	14.05	1,669
1986	51,128.44	32,661	21,119	32,566	14.49	2,247

SURVIVOR CURVE.. IOWA 37-S0.5
NET SALVAGE PERCENT.. -5

1987	43,579.63	27,295	17,649	28,110	14.93	1,883
1988	66,686.89	40,896	26,444	43,577	15.39	2,832
1989	48,730.23	29,248	18,912	32,255	15.85	2,035
1990	55,266.81	32,434	20,972	37,058	16.32	2,271
1991	57,538.15	32,984	21,328	39,087	16.80	2,327
1992	65,641.73	36,716	23,741	45,183	17.29	2,613
1993	40,838.68	22,263	14,396	28,485	17.79	1,601
1994	50,346.79	26,718	17,276	35,588	18.30	1,945
1995	27,196.40	14,031	9,073	19,483	18.82	1,035
1996	123,758.28	61,988	40,082	89,864	19.35	4,644
1997	47,424.94	23,027	14,890	34,906	19.89	1,755
1998	220,609.11	103,675	67,038	164,602	20.44	8,053
1999	116,170.88	52,715	34,086	87,893	21.01	4,183
2000	116,814.37	51,085	33,032	89,623	21.59	4,151
2001	69,990.66	29,436	19,034	54,456	22.18	2,455
2002	182,064.13	73,469	47,506	143,661	22.78	6,306
2003	733,042.38	282,917	182,939	586,755	23.40	25,075
2004	853,169.67	313,782	202,897	692,931	24.04	28,824
2005	896,298.99	313,109	202,462	738,652	24.69	29,917
2006	725,717.37	239,924	155,139	606,864	25.35	23,939
2007	1,124,402.70	349,724	226,137	954,486	26.04	36,655
2008	789,020.41	229,735	148,551	679,920	26.74	25,427
2009	727,630.00	197,199	127,512	636,500	27.45	23,188
2010	646,915.20	161,739	104,583	574,678	28.19	20,386
2011	512,772.54	117,142	75,746	462,665	28.95	15,982
2012	932,693.90	192,693	124,599	854,730	29.72	28,759
2013	1,164,608.84	214,168	138,485	1,084,354	30.52	35,529
2014	1,054,118.26	169,311	109,479	997,345	31.34	31,823
2015	1,593,198.70	217,923	140,913	1,531,946	32.18	47,606
2016	1,542,322.25	172,891	111,794	1,507,644	33.05	45,617
2017	1,367,448.14	119,130	77,031	1,358,790	33.93	40,047
2018	4,089,586.98	250,688	162,099	4,131,967	34.84	118,598
2019	7,734,141.05	267,744	173,128	7,947,720	35.78	222,127
2020	3,015,123.35	31,659	20,472	3,145,408	36.63	85,870
	31,459,092.04	4,955,062	3,204,944	29,827,103		968,534

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 30.8 3.08

SURVIVOR CURVE.. IOWA 42-R0.5
NET SALVAGE PERCENT.. -5

1940	258.47	260	270	1	1.83	1
1946	18.42	17	18	1	4.54	
1949	26.00	24	25	2	5.80	
1950	23.50	21	22	3	6.20	
1951	781.60	692	718	103	6.61	16
1953	1,843.64	1,594	1,653	283	7.41	38
1954	782.55	669	694	128	7.80	16
1955	1,864.85	1,576	1,634	324	8.20	40
1956	1,125.97	940	975	207	8.59	24
1957	848.73	700	726	165	8.99	18
1958	12,828.34	10,458	10,845	2,625	9.39	280
1959	936.42	754	782	201	9.79	21
1960	833.56	663	688	187	10.19	18
1961	15,110.66	11,866	12,305	3,561	10.59	336
1962	3,683.97	2,856	2,962	906	10.99	82
1963	2,927.80	2,240	2,323	751	11.40	66
1964	2,341.96	1,768	1,833	626	11.81	53
1965	3,868.19	2,879	2,985	1,077	12.23	88
1966	8,805.83	6,464	6,703	2,543	12.64	201
1967	27,667.14	20,010	20,750	8,300	13.07	635
1968	20,817.95	14,838	15,387	6,472	13.49	480
1969	52,881.02	37,122	38,495	17,030	13.92	1,223
1970	62,210.52	42,988	44,578	20,743	14.36	1,444
1971	37,726.77	25,654	26,603	13,010	14.80	879
1972	31,825.31	21,291	22,078	11,339	15.24	744
1973	28,038.13	18,442	19,124	10,316	15.69	657
1974	28,210.83	18,238	18,912	10,709	16.14	664
1975	11,399.99	7,239	7,507	4,463	16.60	269
1976	13,233.66	8,248	8,553	5,342	17.07	313
1977	27,388.86	16,748	17,367	11,391	17.54	649
1978	19,978.14	11,982	12,425	8,552	18.01	475
1979	41,783.51	24,548	25,456	18,417	18.50	996
1980	27,452.03	15,799	16,383	12,442	18.98	656
1981	100,166.00	56,419	58,506	46,668	19.47	2,397
1982	118,305.77	65,156	67,566	56,655	19.97	2,837
1983	194,299.70	104,582	108,450	95,565	20.47	4,669
1984	24,668.07	12,963	13,442	12,459	20.98	594
1985	55,626.09	28,509	29,563	28,844	21.50	1,342
1986	46,773.63	23,363	24,227	24,885	22.02	1,130
1987	135,129.59	65,740	68,171	73,715	22.54	3,270
1988	54,163.32	25,633	26,581	30,290	23.07	1,313

SURVIVOR CURVE.. IOWA 42-R0.5
NET SALVAGE PERCENT.. -5

1989	77,309.95	35,543	36,857	44,318	23.61	1,877
1990	72,276.34	32,253	33,446	42,444	24.15	1,758
1991	136,490.95	59,066	61,250	82,065	24.69	3,324
1992	104,194.83	43,658	45,273	64,132	25.24	2,541
1993	71,020.72	28,763	29,827	44,745	25.80	1,734
1994	82,471.40	32,246	33,439	53,156	26.36	2,017
1995	153,122.62	57,728	59,863	100,916	26.92	3,749
1996	241,479.10	87,598	90,838	162,715	27.49	5,919
1997	211,676.01	73,768	76,496	145,764	28.06	5,195
1998	6,088.17	2,035	2,110	4,283	28.63	150
1999	152,855.76	48,875	50,683	109,816	29.21	3,760
2000	149,368.90	45,594	47,280	109,557	29.79	3,678
2001	51,271.72	14,895	15,446	38,389	30.38	1,264
2002	265,875.78	73,383	76,097	203,073	30.96	6,559
2003	127,929.51	33,422	34,658	99,668	31.55	3,159
2004	125,575.43	30,922	32,066	99,788	32.15	3,104
2005	175,520.49	40,634	42,137	142,160	32.74	4,342
2006	132,046.75	28,621	29,679	108,970	33.33	3,269
2007	280,013.18	56,492	58,581	235,433	33.93	6,939
2008	242,404.26	45,270	46,944	207,580	34.53	6,012
2009	56,659.47	9,731	10,091	49,401	35.13	1,406
2010	309,060.24	48,447	50,239	274,274	35.73	7,676
2011	225,582.00	31,976	33,158	203,703	36.33	5,607
2012	122,412.99	15,486	16,059	112,475	36.94	3,045
2013	206,371.84	22,958	23,807	192,883	37.55	5,137
2014	104,487.38	10,057	10,429	99,283	38.15	2,602
2015	322,176.46	26,095	27,060	311,225	38.76	8,030
2016	82,228.38	5,386	5,585	80,755	39.38	2,051
2017	241,811.61	12,152	12,601	241,301	39.99	6,034
2018	213,360.59	7,415	7,689	216,340	40.61	5,327
2019	229,640.83	4,478	4,644	236,479	41.22	5,737
2020	41,997.25	242	251	43,846	41.77	1,050
	6,233,437.40	1,777,142	1,842,868	4,702,241		152,986

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 30.7 2.45

SURVIVOR CURVE.. IOWA 32-S2
NET SALVAGE PERCENT.. 0

1940	8.57	9	9			
1958	140.46	139	140			
1993	938.75	640	767	172	10.18	17
1998	15,916.29	9,520	11,405	4,511	12.86	351
2017	92,358.65	9,380	11,237	81,122	28.75	2,822
	109,362.72	19,688	23,558	85,805		3,190

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 26.9 2.92

SURVIVOR CURVE.. IOWA 40-R2.5
NET SALVAGE PERCENT.. -5

1967	7.26	7	6	2	5.14	
2000	5,611.65	2,618	2,205	3,687	22.23	166
2004	1,490.63	569	479	1,086	25.45	43
2006	2,249.73	760	640	1,722	27.13	63
2007	60,146.84	18,978	15,983	47,171	27.98	1,686
2008	1,599,259.06	468,503	394,570	1,284,652	28.84	44,544
2010	964,047.14	238,132	200,553	811,696	30.59	26,535
2011	627,211.60	140,276	118,139	540,433	31.48	17,168
2012	2,367,487.22	473,557	398,826	2,087,036	32.38	64,454
2013	490,582.62	86,539	72,882	442,230	33.28	13,288
2014	244,222.20	37,247	31,369	225,064	34.19	6,583
2015	588,101.55	75,645	63,708	553,799	35.10	15,778
2016	162,599.65	16,988	14,307	156,423	36.02	4,343
2017	141,476.97	11,327	9,540	139,011	36.95	3,762
2018	15,696.78	874	736	15,746	37.88	416
2019	402,543.57	12,469	10,501	412,170	38.82	10,617
2020	1,410,731.61	12,961	10,916	1,470,352	39.65	37,083
	9,083,466.08	1,597,450	1,345,360	8,192,279		246,529

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 33.2 2.71

SURVIVOR CURVE.. IOWA 20-S3
NET SALVAGE PERCENT.. 0

1980	783.36	783	783
2005	17,481.38	12,010	17,481
2008	5,661.35	3,303	5,661
2011	2,557.23	1,165	2,558
	26,483.32	17,261	26,483

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 0.0 0.00

FULLY ACCRUED

2005	1,406.54	1,407	1,407			
	1,406.54	1,407	1,407			

AMORTIZED
SURVIVOR CURVE.. 20-SQUARE
NET SALVAGE PERCENT.. 0

2006	1,902.21	1,355	1,356	547	5.75	95
2007	2,559.14	1,695	1,696	863	6.75	128
2008	79,446.05	48,661	48,683	30,763	7.75	3,969
2009	7,114.12	4,002	4,004	3,110	8.75	355
2011	14,756.99	6,825	6,828	7,929	10.75	738
2013	17,495.49	6,342	6,345	11,151	12.75	875
2014	167,508.67	52,346	52,370	115,139	13.75	8,374
2017	35,219.56	5,723	5,726	29,494	16.75	1,761
2018	29,263.66	3,292	3,293	25,970	17.75	1,463
	355,265.89	130,241	130,300	224,966		17,758
	356,672.43	131,648	131,707	224,966		17,758

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 12.7 4.98

FULLY ACCRUED

2014	68,394.13	68,394	68,394			
2015	25,474.28	25,474	25,474			
	93,868.41	93,868	93,868			

AMORTIZED
SURVIVOR CURVE.. 5-SQUARE
NET SALVAGE PERCENT.. 0

2016	34,907.06	29,671	28,904	6,003	0.75	6,003
2018	73,104.41	32,897	32,047	41,058	2.75	14,930
2019	328,496.77	82,124	80,001	248,496	3.75	66,266
2020	265,389.91	20,170	19,649	245,741	4.62	53,191
	701,898.15	164,862	160,600	541,298		140,390
	795,766.56	258,730	254,468	541,298		140,390

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 3.9 17.64

SURVIVOR CURVE.. 5-SQUARE
NET SALVAGE PERCENT.. 0

2019	222,823.63	55,706	55,700	167,124	3.75	44,566
	222,823.63	55,706	55,700	167,124		44,566

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 3.8 20.00

SURVIVOR CURVE.. IOWA 7-L3
NET SALVAGE PERCENT.. +25

1997	5,142.20	3,857	3,857			
2010	8,560.14	5,154	5,408	1,012	1.38	733
2013	10,117.38	5,355	5,619	1,969	2.06	956
2014	16,679.19	8,506	8,926	3,583	2.24	1,600
2017	9,526.50	3,174	3,331	3,814	3.89	980
	50,025.41	26,046	27,141	10,378		4,269

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 2.4 8.53

SURVIVOR CURVE.. IOWA 8-L2.5
NET SALVAGE PERCENT.. +25

2008	14,512.12	8,408	10,884			
2009	37,116.16	20,704	27,074	763	2.05	372
2010	94,979.04	50,843	66,485	4,749	2.29	2,074
2011	272,434.57	139,963	183,024	21,302	2.52	8,453
2012	124,843.14	61,914	80,962	12,670	2.71	4,675
2013	369,445.51	176,295	230,533	46,551	2.91	15,997
2014	629,974.46	284,670	372,251	100,230	3.18	31,519
2015	919,846.39	379,437	496,173	193,712	3.60	53,809
2016	875,782.30	311,997	407,985	248,852	4.20	59,250
2017	656,720.47	187,165	244,748	247,792	4.96	49,958
2018	899,413.84	182,975	239,269	435,291	5.83	74,664
2019	402,501.02	46,791	61,186	240,690	6.76	35,605
2020	1,978,692.55	68,636	89,753	1,394,267	7.63	182,735
	7,276,261.57	1,919,798	2,510,327	2,946,870		519,111

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 5.7 7.13

SURVIVOR CURVE.. IOWA 6-R2.5
NET SALVAGE PERCENT.. +25

2015	62,551.20	32,683	33,707	13,207	1.82	7,257
	62,551.20	32,683	33,707	13,207		7,257

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 1.8 11.60

SURVIVOR CURVE.. IOWA 15-L2.5
NET SALVAGE PERCENT.. +25

2007	928.41	440	696			
2008	106,512.73	49,049	79,885			
2010	92,268.91	38,983	69,202			
2013	64,338.20	21,264	48,254			
2017	163,202.56	25,949	65,712	56,690	11.82	4,796
	427,250.81	135,685	263,749	56,689		4,796

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 11.8 1.12

SURVIVOR CURVE.. IOWA 20-S1.5
NET SALVAGE PERCENT.. +25

1991	12,414.28	8,021	9,311			
1999	8,089.71	4,472	6,067			
2001	6,738.28	3,525	5,054			
2005	1.00			1	7.91	
2006	1,657.55	718	1,243			
2008	3,626.20	1,410	2,720			
2009	4,059.05	1,481	3,022	22	10.27	2
2010	20,648.79	7,000	14,284	1,203	10.96	110
2011	10,952.45	3,417	6,972	1,242	11.68	106
2012	13,689.15	3,881	7,919	2,348	12.44	189
2014	61,383.60	13,627	27,806	18,232	14.08	1,295
2015	4,048.45	765	1,561	1,475	14.96	99
2017	11,325.89	1,355	2,765	5,729	16.81	341
2019	8,980.23	421	860	5,876	18.75	313
	167,614.63	50,093	89,584	36,127		2,455

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 14.7 1.46

SURVIVOR CURVE.. 25-SQUARE
NET SALVAGE PERCENT.. 0

1998	21,462.60	19,102	19,100	2,363	2.75	859
2000	566.31	459	459	107	4.75	23
2001	1,174.83	905	905	270	5.75	47
2019	6,321.24	316	316	6,005	23.75	253
	29,524.98	20,782	20,780	8,745		1,182

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 7.4 4.00

FULLY ACCRUED

1994	19,571.29	19,571	19,571			
1995	44,730.52	44,731	44,731			
	64,301.81	64,302	64,302			

AMORTIZED
SURVIVOR CURVE.. 25-SQUARE
NET SALVAGE PERCENT.. 0

1996	60,143.87	58,340	58,065	2,079	0.75	2,079
1997	62,476.96	58,104	57,830	4,647	1.75	2,655
1998	699.08	622	619	80	2.75	29
1999	3,396.05	2,887	2,873	523	3.75	139
2000	109,509.90	88,703	88,285	21,225	4.75	4,468
2001	18,536.54	14,273	14,206	4,331	5.75	753
2003	24,819.95	17,126	17,045	7,775	7.75	1,003
2004	9,101.21	5,916	5,888	3,213	8.75	367
2005	19,414.80	11,843	11,787	7,628	9.75	782
2006	20,175.58	11,500	11,446	8,730	10.75	812
2007	46,171.65	24,471	24,356	21,816	11.75	1,857
2008	144,991.77	71,046	70,711	74,280	12.75	5,826
2009	45,373.45	20,418	20,322	25,052	13.75	1,822
2010	58,093.66	23,818	23,706	34,388	14.75	2,331
2011	157,853.30	58,406	58,131	99,722	15.75	6,332
2012	268,043.89	88,454	88,037	180,006	16.75	10,747
2013	160,645.22	46,587	46,368	114,278	17.75	6,438
2014	171,783.26	42,946	42,744	129,039	18.75	6,882
2015	66,533.14	13,972	13,906	52,627	19.75	2,665
2016	121,093.44	20,586	20,489	100,604	20.75	4,848
2017	12,206.57	1,587	1,580	10,627	21.75	489
2018	8,857.15	797	793	8,064	22.75	354
2019	534,039.05	26,702	26,576	507,463	23.75	21,367
2020	180,805.28	2,748	2,735	178,070	24.62	7,233
	2,304,764.77	711,852	708,500	1,596,265		92,278
	2,369,066.58	776,154	772,802	1,596,265		92,278

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 17.3 3.90

FULLY ACCRUED						
2000	1,564.04	1,564	1,564			
	1,564.04	1,564	1,564			
AMORTIZED						
SURVIVOR CURVE.. 20-SQUARE						
NET SALVAGE PERCENT.. 0						
2008	1,323.32	811	809	514	7.75	66
2010	5,156.67	2,643	2,637	2,520	9.75	258
2012	5,234.24	2,159	2,154	3,080	11.75	262
	11,714.23	5,613	5,600	6,114		586
	13,278.27	7,177	7,164	6,114		586

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 10.4 4.41

SURVIVOR CURVE.. IOWA 17-S1
NET SALVAGE PERCENT.. +15

1997	3,491.51	2,420	2,009	959	3.14	305
2007	10,363.09	5,099	4,233	4,576	7.16	639
2008	85,291.93	39,788	33,033	39,465	7.67	5,145
2009	12,828.38	5,638	4,681	6,223	8.21	758
2010	144,233.00	59,280	49,216	73,382	8.78	8,358
2011	88,155.73	33,588	27,886	47,046	9.38	5,016
2012	101,424.71	35,397	29,387	56,824	10.02	5,671
2013	282,997.42	89,145	74,011	166,537	10.70	15,564
2014	146,849.74	40,898	33,954	90,868	11.43	7,950
2015	107,271.03	25,745	21,374	69,806	12.20	5,722
2017	30,580.91	4,755	3,948	22,046	13.89	1,587
2019	46,982.33	2,913	2,419	37,516	15.76	2,380
	1,060,469.78	344,666	286,151	615,249		59,095

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 10.4 5.57

FULLY ACCRUED

2003	6,322.29	6,322	6,322			
2004	8,644.55	8,645	8,645			
2005	2,144.16	2,144	2,144			
	17,111.00	17,111	17,111			

AMORTIZED
SURVIVOR CURVE.. 15-SQUARE
NET SALVAGE PERCENT.. 0

2006	7,136.34	6,780	6,777	360	0.75	360
2007	142,219.97	125,627	125,562	16,658	1.75	9,519
2008	104,052.18	84,976	84,932	19,120	2.75	6,953
2009	55,113.71	41,335	41,314	13,800	3.75	3,680
2010	76,792.89	52,475	52,448	24,345	4.75	5,125
2011	298,409.08	184,020	183,925	114,484	5.75	19,910
2012	210,907.72	115,999	115,939	94,968	6.75	14,069
2013	39,150.29	18,923	18,913	20,237	7.75	2,611
2014	78,603.03	32,752	32,735	45,868	8.75	5,242
2015	222,839.26	77,994	77,954	144,885	9.75	14,860
2016	8,166.31	2,314	2,313	5,854	10.75	545
2019	266,394.90	22,199	22,188	244,207	13.75	17,761
	1,509,785.68	765,394	765,000	744,786		100,635
	1,526,896.68	782,505	782,111	744,786		100,635

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 7.4 6.59

SURVIVOR CURVE.. 15-SQUARE
NET SALVAGE PERCENT.. 0

2015	3,707.85	1,298	1,296	2,412	9.75	247
2019	13,510.06	1,126	1,124	12,386	13.75	901
	17,217.91	2,424	2,420	14,798		1,148

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 12.9 6.67

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
d/b/a BLACK HILLS ENERGY

COMPARISON OF EXISTING VS. PROPOSED DEPRECIATION EXPENSE AS OF SEPTEMBER 30, 2020

			EXISTING				PROPOSED				
	ACCOUNT	ORIGINAL COST AS OF SEPTEMBER 30, 2020	SURVIVOR CURVE	NET SALVAGE PERCENT	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT	SURVIVOR CURVE	NET SALVAGE PERCENT	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT	INCREASE/ (DECREASE)
	(1)	(2)	(3)	(4)	(5)	(6)=(5)*(2)	(7)	(8)	(9)	(10)	(11)=(10)-(6)
	INTANGIBLE PLANT										
302.00	FRANCHISES AND CONSENTS	74,989.75			0.81	607	30 - SQ	0	0.48	358	(249)
303.00	MISCELLANEOUS INTANGIBLE PLANT	1,335,506.09			0.46	6,143	30 - SQ	0	1.83	24,424	18,281
303.01	MISCELLANEOUS INTANGIBLE PLANT - EASEMENTS	1,730,332.20			3.75	64,887	20 - SQ	0	5.06	87,585	22,698
	TOTAL INTANGIBLE PLANT	**3,140,828.04**				**71,638**			**3.58**	**112,367**	**40,729**
	PRODUCTION PLANT										
336.01	PURIFICATION EQUIPMENT	18,718.78	30 - S2	0	3.33	623	30 - S2	0	2.76	516	(107)
	TOTAL PRODUCTION PLANT	**18,718.78**			**3.33**	**623**			**2.76**	**516**	**(107)**
	TRANSMISSION PLANT										
366.01	STRUCTURES AND IMPROVEMENTS	131,401.69	40 - R2.5	(5)	1.97	2,589	50 - R2	(5)	0.98	1,282	(1,307)
367.00	MAINS	39,814,130.60	VARIOUS	(5)	1.11 *	441,937	70 - R1	(10)	1.46	582,465	140,528
368.04	COMPRESSOR STATION EQUIPMENT	2,474.71	35 - S1.5	(5)	5.31	131	25 - S2.5	(5)	7.27	180	49
369.03	MEASURING AND REGULATING STATION EQUIPMENT	4,002,449.35	37 - S0.5	(5)	3.02	120,874	40 - R2	(10)	2.81	112,621	(8,253)
371.01	OTHER EQUIPMENT	108,344.42	23 - L3	(1)	7.44	8,061	25 - S1.5	0	8.90	9,644	1,583
	TOTAL TRANSMISSION PLANT	**44,058,800.77**			**1.30**	**573,592**			**1.60**	**706,192**	**132,600**
	DISTRIBUTION PLANT										
375.01	STRUCTURES AND IMPROVEMENTS	937,595.97	35 - R2.5	(5)	6.62	62,069	35 - S0	(5)	2.45	23,005	(39,064)
376.00	MAINS	118,761,514.56	VARIOUS	0, (10), (25)	1.74 *	2,066,450	57 - R3	(10)	1.66	1,966,410	(100,040)
377.00	COMPRESSOR EQUIPMENT	175,303.75	35 - S1.5	(5)	3.00	5,259	25 - S2.5	(5)	4.86	8,515	3,256
378.00	MEASURING AND REGULATING STATION EQUIPMENT - GENERAL	5,724,718.80	40 - R2.5	(10)	2.53	144,835	45 - R2.5	(10)	2.33	133,188	(11,647)
379.00	MEASURING AND REGULATING STATION EQUIPMENT - CITY GATE	61,110.51	40 - L2.5	(10)	3.51	2,145	35 - S1.5	(10)	4.74	2,897	752
380.00	SERVICES	70,054,267.85	VARIOUS	(40) , (20)	2.34 *	1,639,270	48 - R4	(15)	2.24	1,567,922	(71,348)
381.00	METERS	10,897,456.30	33 - R2	0	3.05	332,372	22 - S0	0	9.23	1,005,857	673,485
381.01	METERS - ERT AND AMI	9,756,739.33	VARIOUS	0	6.69 *	652,726	15 - R3	0	7.10	692,952	40,226
382.01	METER INSTALLATIONS	1,665,776.13	55 - S2.5	(5)	0.72	11,994	50 - R1.5	0	0.90	14,918	2,924
383.01	HOUSE REGULATORS	31,459,092.04	45 - R2.5	(15)	2.69	846,250	37 - S0.5	(5)	3.08	968,534	122,284
385.01	INDUSTRIAL MEASURING AND REGULATING STATION EQUIPMENT	6,233,437.40	VARIOUS	(10), (5)	1.45 *	90,385	42 - R0.5	(5)	2.45	152,986	62,601
387.00	OTHER EQUIPMENT	109,362.72	28 - L3	0	1.70	1,859	32 - S2	0	2.92	3,190	1,331
	TOTAL DISTRIBUTION PLANT	**255,836,375.36**			**2.29**	**5,855,614**			**2.56**	**6,540,374**	**684,760**
	GENERAL PLANT										
	STRUCTURES AND IMPROVEMENTS										
390.01	OWNED	9,083,466.08	40 - R3	0	2.51	227,995	40 - R2.5	(5)	2.71	246,529	18,534
390.51	LEASED	26,483.32	20 - S3	0	3.41	903	20 - S3	0	-	0	(903)
	TOTAL STRUCTURES AND IMPROVEMENTS	9,109,949.40			2.51	228,898			2.71	246,529	17,631
	OFFICE FURNITURE AND EQUIPMENT										
391.01	FURNITURE AND EQUIPMENT										
	FULLY ACCRUED	1,406.54	FULLY ACCRUED		11.70	165	FULLY ACCRUED		-	0	(165)
	AMORTIZED	355,265.89	18 - SQ	0	11.70	41,566	20 - SQ	0	5.00	17,758	(23,808)
	TOTAL OFFICE FURNITURE AND EQUIPMENT	356,672.43			11.70	41,731			4.98	17,758	(23,973)
391.03	COMPUTER HARDWARE										
	FULLY ACCRUED	93,868.41	FULLY ACCRUED		19.22	18,042	FULLY ACCRUED		-	0	(18,042)
	AMORTIZED	701,898.15	6 - SQ	0	19.22	134,905	5 - SQ	0	20.00	140,390	5,485
	TOTAL COMPUTER HARDWARE	795,766.56			19.22	152,946			17.64	140,390	(12,556)
391.07	IPAD HARDWARE	222,823.63			25.00	55,706	5 - SQ	0	20.00	44,566	(11,140)
	TOTAL OFFICE FURNITURE AND EQUIPMENT	1,375,262.62			18.21	250,383			14.74	202,714	(47,669)

BLACK HILLS/KANSAS GAS UTILITY COMPANY, LLC
d/b/a BLACK HILLS ENERGY

COMPARISON OF EXISTING VS. PROPOSED DEPRECIATION EXPENSE AS OF SEPTEMBER 30, 2020

			EXISTING				PROPOSED				
	ACCOUNT	ORIGINAL COST AS OF SEPTEMBER 30, 2020	SURVIVOR CURVE	NET SALVAGE PERCENT	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT	SURVIVOR CURVE	NET SALVAGE PERCENT	ANNUAL ACCRUAL RATE	ANNUAL ACCRUAL AMOUNT	INCREASE/ (DECREASE)
	(1)	(2)	(3)	(4)	(5)	(6)=(5)*(2)	(7)	(8)	(9)	(10)	(11)=(10)-(6)
	TRANSPORTATION EQUIPMENT										
392.01	SUBUNIT	50,025.41	7 - L4	25	11.52	5,763	7 - L3	25	8.53	4,269	(1,494)
392.03	LIGHT TRUCKS	7,276,261.57	6 - L2	30	13.23	962,649	8 - L2.5	25	7.13	519,111	(443,538)
392.04	MEDIUM TRUCKS	62,551.20	7 - L2	30	12.40	7,756	6 - R2.5	25	11.60	7,257	(499)
392.05	HEAVY TRUCKS	427,250.81	10 - L3	30	8.63	36,872	15 - L2.5	25	1.12	4,796	(32,076)
392.06	TRAILERS	167,614.63	19 - R2	20	5.81	9,738	20 - S1.5	25	1.46	2,455	(7,283)
	TOTAL TRANSPORTATION EQUIPMENT	7,983,703.62			12.81	1,022,779			6.74	537,888	(484,891)
393.00	STORES EQUIPMENT	29,524.98	25 - SQ	0	2.65	782	25 - SQ	0	4.00	1,182	400
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT										
	FULLY ACCRUED	64,301.81	FULLY ACCRUED		2.03	1,305	FULLY ACCRUED		-	0	(1,305)
	AMORTIZED	2,304,764.77	27 - SQ	0	2.03	46,787	25 - SQ	0	4.00	92,278	45,491
	TOTAL TOOLS, SHOP AND GARAGE EQUIPMENT	2,369,066.58			2.03	48,092			3.90	92,278	44,186
395.00	LABORATORY EQUIPMENT										
	FULLY ACCRUED	1,564.04	FULLY ACCRUED		-	0	FULLY ACCRUED		-	0	0
	AMORTIZED	11,714.23	20 - SQ	0	1.55	182	20 - SQ	0	5.00	586	404
	TOTAL LABORATORY EQUIPMENT	13,278.27			1.37	182			4.41	586	404
396.00	POWER OPERATED EQUIPMENT	1,060,469.78	VARIOUS	(25)	2.66 *	28,208	17 - S1	15	5.57	59,095	30,887
397.00	COMMUNICATION EQUIPMENT										
	FULLY ACCRUED	17,111.00	FULLY ACCRUED		6.85	1,172	FULLY ACCRUED		-	0	(1,172)
	AMORTIZED	1,509,785.68	18 - SQ	0	6.85	103,420	15 - SQ	0	6.67	100,635	(2,785)
	TOTAL COMMUNICATION EQUIPMENT	1,526,896.68			6.85	104,592			6.59	100,635	(3,957)
398.00	MISCELLANEOUS EQUIPMENT	17,217.91	18 - SQ	0	12.21	2,102	15 - SQ	0	6.67	1,148	(954)
	TOTAL GENERAL PLANT	**23,485,369.84**			**7.18**	**1,686,019**			**5.29**	**1,242,055**	**(443,964)**
	TOTAL DEPRECIABLE PLANT	**326,540,092.79**			**2.51**	**8,187,486**			**2.63**	**8,601,504**	**414,018**
	UNRECOVERED RESERVE FOR AMORTIZATION										
391.01	FURNITURE AND EQUIPMENT									(40,647) **	(40,647)
391.03	COMPUTER HARDWARE									5,149 **	5,149
391.07	IPAD HARDWARE									1,190 **	1,190
393.00	STORES EQUIPMENT									(365) **	(365)
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT									(17,744) **	(17,744)
395.00	LABORATORY EQUIPMENT									(2,392) **	(2,392)
397.00	COMMUNICATION EQUIPMENT									48,309 **	48,309
398.00	MISCELLANEOUS EQUIPMENT									1,395 **	1,395
	TOTAL UNRECOVERED RESERVE FOR AMORTIZATION									**(5,105)**	**(5,105)**
	NONDEPRECIABLE AND ACCOUNTS NOT STUDIED										
301.00	ORGANIZATION	186,931.82									
303.02	MISCELLANEOUS INTANGIBLE PLANT - TRADEMARKS	181,000.00									
365.01	LAND	9,430.51									
365.02	LAND RIGHTS	594,368.16									
365.71	LAND - FARM TAP	643.94									
365.72	LAND RIGHTS - FARM TAP	2,100.26									
374.01	LAND	187,066.01									
374.02	LAND RIGHTS	183,574.03									
389.01	LAND	905,127.35									
	TOTAL NONDEPRECIABLE AND ACCOUNTS NOT STUDIED	**2,250,242.08**									
	TOTAL GAS PLANT	**328,790,334.87**				**8,187,486**				**8,596,399**	**408,913**

* Represents a composite rate of all prior subaccounts.
** 5-year amortization of unrecovered reserve related to utilization of amortization accounting.