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September 25, 2015

Via Email
Original via Mail

British Columbia Utilities Commission
Sixth Floor
900 Howe Street
Vancouver, B.C.
V6Z 2N3

Attention: Ms. Erica M. Hamilton, Commission Secretary

Dear Ms. Hamilton:

Re: FortisBC Inc. (FBC)

Application for a Certificate of Public Convenience and Necessity (CPCN) for the Kootenay Operations Centre (the Application)

Response to the British Columbia Utilities Commission (BCUC or the Commission) Information Request (IR) No. 1

On July 9, 2015, FBC filed the Application referenced above. In accordance with Commission Order G-124-15 setting out the Regulatory Timetable for the review of the Application, FBC respectfully submits the attached response to BCUC IR No. 1.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC INC.

Original signed by: Ilva Bevacqua

For: Diane Roy

Attachments

cc (email only): Registered Parties



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1 A. PROJECT DESCRIPTION

2 1.0 Reference: OVERVIEW OF PROJECT FACILITIES AND OPERATIONAL 3 FUNCTIONALITY

4 Exhibit B-1, Section 3.2, pp. 18-28

5 Summary of Existing and Proposed Facilities

6 FBC provides an overview of the history, facilities and functionality of the four existing
7 facilities in the Kootenay area, and a comprehensive summary in tabular form will assist
8 in understanding of how the KOC will fit into the overall situation in the region.

9 1.1 Please fill in the tables below making appropriate adjustments to the table to
10 improve clarity and to match available data for current operations. If not obvious,
11 please explain what is included or excluded from location, space and employee
12 categories.

13 **Table 1. Example of a table requested showing the existing breakdown of space by site**

Facility Location	Gross Office (ft ²)	Ware-house (ft ²)	Shop (ft ²)	Other Building (ft ²)	Outside Storage & Other Useable Area	Number of Vehicle Parking Spaces		Number of Small Service Vehicles		Unused Area
						Small	Large	Small	Large	
Trail Office										
Trail Office Rental										
South Slocan Generation Facilities										
South Slocan Generating Plant										
Warfield Total										
Warfield Stations Services										
Castlegar District Office										
Castlegar Yard										
SCC										
BCC										

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1 **Table 2. Example of a table requested showing the existing breakdown of staff by site**

Facility Location	Number of Full Time Employees				Temporary Employees
	Management	Professional & Technical	Clerical, Secretarial & Administrative	Other Full Time	
Trail Office					
Trail Office Rental					
South Slokan Generation Facilities					
South Slokan Generating Plant					
Warfield Total					
Warfield Stations Services					
Castlegar District Office					
Castlegar Yard					
SCC					
BCC					

2

3 **Response:**

4 FBC provides completed Tables 1 and 2 below showing the existing breakdown of space and
5 employees by site.

6

Table 1: Existing Breakdown of Space by Site

Facility Location	Gross Office (ft ²)	Ware-house (ft ²)	Shop (ft ²)	Other Building (ft ²)	Outside Storage & Other Useable Area (ft ²)	Number of Vehicle Parking Spaces		Number of Service Vehicles				Unused Area
						Std	Lrg	Std	Lrg	Trailers	Eqpt	
Trail Office	52,269*	n/a	n/a	n/a	n/a	57	0	12	0	n/a	n/a	0
Trail Office Rental	9,363**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4,410**
South Slokan Generation Facilities including Plant	14,500	11,300	23,973	24,201	568,765	95	0	35	15	4	11	0

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Facility Location	Gross Office (ft ²)	Ware-house (ft ²)	Shop (ft ²)	Other Building (ft ²)	Outside Storage & Other Useable Area (ft ²)	Number of Vehicle Parking Spaces		Number of Service Vehicles				Unused Area
						Std	Lrg	Std	Lrg	Trailers	Eqpt	
Warfield Total	10,051	14,593	13,998	10,808	150,000	90	16	15	19	15	10	0
Warfield Stations Services ***	1,363	1,920	1,051	n/a	20,000	10	15	10	6	4	7	0
Castlegar District Office	2,100	756	3,775	n/a	n/a	n/a	3	0	3	0	0	0
Castlegar Yard	n/a	n/a	n/a	1,950	15,000	20	1	3	1	1	3	0
SCC	5,386	n/a	n/a	108	n/a	20	n/a	0	0	0	0	0
BCC	175	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0

- 1 * including rental space
2 ** useable square footage
3 *** included in Warfield Total
4

5 **Table 2: Existing Breakdown of Employees by Site**

Facility Location	Number of Full Time Employees				Temporary Employees (Total All affiliations)
	Management & Exempt (M&E)	IBEW (International Brotherhood of Electrical Workers)	COPE (Canadian Office & Professional Employees Union)	COPE Customer Services	
Trail Office	34	n/a	43	29	14
Trail Office Rental	n/a	n/a	n/a	n/a	n/a
South Slokan Generation Facilities	18	33	7	n/a	0-10
South Slokan Generating Plant	n/a	n/a	n/a	n/a	n/a
Warfield Total*	10	40	7	n/a	2
Warfield Stations Services	1	16	n/a	n/a	n/a
Castlegar District Office	1	8	2	n/a	1
Castlegar Yard	n/a	n/a	n/a	n/a	n/a
SCC	6	19**	4	n/a	n/a
BCC	n/a	n/a	n/a	n/a	n/a

- 6 * includes Warfield Station Services in Total
7 ** shift workers covering the system power dispatcher role
8

1.2 Please fill in the tables below making appropriate adjustments to the table to improve clarity and to match available data for projected operations after the KOC project as proposed is completed.

Table 3. Example of a table requested showing an as proposed breakdown of space by site

Facility Location	Gross Office (ft ²)	Ware-house (ft ²)	Shop (ft ²)	Other Building (ft ²)	Outside Storage & Other Useable Area	Number of Vehicle Parking Spaces		Number of Small Service Vehicles		Unused Area
						Small	Large	Small	Large	
Trail Office										
Trail Office Rental										
South Slocan Generating Plant										
Warfield Total										
Castlegar District Office										
Castlegar Yard										
KOC Generation Facilities										
KOC Stations Services										
KOC Power Line										
KOC Total										
SCC										
BCC										

Table 4. Example of a table requested showing an as proposed breakdown of staff by site

Facility Location	Number of Employees				Temporary Employees
	Management	Professional & Technical	Clerical, Secretarial & Administrative	Other Full Time	
Trail Office					

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Trail Office Rental					
South Slocan Generating Plant					
Warfield Total					
Castlegar District Office					
Castlegar Yard					
KOC Generation Facilities					
KOC Stations Services					
KOC Power Line					
KOC Total					
SCC					
BCC					

1

2 **Response:**

3 FBC provides the completed Table 4 below showing the proposed breakdown of employees by

4 site. Table 3, providing a breakdown of space by site, is being filed confidentially under a

5 separate cover as it contains information related to the Company's assets, including Critical

6 Assets. FBC believes that there is a reasonable expectation that the release of such information

7 could potentially jeopardize the safety and security of the Company's system.

1

Table 4: Proposed Breakdown of Staff by Site

Facility Location	Number of Full Time Employees				Temporary Employees (Total All affiliations)
	Management & Exempt (M & E)	IBEW (International Brotherhood of Electrical Workers)	COPE (Canadian Office & Professional Employees Union)	COPE Customer Services	
Trail Office	32	n/a	42	29	14
Trail Office Rental	n/a	n/a	n/a	n/a	n/a
South Slocan Generating Plant	1	15	n/a	n/a	n/a
Warfield Total	9	24	7	n/a	2
Castlegar District Office	1	8	2	n/a	1
Castlegar Yard	n/a	n/a	n/a	n/a	n/a
KOC Generation Facilities	15	18	7	n/a	0-10
KOC Station Services	1	16	n/a	n/a	n/a
KOC Line Patrol	n/a	n/a	n/a	n/a	n/a
KOC Total	16	34	7	n/a	0-10
SCC	10	19**	5	n/a	n/a
BCC	n/a	n/a	n/a	n/a	n/a

2 *** shift workers covering the system power dispatcher role*

3

4

5

6 On page 46 of the Application, FBC states:

7 ...it has taken a strategic approach by pursuing a single, integrated solution to
 8 resolving the issues at all of the various facilities identified in the Application. The
 9 need to address multiple facilities at different locations provides FBC with an
 10 opportunity to resolve both the near term and longer term challenges...

11 To aid in accessing the merits of the individual components of the single solution
 12 proposed, it would be helpful to understand the costs of each component individually.

13 1.3 Please provide a detailed breakdown showing separately the O&M costs by each
 14 site location, as well as showing for each site location the labour and non-labour
 15 costs separately, each before and after the implementation of the proposed
 16 project. For the breakdown after implementation please show the KOC O&M
 17 costs broken down into the original functional groups.

18

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1 **Response:**

- 2 FBC is unable to provide O&M details by site location as O&M costs are not forecast or tracked
3 by site location. In the following table, FBC provides the forecast incremental impact of this
4 Project on O&M by function and Labour and Non-Labour components.

Forecast O&M Costs and Savings (\$000s)								
Particular	Generation		SCC		Station Services		Total	
	Labour	Non-Labour	Labour	Non-Labour	Labour	Non-Labour	Labour	Non-Labour
KOC Operating Costs	\$ -	\$ 190	\$ -	\$ 70	\$ -	\$ 35	\$ -	\$ 295
Net Generation Recoveries	-	(150)	-	-	-	-	-	(150)
Increased Generation Travel	-	30	-	-	-	-	-	30
Forecast Costs (Table 5-1)	-	70	-	70	-	35	-	175
Travel Time C&M	-	-	-	-	(144)	-	(144)	-
Premium Saving on Call Out Staff	-	-	-	-	(11)	-	(11)	-
Tool Crib Savings	-	-	-	-	-	(10)	-	(10)
Fleet Vehicle Savings	-	-	-	-	-	(25)	-	(25)
Warfield Janitorial Cleaning Reduction	-	-	-	(4)	-	(6)	-	(10)
Forecast Savings (Table 5-2)	-	-	-	(4)	(155)	(41)	(155)	(45)
Net O&M Change	<u>\$ -</u>	<u>\$ 70</u>	<u>\$ -</u>	<u>\$ 66</u>	<u>\$ (155)</u>	<u>\$ (6)</u>	<u>\$ (155)</u>	<u>\$ 130</u>

5

6

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B. SITE SELECTION AND PROJECT DESIGN CRITERIA

2.0 Reference: CONSULTATION

Section 9.1, p. 87

PUBLIC CONSULTATION

FBC states that “FBC regards its responsibility to engage stakeholders in a meaningful and comprehensive consultation process as a key consideration in the development and execution of its projects necessary to provide electrical service that is safe, reliable, and cost effective.”

2.1 Please describe the Stakeholder Identification process FBC followed for the KOC project. Please list any additional stakeholders not already identified in the Application.

Response:

FBC believes this Project to have a local and regional impact and, accordingly, a concerted effort was taken to inform the customers and organizations in the Castlegar and Trail regions about the KOC Project. At the initial stages of the Project, a consultation plan was developed and a list was put together by the Project team that identified stakeholders that FBC believed could have a direct interest in the Project. In 2012 FBC began discussions with these stakeholders. The contact log can be found in Appendix M-1 to the Application. In addition, FBC identified customers within a 500 meter radius of the Project for more specific outreach. During KOC Project development, the FBC Community and Aboriginal Relations group and the Project team met often to determine other stakeholders that may have an interest in the KOC Project, and contacted those stakeholders to inform them of the Project.

As discussed in Section 9.2 of the Application, FBC began speaking with First Nations during the Project development. Through longstanding relationships with local First Nations, FBC identified which First Nations it would contact and began dialogues in early 2012 to determine if there were any concerns regarding the Project. It was through these conversations that FBC decided to undertake an archeological overview assessment (AOA). This AOA process also served as an early notification to all First Nations that have identified the Project site as within their traditional territory. FBC continues to be in contact with various First Nations about the Project.

There are some stakeholders to whom FBC has presented Project details that are not specifically identified in the Application and also groups and organizations where dialogue occurred during the normal course of business.

Additional stakeholders not already identified in the Application include the following:

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- FBC employees;
- Regional elected officials and regional government staff, who were told of our project during the Union of British Columbia Municipalities meetings as well as the Association of Kootenay Boundary Local Government meeting and the joint Rocky Mountain-Kootenay Local Government Managers Association Meetings (2013 and 2014);
- Members of the local Doukhobor community in Ootischenia;
- Castlegar Chamber of Commerce;
- Trail Chamber of Commerce;
- Ootischenia Improvement District;
- Advisory Committee for the Friends of Kootenay Lake;
- British Columbia Electrical Municipal Utilities Conference;
- Castlegar Airport Authority;
- NAV Canada; and
- Ministry of Transportation.

In Appendix M-3 of the Application the material presented at the 2012 open house states, "It is the intent that a 5' wide meandering gravel trail be included in the design of this buffer allowing residents to remain safely off the roadway." The open house material further states the office space will be heated with a Water Source Heat Pump.

2.2 Does the KOC as proposed still have 5' wide meandering gravel trail allowing residents to remain safely off the roadway as shown during the open house? If not, why not?

Response:

Yes, the proposed KOC landscaping layout includes a 5' wide meandering gravel trail located on FBC's property along Columbia Road. It will provide a buffer to the property and will allow residents to remain safely off the roadway.

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2.3 When and why was it decided to remove ground source HVAC from the design?
Please provide any economic calculations that were used to justify its removal.

Response:

The ground source heat pump was removed from design in early 2015 as part of value engineering to manage the capital expenditure on the KOC project. It was replaced, at a lower capital cost, with rooftop units (RTU) with CO2 demand controls to allow the units to reduce airflow when occupancy is decreased. The ventilation air for the building will be provided by heat recovery ventilation units that recover waste heat from the exhaust air and temper the outdoor air. The RTUs will have the ability to free cool directly from the unit when conditions permit. The current capital cost differential between the two mechanical systems is \$575,000.

The heating and cooling energy for the RTU system included in the current design is expected to be in the range of 140-160 kWh/m²/annum. For comparison, a water source heat pump system as originally designed is expected to be approximately 20% more efficient. Although it is expected that the proposed RTU system would consume approximately 60,564 kWh more electricity than the previously proposed water source heat pump system, overall savings associated with the mechanical change are expected.

The analysis below provides details on the net savings to customer as a result of using a mechanical system with a lower capital cost and the incremental energy consumption, for a total of approximately \$50,000 in annual savings.

Additionally, the RTU system allows for easier maintenance and better control of operational costs because it can be accessed more easily than the heat pump, which would sit above the ceiling space of the employee's desk. FBC believes the change to an RTU system is reasonable and the economic calculations justify its inclusion.

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			<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>
			(\$000s)				
Additional Cost of Plant			(575.0)	-	-	-	-
Depreciation	2.80%		-	16.1	16.1	16.1	16.1
Net Book Value			(575.0)	(558.9)	(542.8)	(526.7)	(510.6)
Rate Base			(287.5)	(567.0)	(550.9)	(534.8)	(518.7)
<u>Financing Cost & Taxes</u>							
Cost of Equity	9.15%	Equity%: 40%	(10.5)	(20.8)	(20.2)	(19.6)	(19.0)
Cost of Debt	5.3%	Debt%: 60%	(9.1)	(18.0)	(17.5)	(17.0)	(16.4)
Depreciation cost			-	(16.1)	(16.1)	(16.1)	(16.1)
Income Tax			4.4	2.6	1.5	0.6	(0.2)
Net Revenue Impact			(15.3)	(52.3)	(52.2)	(52.0)	(51.8)

Energy Cost Impact (Lower Efficiency Plant):

Average Energy Cost of procurement	\$k/kWh	0.00002	0.00002	0.00003	0.00003	0.00003
Incremental Energy Consumed by Mechanical Plant	kWh	60,564	60,564	60,564	60,564	60,564
Incremental Unmetered Power Purchase Cost (Post Tax)	\$k	1.06	1.11	1.17	1.21	1.24
Savings Achieved due to Mechanical System Change	\$k	(14.2)	(51.1)	(51.0)	(50.8)	(50.5)

2.4 Please provide a copy of the design criteria document given to architects that was used to produce the design and cost estimate.

Response:

FBC provided the consultant team with two main documents:

- Kootenay Operations Centre Design and Room Intent (attached as Confidential Attachment 2.4); and
- KOC Space Program (Confidential Appendix D-3-1) to begin the initial design.

FBC participates and contributes in the design process of its buildings to ensure efficiency, business functionality and room intent. It then requests that the Architect, Mechanical, Electrical and Structural engineers to provide a design brief outline (provided in Confidential Attachment 2.4). The design briefs with the fifty percent construction documents were provided to the Quantity Surveyor for estimation.

Confidential Attachment 2.4 is being filed confidentially under separate cover as it contains information related to the Company's assets, including Critical Assets. FBC believes that there

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- 1 is reasonable expectation that the release of such information could potentially jeopardize the
- 2 safety and security of the Company's system.

3

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3.0 Reference: PROJECT ALTERNATIVES

Exhibit B-1, Section 5.1, pp. 46-7

FBC's Long Term Space Strategy and Requirements

FBC states that it considered the ability of each Project alternative to resolve space issues consistent with its long term space strategy that seeks to achieve several objectives, including the provision of building capacity to meet current and future requirements.

3.1 Please provide a copy of the document that sets out FBC's long term space strategy in detail, and discuss when and how this strategy was reviewed by the Commission and ratepayers.

Response:

The most recent comprehensive document setting out FBC's overall, long-term corporate strategy was the 2012 Integrated System Plan (ISP) application. A major component of this filing was the 2012 Long-Term Capital Plan (LTCP), which was described as covering:

"[...] the full range of FortisBC's assets and infrastructure, including Generation, Transmission and Distribution, Telecommunications, and **General Plant components comprised of Buildings**, Information Technology, Fleet and other categories of assets."¹ [emphasis added]

Section 5 of the LTCP section explored FBC's plans for General Plant assets which were described as consisting of:

"[...] vehicles, metering, information systems, telecommunications, **buildings, furniture and fixtures**, tools and equipment. These areas provide support services, facilities and technologies that enable the effective and efficient delivery of the electrical services that FortisBC customers expect of their electric utility.

Budgets requested in each of the General Plant subsections are based on the requirements generated by 2012 Long Term Capital Plan projects over the planning horizon. Specifically, the **facilities**, vehicles and technologies included in General Plant **are determined by reviewing the overall 2012 Long Term Capital Plan and planning the required support.**"² [emphasis added]

Consequently, and specific to buildings and facilities, the LTCP identified the following projects along with general descriptions for each project, the forecast timelines and costs, and the project justifications:

¹ FBC 2012 Integrated System Plan – Volume 1, p.1.

² FBC 2012 Long Term Capital Plan, p. 196.

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- Kootenay Long Term Facilities Strategy;
- Okanagan Long Term Solution;
- Trail Office Lease Purchase; and
- Central Warehousing.

Two of these projects (the Trail Office Lease Purchase and Central Warehousing) have already been completed.

With respect to its buildings and facilities in the Kootenays, it was noted in the LTCP that “[a] long term space strategy for these sites is being developed”. The KOC CPCN Application is the detailed outcome of that analysis. A space strategy to address space constraints and facilities issues in the Okanagan area is currently under development; FBC has not identified any linkages between the two plans which would impact the proposed KOC Project or future Okanagan solutions.

The Company requested a Commission determination on whether the 2012 Integrated System Plan (including the 2012 Long Term Capital Plan) was in the public interest pursuant to section 44.1(6) of the UCA. The entire application underwent extensive regulatory review including two rounds of written information requests and an oral hearing component. By Order G-110-12, the Commission noted that it “[...] accepts FortisBC’s Long Term Capital Plan is in the public interest”.

- 3.2 Please confirm that FBC has included a 10 percent allowance for growth in the design of the KOC building, or provide the correct growth number.

Response:

Please refer to the response to BCUC IR 1.3.3.

- 3.3 Please discuss how many years into the future this allowance for growth is expected to accommodate the growth in staff and facilities needed to serve customers in the Kootenay region.

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1 **Response:**

2 FBC has provided for an eight percent growth allowance within the open office plan of the
3 building. FBC believes this allowance to be reasonable based on stable business activity
4 forecasts over the next 20 years. FBC expects the space requirements for the KOC will
5 accommodate general headcount changes over this period.

6 The eight percent growth allowance for the building would not accommodate any future building
7 retirements or requirements for the Castlegar District Office. An addition to the KOC would be
8 required to accommodate the functions and staff of the Castlegar District Office. The KOC
9 infrastructure has been designed to accommodate a potential building expansion without any
10 redesign of systems.

11

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C. PROJECT MANAGEMENT AND COST

4.0 Reference: PROJECT COST

Appendix G, pp. 78-83; Appendix G-1, p. 3; Appendix L, p. S1

Project Cost Estimates

On page 7 of the BCUC 2015 Certificate of Public Convenience and Necessity Application Guidelines (Appendix A to Order G-20-15), it states:

The project cost estimate should include...a description of the method of estimating used, the percentage of the project definition and design complete at the time of the estimate based on the judgment of FBC's management, identification and justification of all assumptions, exclusions, inflation and discount factors, and sources of benchmarks and other data including lessons learned from relevant past projects.

4.1 Please provide a summary of the inputs and assumptions used in the analysis of each of the alternatives provided in Appendix G.

Response:

The following are lists of the inputs / assumptions that are common to each of the alternatives and inputs/assumptions that are particular to each alternative:

Common to All Alternatives:

- For building materials, furniture & IT equipment sourced in the US, the exchange rate assumed was \$0.82 Cdn / \$US;
- Capital costs enter Rate Base at the beginning of the year after the asset is in-service;
- Capital cost escalation rate is 3%;
- Aside from Masonry Structures, capital asset costs are depreciated at the currently Commission approved depreciation rates;
- Capital structure is 60% debt and 40% equity, the cost of debt (pre-tax) is 5.30% and the return on equity is 9.15%;
- Percentage rate increase is derived by the incremental impact to the cost of service divided by forecasted revenues of \$321.1 million (from FBC's Annual Review filing February 6, 2015, Section 11, Schedule 1);
- Current Income Tax Rate is 26%;
- O&M overhead capitalization rate is 15%; and
- O&M in 2015\$ and Property Taxes in 2015\$ are escalated at 2.3%, approximating inflation.

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Specific to Alternative 2: Renovate the Existing Facilities:

- Work at the Generation Facilities are completed and they are in-service in the 4th quarter, 2017, added to Rate Base in 2018;
- Added extended life to Generation Facilities is approximately 40 years for building structures;
- Renovation requires temporary relocation of staff into trailers and material into temporary storage structures;
- Repairs and renovation to buildings per Generation Office and Warehouse Facility Assessment included in Appendix B consist of:
 - Repair of existing roof, gutters, fascias and soffits, existing portico and canopy structure;
 - Replacement of existing stucco cladding system and exterior windows and doors;
 - Foundation and other structural seismic upgrades and repairs;
 - Electrical upgrade including lighting and code related items;
 - Mechanical and HVAC system replacement;
 - Plumbing code deficiencies;
 - Replacement of exterior hard paving and landscaping improvements;
 - Finish items identified as needing replacement in 4-10 years;
 - Consultants costs estimated at 16% of building construction cost; and
 - Permitting costs estimated at 2% of building construction cost.
- Work at the BCC is completed and in-service in the 1st quarter, 2017, added to Rate Base in 2018;
- Estimate developed per architectural plans prepared by Iredale Group Architecture;
- Work includes:
 - Tenant improvements to approximately 5,000 sq. ft. that requires demolition and consolidation of 3 existing tenant spaces;
 - Existing multi-tenant hallway is incorporated within the space;
 - Addition of base building and common amenities required based on location;
 - Security additions;
 - Electrical and mechanical system upgrades;
 - Finish replacement;
 - Consultants costs estimated at 16% of building construction cost; and
 - Permitting costs estimated at 2% of building construction cost.
- BCC work must be completed prior to SCC renovation being started;
- Work at the SCC is completed and in-service in the 2nd quarter, 2018, added to Rate Base in 2019;
- Estimate developed per architectural schematic plan prepared by MQN Architects;
- Work includes:
 - Addition to the current SCC building of approximately 4,500 sq. ft. and renovation of existing 3,950 sq. ft.;

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- 1 ○ Exterior wall construction to match existing building;
- 2 ○ Control Centre relocated to existing BCC site during construction but consoles to
- 3 remain operational and compliant to MRS requirements during construction;
- 4 ○ Consultants' costs estimated at 16% of building construction cost; and
- 5 ○ Permitting costs estimated at 2% of building construction cost.
- 6 • Added extended life to SCC and BCC is approximately 45 years;
- 7 • Gross incremental O&M (2015\$) is \$151 thousand; and
- 8 • Incremental Property Taxes (2015\$) is \$290 thousand.

9 Specific to Alternative 3: Replace Generation Facilities and SCC Facility and Renovate BCC:

- 10 • Work at the Generation Facilities are completed and they are in-service in the 3rd
- 11 quarter, 2018, added to Rate Base in 2019;
- 12 • Estimate developed per architectural schematic plans prepared by Iredale Group
- 13 Architecture;
- 14 • Work includes:
 - 15 ○ New construction of 19,214 sq. ft. combined office and warehouse building on
 - 16 existing site;
 - 17 ○ Building structure is a traditional cast in-situ concrete slab on grade over
 - 18 standard perimeter strip and pad foundation with concrete foundation walls;
 - 19 ○ Building superstructure comprised of light structural steel frame with open web
 - 20 steel joists and beams supporting roof loads;
 - 21 ○ Consultants' costs estimated at 16% of building construction cost;
 - 22 ○ Permitting costs estimated at 2% of building construction cost; and
 - 23 ○ Environmental impacts on or from river not considered or included in cost
 - 24 estimate.
- 25 • Staging and temporary relocation of some staff and material as a result of conflict where
- 26 new building is situate to existing;
- 27 • Added extended life to Generation Facilities is approximately 75 years for building
- 28 structure;
- 29 • Work at the Backup Control Centre is completed and it is in-service in the 1st quarter,
- 30 2017, added to Rate Base in 2018;
- 31 • Estimate developed per architectural plans prepared by Iredale Group Architecture;
- 32 • Work includes:
 - 33 ○ Tenant improvements to approximately 5,000 sq. ft. that requires demolition and
 - 34 consolidation of 3 existing tenant spaces;
 - 35 ○ Existing multi-tenant hallway is incorporated within the space;
 - 36 ○ Addition of base building and common amenities required based on location;
 - 37 ○ Security additions;
 - 38 ○ Electrical and Mechanical system upgrades;
 - 39 ○ Finish replacement;

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- 1 ○ Consultants' costs estimated at 16% of building construction cost; and
- 2 ○ Permitting costs estimated at 2% of building construction cost.
- 3 • BCC work must be completed prior to SCC renovation being started;
- 4 • Work at the System Control Centre is completed and in-service in the 3rd quarter, 2018,
- 5 added to Rate Base in 2019;
- 6 • Estimate developed per architectural schematic plan prepared by MQN Architects;
- 7 • Work includes:
 - 8 ○ Addition to the new construction of 8,436 sq. ft. building;
 - 9 ○ Exterior wall construction to match site buildings (block);
 - 10 ○ Consultants' costs estimated at 16% of building construction cost;
 - 11 ○ Permitting costs estimated at 2% of building construction cost; and
 - 12 ○ Assumes \$300,000 allocation for helicopter pad relocation within the property.
- 13 • Added extended life to SCC and BCC is approximately 45 years;
- 14 • Gross incremental O&M (2015\$) is \$137 thousand; and
- 15 • Incremental Property Taxes (2015\$) is \$310 thousand.

16 Specific to Alternative 5: Build a New Combined Operations Centre to Replace Existing
 17 Facilities:

- 18 • New Operations Centre is in-service in the 4th quarter, 2017, added to Rate Base in
- 19 2018;
- 20 • New construction of a single-storey building of 30,090 sq. ft., wash bay 1,741 sq. ft. and
- 21 covered parking of 8,467 sq. ft;
- 22 • Work includes:
 - 23 ○ Building structure is a traditional cast in-situ concrete slab on grade over standard
 - 24 perimeter strip and pad foundation with concrete foundation walls;
 - 25 ○ Building superstructure comprised of light structural steel frame with open web
 - 26 steel joists and beams supporting roof loads;
 - 27 ○ Perimeter infill walls constructed using high performance Cementitious Panel
 - 28 Cladding;
 - 29 ○ Exterior fenestrations will be extensive to the office component with minimal
 - 30 glazing in the warehouse component;
 - 31 ○ Site development work includes extensive paved area with security fencing and
 - 32 landscaping; and
 - 33 ○ Site servicing will include new sanitary system connected to an on-site sewage
 - 34 treatment and disposal system, storm drainage, domestic water connection,
 - 35 utility service hydro, TELUS and cable.
- 36 • Depreciation rates per Table 7-2 in Exhibit B-1, the Application.
- 37 • Existing Generation Facilities structures are retired in 2017 resulting in a temporary
- 38 reduction in depreciation expense which FBC stops in 2023 when the Net Book Value

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would have reached zero. Reduced annual depreciation expense from 2018-2023 is \$44 thousand;

- Land where Warehouse building is demolished will be re-purposed for grade exterior;
- Land where Generation Administration Office building is demolished will be included in security buffer;
- Gross net decreased O&M (2015\$) is \$25 thousand; and
- Incremental Property Taxes (2015\$) is \$419 thousand.

4.2 Please explain the variance between the building cost estimate in the summary of the LTA Cost Estimate on page S1 and the Building-Primary estimate in Alternative 5: New KOC on New Site table on page 3 of Appendix G-1.

Response:

This question refers to information provided in Confidential Appendices G-1 and L-1. The building primary estimate provided in Exhibit B-1-1 – Confidential Appendix G-1, Page 3, for Alternative 5: New KOC on New Site, includes all hard and soft costs for the building construction. The LTA cost estimate provided in Exhibit B-1-1 – Confidential Appendix L-1, Page S1, excludes some soft costs, which were specified on page 5 as including consulting fees and development and permit fees.

A reconciliation between the cost estimate provided by LTA Consultants and the Building Cost forecast is being filed confidentially under separate cover as it contains capital cost estimates for the KOC that must be kept confidential in order to preserve FBC's ability to negotiate with bidding parties.

4.3 In Alternative 5: New KOC on New Site table, what do "Other- Move Cost" include?

Response:

"Other - Move Cost" as noted in the table Alternative 5: New KOC on New Site includes the labour costs for the relocation of content which would include items such as filing cabinets, files,

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stationary, computers, material and equipment for all of the sites impacted by the relocation requirements of the KOC Project.

4.4 Does the Cost Summary of Major Equipment on the last page of Appendix L correspond to the Communication Structures listed in Alternative 5: New KOC on New Site table?

Response:

Yes, the Cost Summary of Major Equipment, shown on the last page of Exhibit B-1-1 – Confidential Appendix L, corresponds to the Communication Structures and Equipment listed in Exhibit B-1-1 – Confidential Appendix G-1. There is a difference in the values shown in each appendix because the cost estimate for Cost Structures and Equipment shown in Appendix G-1 was subsequently updated after the LTA Consultants report (Confidential Appendix L) was prepared for FBC. The additional costs of \$22 thousand (2015\$) were for IT requirements for other groups that were not included in the LTA Consultants report.

4.4.1 If yes, please explain the variance between the two numbers. If not, how does the Cost Summary of Major Equipment relate to the KOC cost table?

Response:

Please refer to the response to BCUC IR 1.4.4.

4.4.2 Please explain and justify the contingency in the Cost Summary of Major Equipment when another overall contingency is applied within the KOC cost table.

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1 **Response:**

2 The contingency referred to in Exhibit B-1-1 – Appendix G-1 (Line 9 and Line 11 – third row) is
3 specifically related to the building and demolition/removal costs and not to the Communication
4 Structures and Equipment (Cost Summary of Major Equipment). The Communication Structures
5 and Equipment category has its own separate contingency amount (Confidential Appendix L,
6 last page).

7

8

9

10 4.4.3 Do any other of the budget items in the KOC cost table to which the
11 overall contingency is applied also have their own contingency factors?
12 If yes, please provide a list of each of the contingency amounts.

13

14 **Response:**

15 No.

16

17

18

19 4.5 For each of the following line items in Alternative 5: New KOC on New Site table:

20

21 3 Furniture & Equipment

22 4 Tools & Heavy Work Equipment

23 5 Communications Structures & Equipment

24 6 Facilities & Project Management

25 7 CPCN Applications

26 8 Project Development

27

28 Please describe in detail what specific items the costs include and explain why
29 they are directly related to the new facility construction and should not be
30 covered under PBR formula capital or O&M. In the response describe what is
31 specifically contained in similar PBR O&M and capital categories.

32

33

34 **Response:**

35 All of the costs included in the project estimate are a direct result of and related to the KOC
36 Project and this CPCN Application. The capital expenditures are part of the major non-recurring

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- 1 types of capital which would be exempt from the PBR formula as approved by the Commission
- 2 by Orders G-139-14 and G-120-15.
- 3 Please refer to the response to BCUC IR 1.10.8 with respect to adjustment of base O&M to
- 4 account for the net incremental O&M of this Project.
- 5 The following table provides a description of each type of capital cost and how the costs are
- 6 relevant to this Project.

Project Costs	
Project Capital Expenditures	
Furniture & Equipment	The costs associated with new furniture and equipment directly related to the KOC Project. The building was designed and sized based on current space and furniture standards. Using the space and furniture standards has allowed FBC to build a smaller and more efficient building, which is more cost effective than building for the existing furniture and equipment sizes.
Tools & Heavy Work Equipment	This includes back-up power supply that is required to support critical functions and cannot be relocated from other facilities.
Communication Structures and Equipment	The Communication Structure and Equipment includes labour for de-installation and re-installation of the computer equipment to the proposed facilities. Please refer to the responses to CEC Confidential IRs 1.3.5 and 1.3.6 for information related to the communication equipment for the SCC and BCC.
Facilities and Project Management	This includes Facilities Project Management services to oversee the project to its completion.
Project Development and Approval³	
CPCN Application	These costs include third party legal services to assist with preparation of the application, IR responses and other services directly related to the regulatory review of the application, costs for advertising of the filing of the Application, Commission costs and PACA awards as approved by the Commission related to this CPCN.
Project Development	These are preliminary and investigative costs required for the development of the CPCN Project, including consulting engineering fees for schematic and design development, technical reports specific to the building condition and construction and estimation costs for proposed project and alternatives.

³ Project Development and Approval costs are captured in the CPCN Projects Preliminary Engineering deferral account approved by Order G-139-14, and are transferred to the capital project following Commission approval.

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5.0 Reference: PROJECT MANAGEMENT

Section 2.2-3, pp. 14-16

Technical Capacity

- 5.1 Please provide a list of the names of any project managers assigned to the project and the approximate dates they were assigned and left the project if applicable.

Response:

Becky Richardson was assigned as the project manager for the KOC Project in 2011 and has continued to act in this capacity.

- 5.1.1 Please provide the qualification of the current project manager including a list of relevant projects they have managed.

Response:

The assigned project manager for the proposed KOC Project is Becky Richardson. Ms. Richardson holds designations in Certified Facility Management and Telecommunication Planning and has held numerous positions within the FortisBC group of companies, most recently in a senior manager role for over eight years.

Ms. Richardson has developed and delivered four greenfield developments of combined office, warehouse and yard compound space of varying sizes over the past five years, as well as multiple building renovations. These projects include the Victoria Area Regional Operations Centre, Prince George Contact Centre, Burnaby Contact Centre, Warfield Central Warehousing and Squamish, North Vancouver and East Langley Muster replacements. Details of some of these projects are provided in Section 2.2 of the Primary Application.

- 5.1.2 Is the current project manager expected to complete the project? If not, who is expected to complete the project and when is the transition planned?

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1 **Response:**

2 Yes, Ms. Richardson is expected to complete the project.

3
4

5

6 5.1.2.1 If applicable, please provide the qualifications including
7 relevant projects of the project manager who is expected to
8 complete the project.

9

10 **Response:**

11 Please refer to the response to BCUC IR 1.5.1.2.

12
13

14

15 5.2 Who will be developing the detailed building specification and tender documents
16 to be used for tender of the fixed price building contract? Please provide their
17 qualifications including a list of relevant projects.

18

19 **Response:**

20 FBC's KOC consultant team and FBC Facilities will jointly develop the detailed building
21 specifications. FBC will incorporate the specifications within the FBC tender documents and
22 issue the tender for the fixed price building contract. Listed below are the consultants'
23 backgrounds and qualifications.

24 **Integral Group**

25 Integral Group is a global network of mechanical, electrical, plumbing and energy engineers
26 collaborating under a single green building services engineering umbrella. They specialize in
27 the design of simple, elegant, cost-effective systems for a wide variety of project types:
28 residential, mixed use, critical environments (cleanrooms, laboratories, and data centers)
29 industrial facilities, office buildings, and educational facilities, civic and commercial buildings.
30 They also provide businesses and utilities with analyses of installations that help to prioritize
31 their energy saving potential.

32

33 **Applied Science Technologist.** With over 15 years of experience in mechanical and
34 sustainable consulting engineering, he is responsible for a number of sustainable
35 buildings in the Okanagan Valley including Askews Foods in Salmon Arm, the LEED CI

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Gold certified KPMG Office Building in Kelowna and the new Landfill Administration Building for the City of Kelowna.

The Technologist graduated from Thomson Rivers University in 2000 with a diploma in Engineering, and attained LEED AP status with the U.S. Green Building Council in 2002. Born and raised in Kamloops, Jamie returned to the BC Interior to lead the Integral Design Studio in Kelowna after gaining several years of experience in Toronto and Vancouver. His design team works on a diverse range of projects including office, retail, healthcare and civic buildings in Interior and Northern British Columbia.

Professional Engineer The Engineer gained considerable experience while working in Fresno and Los Angeles as a design engineer prior to moving to Vancouver in 1976. Throughout his career, he has continued to practice the design of innovative electrical solutions for an array of building types, designing a wide variety of commercial, institutional and light industrial buildings.

The Engineer's experience with post-secondary schools includes the Applied Science Building at Simon Fraser University, as well as various buildings with the University College of Fraser Valley's Abbotsford Campus. He has also worked on the 1067 Seymour Street residential tower, Coquitlam Centre renovations, and various Expo '86 projects.

- **CTQ Consultants**

Created in 2003, the founding partners Matt Cameron and Gordon Savage combined forces to form CTQ Consultants Ltd. (CTQ), a private consulting company in BC.

CTQ's goal is to provide responsible and sustainable engineering with design and project management services in the following areas: park master planning, recreation planning, water distribution, wastewater, transportation, regional utilities, urban and regional planning, site planning and development, storm water management, land use planning, street reconstruction, official community plans and infrastructure studies.

- **Professional Engineer**

The Engineer is a senior municipal engineer with 20 years' experience. Based in the Central Okanagan for the past 10 years, Murray has successfully completed a broad range of projects for both private and public sector clients. Land development experience includes servicing and road designs for single-family residential subdivisions, multi-family developments, school sites, industrial subdivisions, and commercial projects. Murray has completed municipal design and construction projects for the City of Kelowna, District of Lake Country, and the Central Okanagan Regional District and been involved in all aspects of municipal engineering and land development including topographic survey, earthworks, sanitary sewer design and wastewater treatment storm

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water management, water system design and analysis, pump stations, roadway design, project management, and contract administration.

- **Landscaping Architect**

The Landscaping Architect has over 25 years of experience in landscape and urban design, parks planning, presentation graphics, and computer 3D modeling. Frank has extensive experience as a designer on urban design streetscapes, downtown revitalizations, waterfront walkways, commercial and institutional landscapes, waterfront parks and numerous Provincial Park projects throughout British Columbia. Design components included site and open space planning, town centre strategies, pedestrian and vehicular circulation, amenity features, hard and soft landscaping, and site component coordination.

- **CWMM Consulting Engineers**

Originally founded in 1955, CWMM Consulting Engineers Ltd. is one of BC's most prominent structural engineering firms with a total BC based staff level of approximately 40 persons, with a head office located in Vancouver, an Interior based office in Kelowna and a satellite office in Creston. The company has been actively involved in the design and construction of a large number of major building projects and commercial office building projects over many years.

- **Professional Engineer**

The Engineer will be CWMM's Principal in Charge of this project. He has over 30 years of structural design experience, and has worked with MQN Architects on many major building projects including the FBC Operations facility on Benvoulin Road in Kelowna.

- **Professional Engineer**

The Engineer will carry out peer review and is a principal in the firm's Vancouver office, and has approximately 35 years' experience, including a large number of major building projects.

- **MQN Architects**

MQN Architects is an architectural firm specializing in recreational, educational, residential, institutional, and commercial projects.

MQN is a BC architectural firm specializing in architectural design and planning, interior design, space planning and project management originally established by Robert B. McDonnell (now retired) in July 1987. The practice is now directed by two partners: Brian Quiring and Vicki Topping.

Architect After graduating in 1992 with a Master of Architecture and a Bachelor of Environmental Studies, the Architect worked with a number of firms before launching his own company in 1998. The Architect has experience in a variety of sectors such as

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recreation, commercial, industrial, multi-family residential, educational and religious design and master planning.

- **SSDG Interiors Inc.**

SSDG Interiors has provided interior design consulting services in Vancouver since 1979. SSDG employs 22 people; the three partners Keath Seeton, Gerry Shinkewski and Susan Steeves, along with ten of the firm's designers, are registered Interior Designers members of the Interior Design Institute of BC and members of the Interior Designers of Canada. Over half of the firm's designers are LEED accredited professionals.

- **Interior Designer**

The Interior Designers holistic approach to design is the product of a multidisciplinary education including a Bachelor of Interior Design from the University of Manitoba and further education in architecture, communication design and fine arts. Joanne has experience in corporate, hospitality and institutional projects.

5.2.1 What review of the detailed building specification and the tender documents is planned?

Response:

Consistent with FBC Facilities practice to review construction drawings and building specifications for building projects at percent completion intervals, the proposed KOC Project has scheduled reviews at 65, 80, 90 and 100 percent completion. Review of the construction drawings and building specifications will be completed by the KOC Project Manager, consultant team, Facilities Maintenance Manager, Facilities Coordinator Leads and FBC Legal Counsel. In addition, MQN Architects have an internal quality control process which will be used to review the building specification details for accuracy and consistency.

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1 **6.0 Reference: PROJECT DESCRIPTION**

2 **Exhibit B-1, Section 6.2.1, p. 65**

3 **Connection of KOC to FBC Fibre Optic Network**

4 On page 65 of the Application, FBC states that the KOC site is located adjacent to its
5 fibre optic network, and that the network can be cost-effectively extended to the KOC.

6 6.1 What is the estimated cost of the fibre optic connection to KOC?

7

8 **Response:**

9 The cost of the fibre optic connection to the KOC is estimated to be less than \$100,000. This is
10 a necessary Project cost as it is required to interconnect the KOC with the existing FBC
11 communications network and would not be incurred if the KOC Project did not proceed.

12

13

14

15 6.2 Please confirm that the cost of the fibre optic connection is included in the cost
16 estimate for the KOC, or explain otherwise.

17

18 **Response:**

19 Please refer to the response to BCUC IR 1.6.1.

20

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D. JUSTIFICATION FOR KOOTENAY STATIONS SERVICES MOVE

7.0 Reference: PROJECT JUSTIFICATION

Exhibit B-1; Section 5.2.5; Appendix F

Business Case for Relocation of Kootenay Station Services Group

FBC describes the function of the Kootenay Station Services group⁴ and identifies certain inefficiencies related to the location of this group at Warfield.⁵ FBC identifies annual savings of \$200,000 per year related to reduced travel time and other efficiencies in Section 5.2.5 of the Application.

7.1 Please list in detail the items, quantity and rates that make up the annual savings of \$200,000 per year.

Response:

The annual savings identified in Table 5.2 of Section 5.2.5 of the Application include the following detail:

Travel Time Savings C&M \$144,000

The average number of hours worked in one year by the C&M crews (Kootenay Station Services Group) in substations is 11,520 hours. By moving to a “substation central” location in Castlegar, the FBC Kootenay Station Services Group will be closer to their substation work, which translates to an average yearly savings of \$144,000. The \$144,000 savings is calculated based on the following assumptions:

- 11,520 hours substation work annually
- Time spent in 1 event is 1 day
- 11,520/7.5 hours in a day = 1,536 events
- 1,536 events x 1 hour travel time (half hour each way from Warfield) x \$94 per hour (technician’s time plus vehicle cost)

Premium Savings on Call-Out Staff \$11,000

Generation and Station Services personnel operate a wide range of equipment and systems on Transmission, Distribution, and Generation plants. Currently three employees are on call to provide after hour and weekend support for all Generation plants and one employee for the Kootenay substations. These on call personnel share some similarities, but many have specific skills, knowledge, and experience required for their own equipment and systems. Upon

⁴ Exhibit B-1, Section 3.2.2.3, pp. 25-6

⁵ Ibid; Section 4.5, p. 41

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completion of the proposed KOC project, the electrical workers will gain familiarity with both station and generation systems. FBC anticipates that, over time, employees will become able to work on call for both station and generation plant, improving staffing flexibility and providing efficiencies at certain times throughout the year. These staffing efficiencies are estimated at \$11,000.

Tool Crib Savings \$10,000

Combining specific Station Services and Generation tools and test equipment within a centralized tool crib will create an overall reduction in inventory, tool maintenance, and test equipment calibration requirements. The \$10,000 savings assumes a total of 10 reduced calibration or maintenance events at \$1000 per event.

Fleet Vehicle Savings \$25,000

With the groups coming together at the centralized KOC, there is an opportunity to reduce the number of pool vehicles used, resulting in a \$25,000 annual savings.

Warfield Janitorial Savings \$10,000

As a result of the relocation of Warfield Complex personnel, janitorial services to the site will be reduced in footprint and duration, resulting in an estimated savings of approximately \$10,000.

7.1.1 Will any employee position be eliminated or hours reduced as a result of the Kootenay Station Services Group move? If not, please describe how any savings to ratepayers resulting from reduced travel time will be brought about.

Response:

FBC anticipates an O&M reduction of the equivalent of the hours associated with one full time position in the Station Services Group as a result of the central location of the proposed KOC and resulting reduced travel time for the Kootenay Stations Services group. FBC plans to reallocate employee hours to complete a larger portion of capital work internally.

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7.2 Please explain the role of the tradesperson who is on standby call for the Kootenay Station Services Group each day, and discuss how this role and function will be impacted by the move to KOC.

Response

Kootenay Station Services group employees are on call during weekly off shift hours, weekends, and statutory holidays. The employees are dispatched from home with their on call vehicle and travel directly to the location of the Electrical Facility requiring an on-site response. The Kootenay Station Services Group is a multi-disciplinary team including Communication and Protection Control Technologists, Equipment Electricians, and Meter Technicians who would respond to operating and trouble calls on the system. FBC anticipates the relocation to the KOC will reduce the number of similarly skilled Generation and Station Services disciplines currently on call today. It is not possible to fully reduce the overlap between the departments because each department has their own distinct skillset and specialized equipment or systems required for response to trouble calls. Please also refer to the response to BCUC IR 1.7.1.

7.3 Explain any material changes in the Station Services Group space allocations between their Warfield and KOC locations.

Response:

There is no material difference between the Station Service group office space allocation at Warfield or the office space allocation at the KOC. However, the 2,000 sq. ft. transformer and regulator pit located at the Warfield Complex will not be duplicated at the KOC as this pit is used infrequently by only two FBC employees. FBC believes this reduction is appropriate because the pit is costly to duplicate, will only be required intermittently and is available for use when required at the Warfield Complex.

7.4 Please provide an estimate of total costs related to moving this group to KOC, including the capital cost of providing the office and other space the group required and costs related to carrying out the relocation. Please identify significant assumptions used in the analysis.

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1 **Response:**

2 Please refer to response to BCUC Confidential IR 1.1.1.

3
4

5

6 7.5 Please provide a detailed analysis as a sixth alternative of not moving the
7 Kootenay Station Services Group to the KOC. Please show annual charges
8 related to capital costs, O&M expenses and savings, net of cost recoveries from
9 other parties.

10

11 **Response:**

12 The four tables below provide a comparison of Alternative 6 as described in the question to
13 Alternative 5 as presented in the Application. Generally, the reduction of capital cost associated
14 with Alternative 6 is offset by the increase in O&M. As compared to Alternative 5, the forecast
15 percent rate impact remains the same; however, Alternative 6 results in a greater present value
16 of cost of service by approximately \$1.6 million. Thus, FBC customers would be marginally
17 better off for the Kootenay Station Services Group to be included in the new KOC.

18 The Kootenay Station Services and Warfield groups have always operated independently, and
19 for this reason it is difficult to quantify all of the opportunities for coordination and resource
20 sharing. Although they may not be quantifiable, the Company believes it will realize benefits by
21 bringing the Generation and Station Services groups together through:

- 22 • Enhanced communication, information sharing and situational awareness;
- 23 • Enhanced management consistency, more frequent interactions with management, and
- 24 enhanced staffing oversight and support; and
- 25 • Enhanced opportunities for training, coaching and mentoring.

26 Tables 5-1, 5-2, 5-5 and 5-6 from the Application are modified below to show the original
27 numbers for Alternative 5 and then to show the values for Alternative 6 which excludes
28 Kootenay Station Services Group from the new KOC (i.e. Alternative 5 without Kootenay Station
29 Services).

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Table 5-1: KOC Operating Costs for Alternatives 5 and 6

Item Description	2015 Estimated Annual O&M Cost and Savings (\$000's)		
	Alternative 5	Alternative 6	Change
KOC Operating Costs	\$295	\$281	\$(14)
Net Generation Recoveries	(150)	(150)	--
Increased Generation Travel	30	30	--
Total	\$175	\$161	\$(14)

Table 5-2: Kootenay Station Services Gross O&M Savings for Alternatives 5 and 6

Item Description	2015 Estimated Annual O&M Savings (\$000's)		
	Alternative 5	Alternative 6	Change
Travel Time C&M	\$144	\$0	\$(144)
Premium Savings on Call Out Staff	11	0	(11)
Tool Crib Savings	10	0	(10)
Fleet Vehicle Savings	25	0	(25)
Warfield Janitorial Cleaning Reduction	10	7	(3)
Total	\$200	7	\$(193)

Table 5-5: Summary of Capital Costs of Alternatives (\$millions) for Alternatives 5 and 6

	Alternative 5	Alternative 6	Change
2015\$	\$18.896	\$17.312	\$(1.584)
As-Spent	\$19.077	\$17.413	\$(1.664)
AFUDC	1.128	1.078	(0.050)
Demolition / Removal	0.446	0.446	0
Total	\$20.651	\$18.937	\$(1.714)

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Table 5-6: Summary of Financial Analysis of Alternatives 5 and 6 (\$million unless otherwise stated)

	Alternative 5	Alternative 6	Change
As-Spent Capital Costs	\$20.651	\$18.937	\$(1.714)
2018 Rate Base	\$20.459	\$18.782	\$(1.677)
Incremental Property Taxes – 2015\$	\$0.419	\$0.391	\$(0.028)
Gross Incremental O&M Expense – 2015\$	\$(0.025)	\$0.154	\$0.179
PV of Incremental Revenue Requirement	\$33.912	\$35.511	\$1.599
DCF – NPV	\$(0.060)	\$(0.099)	\$(0.039)
2018 Rate Increase (%)	0.7%	0.7%	0.0%

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E. JUSTIFICATION FOR NOT INCLUDING CASTLEGAR DISTRICT OFFICE

8.0 Reference: PROJECT JUSTIFICATION

Exhibit B-1, Section 3.2.4, p. 27; Section 4.6, p. 41; Section 5.1, pp. 46-7; Appendix C

Business Case for not Relocating the Castlegar District Office

On page 27 of the Application FBC states that the Application affects the Castlegar District Office only with respect to the yard space limitations, and at page 44 states that its long term plan is to operate the Castlegar District Office to its end-of-life, after which the KOC site can be considered to accommodate its functions.

The Facility Life-Cycle Report for the Castlegar District Office dated 2 April 2012 by Iredale Group Architecture in Appendix C recommends that the building be replaced in the next 3 to 5 years.

In Section 5.1 of the Application, FBC discusses its selection criteria for considering alternatives for the Project.

8.1 Please describe in detail how FBC plans to accommodate the functions and staff from Castlegar District Office when that building reaches end-of-life.

Response:

FBC has delayed the replacement of the Castlegar District Office to limit the incremental cost of service associated with the Project and to allow time to evaluate the opportunities for consolidating Network Services with the staff at the Castlegar District Office, while continuing to provide safe and reliable service by addressing the more immediate requirements of the region through the KOC Project. FBC, in consultation with Iredale Group Architecture, believes it can extend the life of the Castlegar District Office up to an additional five years to beyond 2020.

The Castlegar District Office is not included as part of the Application and FBC will assess alternatives to accommodate the functions and staff from the Castlegar District Office at a later date. However, based on asset life extension of the Castlegar District Office to beyond 2020, the KOC could provide a viable alternative for future Castlegar District Office requirements. A future addition to the south west corner of the proposed KOC building for office space and truck bays would accommodate the functions and staff of the Castlegar District Office. Interior material storage would be assumed within the proposed KOC material storage. Additional exterior foundation and racking would be added to support the additional yard material such as transformers and wire required for the Network Services Group.

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8.1.1 Does FBC plan on submitting a CPCN? If yes, when?

Response:

FBC contemplates that any future requirements for the Castlegar District Office will be addressed outside of the current PBR term. At this time, the Company does not expect the scope or cost would meet the criteria or threshold requirements of a CPCN. As such, FBC would identify this as a future project within the General Plant section of a future Capital Expenditure Plan.

8.1.2 If FBC has not yet determined how it will deal with the situation at end-of-life of that building, please discuss how this is consistent with its strategic approach to pursue a single, integrated solution to resolve the issues at all the facilities identified in the Application.

Response:

Please refer to the response to BCUC IR 1.8.1.

8.2 Considering the recommendation in the Facility Life-Cycle Report, please discuss when FBC currently anticipates that the Castlegar District Office will reach end-of-life and the analysis that supports this view.

Response:

The Company, in consultation with Iredale Architecture Group, identified opportunities to extend the life of the building beyond 2020 through prioritized remedial actions.

FBC experienced failures of the Castlegar District Office pavement and the HVAC in 2014 and has actioned these items. The additional remedial requirements are estimated to cost approximately \$30,000 in O&M and are expected to be completed by the end of 2016.

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8.3 Please discuss what FBC means by the statement that the KOC site can be considered to accommodate functions of the Castlegar District Office.

Response:

Please refer to the response to BCUC IR 1.8.1.

8.3.1 To what extent does the design of KOC include office or other space, or other provisions, which are specifically to accommodate staff and functions from the Castlegar District Office?

Response:

The KOC Project does not include a growth allowance in office space to accommodate the staff from the Castlegar District Office. However, as noted in the response to BCUC IR 1.3.3, the KOC building design ensures all infrastructure and building code requirements can accommodate a potential building expansion to avoid any redesign of systems.

Additionally, the KOC provides a permanent pole and pole trailer storage solution in close proximity to the Castlegar District Office.

8.3.2 Please discuss the extent to which the KOC facility will initially have relatively unused space that could accommodate additional functions and staff.

Response:

Given the preamble, FBC understands this question is asked in the context of the Castlegar District Office, and has responded accordingly to this series of questions.

As noted in the responses to BCUC IRs 1.8.3.1 and 1.3.3, the KOC Project does not include a growth allowance in office space to accommodate the staff from the Castlegar District Office. However, the KOC building design ensures all infrastructure and building code requirements can accommodate a potential building expansion to avoid any redesign of systems.

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The KOC 10 acre site will be fully utilized upon completion of the proposed KOC Project. The potential future addition for the Castlegar District Office would require relocation of 14 fleet parking stalls and the addition of 10 staff parking stalls. These changes would be achieved by removal of landscaping to accommodate the addition of staff parking. Additionally, vertical storage racking would be added to maximize usage of the available laydown area space.

Please also refer to the response to BCUC IR 1.8.1.

8.3.3 Please discuss the extent to which the KOC building has been designed to facilitate expansion to accommodate additional functions and staff.

Response:

FBC and its consultants reviewed the impact of a future addition to the proposed KOC building to better understand the building code, infrastructure and base building implications. As a result of the review, FBC revised the design to include an addition of one toilet for each gender to ensure FBC would be able to meet future occupancy loads. By doing so, at a very minimal cost impact to the overall KOC Project budget, future capital costs to accommodate an expansion would be minimized as major infrastructure modifications or renovation of base building requirements can be costly.

8.3.4 Please discuss the feasibility, including the cost on a square foot basis, of adding a full or partial second story during initial construction of the KOC building in order to accommodate additional functions and staff.

Response:

FBC evaluated the costs of a future addition of a second story onto the proposed KOC as part of the Project analysis. As the evaluation assumed the second story would be constructed following the original build, the estimate was broken into two cost components:

1. Additional costs during the initial build to minimize infrastructure changes required for implementation of a second floor addition. These costs equate to an increase of approximately \$17.65 per sq. ft. The assumptions for this estimate are:

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- Cost for increased foundations bearing for the second floor (perimeter foundations and pad footings);
- Elevator pad footing and shaft;
- Metal decking;
- Additional structural steel requirements for an upper floor structure rather than a roof;
- Concrete topping;
- Mechanical allowance;
- Electrical allowance; and
- Excludes design fees, additional permit costs, soft costs, contingencies, escalations and increase to gross floor area of the building to accommodate the increased spaces (i.e. room for the elevator and stairs within the building footprint).

2. Cost to build out the second story is estimated to be approximately \$275 per sq. ft. and assumes:

- Upper floor costs at \$250 sq. ft.;
- Addition of an elevator car;
- Addition of two flights of stairs; and
- Excludes design fees, additional permit costs, soft costs, contingencies and escalations.

FBC did not include these costs or requirements within the proposed KOC Project estimate as any potential future Castlegar District Office space requirement for an office area are not large enough to warrant the square footage a second floor would provide along with the associated initial build out costs of approximately \$500,000.

8.4 Please provide the number of Castlegar District Office staff that FBC proposes to move to KOC when that facility goes into operation.

Response:

This Application only accounts for the Castlegar District Office with respect to the yard space limitations and does not include the Castlegar District Office replacement or relocation of staff to the KOC. Please refer to the response to BCUC IR 1.8.1 regarding FBC's plans to assess

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alternatives to accommodate the functions and staff from the Castlegar District Office at a later date.

8.5 Please provide the incremental gross amount of office space, warehouse space, shop space and any other space requirements that would be required at KOC to accommodate the staff and functions that FBC proposes to leave at Castlegar District Office.

Response:

Please refer to the responses to BCUC IR 1.8.1 regarding FBC's plans to assess alternatives to accommodate the functions and staff from the Castlegar District Office at a later date. FBC has not fully evaluated the scope of this future project and the requirements cannot be confirmed at this time. However, assuming similar facility requirements, the gross square footage required for replacement of the Castlegar District Office is estimated to be:

- Office: approximately 1,100 sq. ft.; and
- Shop: approximately 4,000 sq. ft.

8.6 Please provide an estimate of costs related to moving the residual staff and functions that FBC proposes to leave at Castlegar District Office to KOC, including the capital cost of providing the office and other space the group requires and costs related to carrying out the relocation. Please identify significant assumptions used in the analysis.

Response:

Please refer to the response to BCUC IR 1.8.7.

8.7 Compared to the situation of operating Castlegar District Office to end-of-life, please provide a detailed business case from the perspective of FBC ratepayers for immediately moving the functions and staff that FBC proposes to leave at

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Castlegar District Office to KOC, by year for at least 20 years after KOC is in operation and shows the annual charges related to capital costs and O&M expenses and savings for each of the two cases.

Response:

The following tables represent Tables 5-1, 5-5 and 5-6 of the Application updated to show a comparison between the operating costs, capital costs and financial analysis for constructing the KOC Project inclusive of the Castlegar District Office (CDO) requirements and the CDO requirements addressed in 2020 (2021 Rate Base) over an analysis period of 50 years.

As shown in Table 5-6 below, the forecast percent impact to customers is the same in all cases at 0.7% and the present value of the incremental revenue requirement of delaying CDO relocation to the KOC beyond 2020 is slightly higher than incorporating the scope into the KOC Project now. However, a delay in the CDO relocation allows time to evaluate opportunities for consolidating the Network Services group while addressing the immediate requirements of the region through the KOC Project. Furthermore, the addition of the CDO into the KOC scope would increase the risk of delay to the proposed schedule in-service date from 2017 to 2018.⁶

Assumptions for this analysis are as follows:

- Capital Cost Additions for including CDO:
 - The capital cost of adding the CDO in 2015\$ is \$2.0 million (cost estimate does not meet AACE Class 3 definition);
 - If the CDO is included with the timing of the KOC in-service date of November, 2017 the As-spent capital cost would be \$2.1 million; and
 - If the CDO is delayed to December, 2020 the As-spent capital cost would be \$2.3 million.
- Operating Cost Impacts for including CDO in KOC:
 - The change in property taxes in 2015\$ from Alternative 5 would be an increase of \$24 thousand; and
 - The change in the O&M expense in 2015\$ from Alternative 5 would be a reduction of \$54 thousand.

Table 5-1: KOC Operating Costs plus Changes for CDO

Item Description	2015 Estimated Annual O&M Cost and Savings \$(000's)
KOC Operating Costs	\$295
Net Generation Recoveries	(150)

⁶ Assets will be included in rate base January 1 of the year following the in-service date.

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Inreased Generation Travel	30
Total	175
Additional KOC Operating Costs from CDO	14
Avoided CDO Costs	(68)
Total with Castlegar District Office Impact	\$121

Table 5-5: Summary of Capital Costs of Alternative 5 + Change for CDO (\$ millions)

	Alternative 5	Alternative 5 + CDO in 2017	Alternative 5 + CDO in 2021
2015\$	\$18.896	\$20.888	\$20.888
As-Spent	\$19.077	\$21.143	\$21.369
AFUDC	1.128	1.242	1.186
Demolition / Removal	0.446	0.446	0.446
Total	\$20.651	\$22.831	\$23.001

Table 5-6: Summary of Financial Analysis of Alternative 5 + Change for CDO (\$ millions unless otherwise stated)

	Alternative 5	Alternative 5 + CDO in 2017	Alternative 5 + CDO in 2021
As-Spent Capital Costs	\$20.651	\$22.831	\$23.001
2018 / 2021 Rate Base	2018: \$20.459	2018: \$22.291 2019: \$20.808	2018: \$20.461 2021: \$21.337
Incremental Property Taxes – 2015\$	\$0.419	\$0.443	\$0.443
Gross Incremental O&M Expense – 2015\$	\$(0.025)	\$(0.080)	\$(0.080)
PV of Incremental Revenue Requirement	\$33.912	\$34.987	\$35.121
DCF – NPV	\$(0.060)	\$(0.074)	\$(0.020)
2018 / 2021 Rate Increase	2018: 0.7%	2018: 0.7% 2021: 0.7%	2018: 0.7% 2021: 0.7%

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F. JUSTIFICATION FOR FULLY FUNCTIONAL BCC

See CONFIDENTIAL INFORMATION REQUEST NO. 1

G. BUILDING DEPRECIATION AND COMPOSITE DEPRECIATION

9.0 Reference: DEPRECIATION

Section 7, Appendix G, pp. 78-83

Depreciation Rates

Section 56.2 of the *Utilities Commission Act* states:

...The commission must determine and, by order after a hearing, set proper and adequate rates of depreciation.

Appendix J – 2011 Depreciation Study on page 44 of FBC's 2012/2013 RRA and ISP Review Evidentiary Update shows a depreciation rate of 6.24% for masonry structures.⁷ FBC submits that for General Plant Buildings, FBC currently has a depreciation rate of 6.1% approved by the BCUC for Masonry Structures (Account 390.1).⁸

9.1 Please clarify why a 6.1% depreciation rate is being used by FBC instead of 6.24%. Please explain all impacts to ratepayers of this difference in depreciation rates.

Response:

FBC is using the rate of 6.24% for Masonry and the rate of 6.02% for Operations Buildings, which results in a blended rate of 6.11%. The use of a blended rate of 6.1% for Structures versus using 6.24% and 6.02%, for Accounts 390.10 (Masonry Structures) and 390.20 (Operations Buildings) respectively, has no impact to customers.

On page 80 of the Application, FBC states that based on conversations with LTA Consultants Inc. Quantity Surveyor and Gannett Fleming Inc. concrete structures generally have an expected life of 75 to 80 years and components of the building, such as mechanical and lighting, have a shorter expected life of approximately 25 years. The

⁷ FBC 2012/2013 RRA and ISP Review, Exhibit B-1, p.602

⁸ Exhibit B-1, Section 7.3.2, p.80

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1 rate of 1.9%, that FBC is seeking Commission approval for is a composite rate for the
2 new building that is based on the building components that are expected to last
3 approximately either 25 or 75 years.⁹

4 9.2 As part of the FBC Annual Review of the 2016 Rates Application, please confirm
5 if FBC will file a depreciation study. If not, why not?
6

7 **Response:**

8 Confirmed. FBC has filed a depreciation study as part of its Annual Review for 2016 Rates.
9
10

11
12 9.2.1 If yes, please confirm if the depreciation study will provide support for
13 the use of the requested 1.9% composite depreciation rate for masonry
14 structures (Account 390.1). If not confirmed, please explain otherwise.
15

16 **Response:**

17 Not confirmed. The depreciation study filed with the 2015 Annual Review for 2016 Rates did
18 not take into consideration the future addition of the KOC that is being applied for in this CPCN.
19 The composite rate in the filed depreciation study is for existing assets in Account 390.1 and
20 Account 390.2 and the estimated composite remaining life of those assets.

21 Depreciation studies are conducted approximately every 5 years and are based primarily on
22 statistical analysis of historical data, which, in the case of the 2015 Depreciation Study, included
23 plant in service as at December 31, 2014. The next depreciation study is scheduled to be
24 undertaken 1-2 years after the Kootenay Operations Centre is in service, at which time a new
25 composite rate for all assets, including KOC, would be calculated.
26
27

28
29 9.2.2 If available, please provide the depreciation study.
30

31 **Response:**

32 The requested depreciation study filed by FBC in its 2015 Annual Review for 2016 Rates is
33 provided in Attachment 9.2.2.

⁹ Ibid, Section 7.3.2, p.80

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9.2.3 Did FBC consider requesting approval for the 1.9% depreciation rate for masonry structures as part of the FBC Annual Review of the 2016 Rates Application? If not, why not? If yes, why did FBC decide to request approval as part of this Application instead?

Response:

FBC has not applied for a depreciation rate of 1.9% for all masonry structures but applied for a rate of 1.9% to apply to the new Kootenay Operations Centre building. Further, FBC did not consider requesting approval for this rate as part of the Annual Review for 2016 Rates because depreciation associated with the KOC project is not expected to commence until January 1, 2018. Although the Annual Review for 2016 Rates includes an updated depreciation study and proposes changes to depreciation rates, this study is not reflective of forecast assets, as described in the response to BCUC IR 1.9.2.1.

Subsequent to the CPCN filing, FBC received an opinion from Gannet Fleming, included as Attachment 9.2.3(a), which estimates the average expected life of the KOC building to be 40 years. This average expected life would result in a depreciation rate of 2.5%. Further, based on the depreciation study included in the Annual Review for 2016 Rates, FBC has proposed changes to the depreciation rates applicable to Accounts 390.10 and 390.20 such that the weighted average depreciation rate in 2016 for Structures would be 2.77%.

Thus, in light of the opinion from Gannet Fleming and updated depreciation study, FBC believes that the proposed revisions to the average expected service life and depreciation rates for Accounts 390.10 and 390.20 indicate that it will be appropriate to include the KOC building in these asset pools. As noted in the response to BCUC IR 1.9.2.1, the next depreciation study will occur shortly after the KOC building is in rate base. When the KOC building is included with the existing assets in these classes, the composite remaining life estimate will be different and, consequently, a revised depreciation rate will be proposed at the time the next depreciation study is performed. Based on the 2015 Depreciation Study estimates and the proposed life estimates for the KOC, the change in the composite depreciation rate for these classes is not likely to be significant.

Thus, FBC believes that it is no longer appropriate to request approval for a depreciation rate of 1.9% specific to KOC. Please refer to Attachment 9.2.3(b) for a revised black-lined version of the Draft Order (Exhibit B-1 – Application, Appendix O-2) which removes the Company's request for approval of a depreciation rate of 1.9%.

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When adjusting the KOC financial model to use a 2.5% depreciation rate for a 40 year period, Alternative 5 is still the Preferred Alternative with the lowest average rate increase of the three alternatives, remaining unchanged at 0.7%; however, the PV of the incremental Cost of Service for 40 years decreases from \$33.9 million to \$33.0 million over 50 years.

9.3 Please provide examples of other masonry structure assets using a depreciation rate the same or similar to 1.9%, and the actual useful lives of any such assets. In your response, please identify which FBC site location such assets belong to.

Response:

Please refer to the response to BCUC IR 1.9.2.3. FBC is no longer requesting approval of a depreciation rate of 1.9%. Further, FBC does not have other masonry structure assets using a depreciation rate at or similar to 1.9%.

9.4 Please explain all impacts to ratepayers that would result if the depreciation rate is changed from 6.1% to 1.9%.

Response:

Please refer to the response to BCUC IR 1.9.2.3, which clarifies that FBC was not seeking approval to change the blended depreciation rate for all structures from 6.1% to 1.9%, but was seeking approval of a rate of 1.9% to apply only to the KOC building. Thus, the impact to customers of changing the existing blended rate of 6.1% for structures to 1.9% is not applicable.

9.4.1 If the 6.1% depreciation rate was used instead, would this change the analysis of project alternatives? If not, why not? If yes, please explain the changes and the impact to ratepayers.

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1 **Response:**

2 Changing the depreciation rate to 6.1% would change the analysis of the project alternatives;
3 however, it does not change the relative ranking of the alternatives. That is, Alternative 5
4 remains the lowest cost and lowest percentage rate impact option at \$36.1 million and 1.0%,
5 respectively, as compared to \$43.1 million and 1.2%, respectively, for Alternative 2 and \$49.8
6 million and 1.3%, respectively, for Alternative 3.

7 Please also refer to the response to BCUC IR 1.9.7.3.

8
9

10

11 9.5 Does FBC currently have any masonry structure assets in Account 390.1? If yes,
12 please provide details and amounts, as well as indicate which, if any, of these
13 assets are discussed in this Application?

14

15 **Response:**

16 Yes, FBC has masonry structure assets in Account 390.1. Since Gannett Fleming has
17 recommended that the KOC be included in Asset Class 390.2, as related to their Depreciation
18 Study, FBC is also providing the list of assets and book value for Account 390.2. Please refer to
19 the tables below which provide a listing of all assets and their net book value in Accounts 390.1
20 and 390.2 as at December 31, 2014. Assets that are discussed in this Application are the
21 Generation Administration Office and Warehouse at the South Slocan Generation Site, Warfield
22 Complex, Trail Office Building and the Castlegar District Office.

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Balance at December 31, 2014
Account 390.1 Structures - Masonry

Name	Gross Book Value	Accumulated Depreciation	Net Book Value
(\$000s)			
WELDING SHOP	93	(36)	57
PENTICTON COMMERCIAL OFFICE & WAREHOUSE	458	(265)	194
GARAGE, LOWER BONNINGTON	24	(15)	9
GREENWOOD OFFICE & SHOP	85	(40)	45
WATER LINES, LOWER BONNINGTON	11	(9)	2
SALMO SHOP	98	(68)	31
OFFICE, CRESTON	1,005	(525)	479
OLIVER DISTRICT OFFICE	930	(207)	723
WAREHOUSE - STEEL STORAGE, KELOWNA	191	(108)	83
KEREMEOS SHOP	135	(60)	75
OFFICE & WAREHOUSE, CASTLEGAR	535	(222)	312
OFFICE, GRAND FORKS	729	(356)	373
OFFICE, SOUTH SLOCAN	985	(215)	770
PROPANE STATION, KELOWNA	2	(1)	1
PROPANE STATION, SOUTH SLOCAN	48	(27)	21
OFFICE & WAREHOUSE, KASLO	209	(115)	94
OIL STORAGE	77	(47)	30
PGO OFFICE, SOUTH SLOCAN	530	(298)	232
OFFICE/WAREHOUSE, OLIVER	758	(437)	321
WARFIELD SCADA CONTROL	485	(228)	256
GARAGE EXTENSION, SOUTH SLOCAN	349	(204)	145
OFFICE RENOVATION, CASTLEGAR	333	(194)	139
COVERED PARKING, SOUTH SLOCAN	46	(28)	18
SOUTH SLOCAN RESIDENCES	140	(72)	68
GARAGE EXTENSION - TRAIL	102	(50)	52
PGO WAREHOUSE	49	(21)	27
WASTE STORAGE FACILITIES	293	(159)	134
PGO SHOPS	93	(42)	52
TRAIL OFFICE HVAC CONTROL SYSTEM	68	(30)	38
GREENWOOD OFFICE RENOVATION	5	(2)	3
BUILDING RECONCILING ITEM	233	(99)	134
SECURITY CAMERA - WARFIELD GARAGE	10	(5)	5
WARFIELD MAIN BUILDING	2,477	(166)	2,311
WARFIELD FLEET BUILDING	54	(21)	33
WARFIELD QUANSET HUT	406	(79)	327
PLP BUILDINGS	903	(557)	345
MOBILE OIL STORAGE UNIT - SOUTH SLOCAN	38	(7)	31
TRAIL OFFICE BUILDING	10,662	(1,315)	9,347
CAP OH ALLOCATIONS	78	0	78
RETIREMENT ASSET	-	563	563
Total	23,725	(5,768)	17,957

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1

Balance at December 31, 2014
Account 390.2 Operations Buildings

Name	Gross Book Value	Accumulated Depreciation	Net Book Value
(\$000s)			
KELOWNA BENVOLIN OFFICE & WAREHOUSE	5,906	(1,859)	4,046
DIVISION/DISTRICT COMPLEX, TRAIL	2,687	(1,748)	939
WARFIELD OFFICE & STORAGE	7,442	(2,273)	5,169
SALVAGE	-	232	232
Total	16,035	(5,648)	10,387

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9.5.1 If yes, and if the 1.9% depreciation rate is approved, does FBC plan to depreciate the existing assets at this new rate? If not, why not? If yes, please explain why the new rate should be applied to the existing assets.

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11 **Response:**

12 Please refer to the response to BCUC IR 1.9.2.3.

13

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9.6 What would be the impact, if any, if the Commission defers a decision on the requested depreciation rate to the next annual rates review?

17

18

19 **Response:**

20 Please refer to the response to BCUC IR 1.9.2.3. FBC is no longer requesting approval for a
21 depreciation rate of 1.9% in this CPCN Application and as such, the depreciation rates
22 applicable to assets associated with this Project will be reviewed as part of a future Annual
23 Review. FBC has accordingly amended the Draft Order.

24

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Further, depreciation associated with Project capital expenditures is expected to commence effective January 1, 2018. From now until the end of 2017, there would be no impact to FBC's revenue requirements.

FBC states that it evaluated the incremental cost of service, cash flow and rate impacts associated with the Project over a 50 year period plus two preceding years during the planning and construction phase. The 50 year period was chosen to allow for an appropriate period of time to compare the revenue requirement impacts from the various long term capital investment alternatives as discussed in Section 5.¹⁰

9.7 If the 6.1% depreciation rate was used instead, would this change the 50 year period used for analysis of project alternatives? If not, why not? If yes, please elaborate and explain the changes and the impact to ratepayers.

Response:

No. The analysis period for evaluating project alternatives should be based on a reasonable period that generally captures the expected life of the assets and the period over which customers will be impacted. Because the KOC Project alternatives consider long term investments that are expected to last 40-50 years, it would not be appropriate to shorten the analysis period to approximately 16 years, as it would not then be an accurate reflection of the expected impact to customers.

9.7.1 If yes, would this result in FBC proposing a different project alternative? If not, why not?

Response:

Please refer to the response to BCUC IR 1.9.7. Further, please refer to the response to BCUC IR 1.9.4.1, which discusses the impact of adjusting the depreciation rate to 6.1% on the various alternatives.

¹⁰ Exhibit B-1, Section 7.4, p. 82

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9.7.2 If yes, would this result in FBC using a different period of time in its analysis of project alternatives? If not, why not?

Response:

Please refer to the response to BCUC IR 1.9.7.

9.7.3 Using the assumption of a 6.1% depreciation rate for masonry structures, please provide a table to show a summary of financial analysis of alternatives similar to that shown in Table 5-6 on page 62 of the Application.

Response:

Please see the table below.

Table 5-6 Summary of Financial Analysis of Alternatives using a Depreciation Rate of 6.1% (\$ millions of dollars unless otherwise stated)

	Alternative 2	Alternative 3	Alternative 5
As-Spent Capital Costs	\$24.628	\$30.019	\$20.651
2018 / 2019 Rate Base	2019: 22.877	2019: \$29.013	2018: \$20.105
Incremental Property Taxes – 2015\$	\$0.290	\$0.310	\$0.419
Incremental O&M Expense – 2015\$	\$0.151	\$0.137	\$(0.025)
PV of Incremental Revenue Requirement	\$43.131	\$49.781	\$36.056
DCF – NPV	\$0.863	\$0.345	\$0.168
2018 / 2019 Rate Increase (%)	1.2%	1.3%	1.0%

9.8 If the 6.1% depreciation rate was used instead, explain how this would change the numerical analysis of the alternatives. Provide an excel file in the same format as that shown in Appendix G-2-5 of the Application to show these changes, and explain the impact to ratepayers.

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Response:

Please refer to the response to BCUC IR 1.9.4.1 for a summary of the impact on the alternatives of using a depreciation rate of 6.1%.

There is no Appendix G-2-5 of the Application; FBC is assuming what was intended is an Excel file in the same format as shown in Appendix G-2-3 for Alternative 5. A higher cost of service results when a depreciation rate of 6.1% is used rather than a rate of 1.9% because the increase in depreciation expense and income tax expense is greater than the decrease in earned return. This net increase in the cost of service does not have a significant impact on the percentage rate increase, shifting the rate impact to 1.0% from 0.7%.

The Excel file is being provided in Confidential Attachment 9.8, and is being filed confidentially as it contains capital cost estimates for the KOC that must be kept confidential in order to preserve FBC's ability to negotiate with bidding parties.

Table 7-2 on page 81 of the Application shows the composite average life as 53 years. The ratepayers' base changes over time and thus when setting the depreciation schedule one important consideration is that the cost recovery is fairly distributed over time.

9.9 What impact would it have on FBC and the ratepayers from different times if the actual useful life of the masonry structure assets was either shorter or longer than the composite average life of 53 years? Please explain for each scenario.

Response:

FBC anticipates that any necessary depreciation rate adjustments will be made in future asset assessments done in conjunction with future depreciation studies. FBC expects that if the asset life was to be less than or longer than the average composite life of 53 years, any impact on FBC and its ratepayers would be minimal as the cost recovery will have been spread out over several decades matching the asset's original expected life plus or minus any adjustments made over the intervening period of time.

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9.9.1 If the actual useful life of the masonry structures was either shorter or longer than the composite average life of 53 years, what would happen to the assets? Please explain for each scenario.

Response:

The KOC assets will remain in service and in rate base until the end of their actual useful lives, regardless of whether those lives exceed or are less than the composite average life which was estimated at 53 years in Table 7-2. FBC will continue to undertake depreciation studies every 3 to 5 years, and each depreciation study will consider the remaining useful lives of the assets in the relevant asset classes. If in these depreciation studies it is determined that the actual useful lives are either longer or shorter than the estimated lives that are approved at that time, the depreciation rates will be adjusted on a go forward basis to reflect the shorter or longer lives being experienced. At the time when the building is no longer useful, it would be retired from service.

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H. ACCOUNTING UNDER PBR

10.0 Reference: APPROVAL SOUGHT AND EXECUTIVE SUMMARY

Exhibit B-1, Section 1.3.1, p. 9; Section 1.4, p. 11

FBC Application for Approval of a PBR Plan for 2014-2018, Exhibit B-1, p. 230

FBC PBR Decision, Table 2.27, p. 164

Treatment of KOC Capital Expenditure and Capital Cost Savings Under PBR

FBC states that Commission Order G-52-05 requires it to file a CPCN application for projects in excess of \$20 million, and that its PBR Plan Application for 2014 to 2018 included adjustments to base capital to eliminate major non-recurring capital expenditures including the Kootenay Long Term Facilities Project. The Kootenay Long Term Facilities Strategy as described on page 230 of the PBR Plan application stated that the South Slocan Generation Site and the System Control Centre require immediate investment, and that the Castlegar District Office is nearing end-of -life within three to five years. It did not mention relocation of the Kootenay Station Services Group or moving the Backup Control Centre (BCC).

Table 2.27 on page 164 of the FBC PBR Decision shows an estimated capital cost of the Kootenay Long Term Facilities Strategy of \$16.4 million. On page 78 of the Application, FBC submits an estimated capital cost of \$20.651 million (including AFUDC of \$1.128 million and Demolition and Waste removal costs of \$0.0446 million).¹¹

10.1 Please provide an explanation for the change in the estimated capital cost as compared to the estimate provided in the FBC PBR Application. In your response, please provide a detailed breakdown of each estimate.

Response:

FBC does not have a detailed breakdown of the preliminary estimate from 2012 of \$16.4 million. In alignment with the CPCN guidelines, FBC completed an AACE Class 3 estimate for the KOC Project which has provided a cost estimate of \$20.651 million. This AACE Class 3 estimate was completed in March 2015 and is included in Confidential Appendix L and Confidential Appendix G-1, Page 3.

¹¹ Exhibit B-1, Section 7.1, p.78

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10.2 Taking into consideration the Commission's decision (G-120-15) on Capital Exclusion Criteria under PBR, if the actual cost of the KOC were to be less than \$20m what is FBC's opinion on whether the KOC should be included or excluded from the PBR formula costs? Please explain.

Response:

FBC considers the KOC Project to be appropriately excluded from PBR formula costs.

FBC provides some background on the CPCN threshold and the Capital Exclusion Criteria under PBR below.

Prior to the issuance of Order G-120-15 issued July 22, 2015, FBC was required to file a CPCN application for projects in excess of \$20 million and for any other projects:

1. Likely to generate significant public concerns;
2. That FBC or the Commission wishes to handle through a CPCN; or
3. That a credible majority of stakeholders believes should involve a CPCN.

On this basis, FBC had identified the Project as being a CPCN consistently in its filings since 2011, including in the PBR Application that set the base for the formula capital in the PBR. At that time, FBC did not include this Project within the base level of capital expenditures and previously identified that it would be submitting a CPCN application for this Project.¹² More specifically, in Section 5.3.3 (p. 179) of the PBR Plan Application, the adjustments to base capital reflected elimination of major non-recurring types of capital, including the Kootenay Long Term Facilities Project.¹³

On January 30, 2015, FEI and FBC (the Companies) filed their compliance filing regarding the appropriate capital exclusion criteria under PBR. Under this proposal, the Companies proposed a \$5 million capital exclusion threshold for FBC and a \$15 million capital exclusion threshold for FEI, with no other criteria, and the same threshold to be applied to CPCN projects. In that filing, the Companies also discussed whether an adjustment to the capital formula base would be required based on their recommendations. Based on the recommendations of the Companies, no adjustments were put forward.

On July 22, 2015, the Commission issued Order G-120-15 in which it accepted the Companies' proposal for FEI's capital exclusion and CPCN threshold, but set FBC's capital exclusion and

¹² FBC also identified in its 2012-13 Capital Expenditure Plan that it planned to file an application for a CPCN for this Project.

¹³ The Kootenay Long Term Facilities Project referred to in the 2014-2019 PBR is now described as the KOC Project in the Application.

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CPCN threshold at \$20 million, with no additional criteria. This was a departure from both FBC's capital exclusion threshold at the time of determining the formula capital base, and also from the proposal of the Companies in which they stated that no adjustment to the formula capital base would have been required had the Commission set FBC's threshold at \$5 million.

Thus, the KOC Project currently meets the existing CPCN and capital exclusion threshold criteria of \$20 million. Even if it did not, it would still be appropriately excluded from the formula capital. If it is not excluded from the formula capital, then a significant adjustment to the capital formula base would be required. As FBC has had no opportunity to comment on what the adjustment should be, FBC is entitled to an opportunity to do so, taking into consideration the size of this and other projects that had previously been identified as non-recurring and outside of the base capital.

To summarize, FBC believes that a CPCN application is necessary for this Project for the following reasons:

- The recovery for the project cost is not contemplated through FBC's formula capital envelope. FBC would be unable to maintain its existing plant and equipment and to meet customer growth if the capital expenditures normally allocated for sustainment and growth capital were to be reduced by the cost of this Project.
- Projects in the nature of the KOC Project were not included in the determination of Base Capital under the PBR formula. Major and non-recurring types of capital, specifically including the KOC Project and other major Buildings and Facilities projects, were eliminated from historical expenditures when determining the level of Base Capital.¹⁴
- FBC has committed since 2011 to filing a CPCN application for this project.¹⁵

10.3 Considering the Kootenay Station Services move from Warfield was not included in the description of the Kootenay Long Term Facilities Strategy in FBC's original PBR application, what is FBC's opinion on whether or not the Kootenay Station Services move should be viewed as a separate project funded under the PBR formula? Please explain.

Response:

¹⁴ FBC 2014-2018 PBR Application, page 179. The KOC Project was referred to as the Kootenay Long Term Facilities Project. BC has always considered the relocation of the Kootenay Station Services Group as part of the KOC Project scope.

¹⁵ Decision accompanying Order G-110-12, page 87.

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FBC has always considered the relocation of the Kootenay Station Services Group as part of the KOC Project scope, even though FBC did not specifically mention the Kootenay Station Services Group move from the Warfield Complex in the high level description of the Kootenay Long Term Facilities Strategy in the PBR Application. The Kootenay Station Services Group move was a part of the Project at that time and had previously been noted in an FBC filing with the Commission.

FBC identified the KOC Project and the requirement to integrate certain work, including station maintenance, in the FBC 2011 Capital Expenditure Plan which was filed in June of 2010. Station maintenance is the role of the Kootenay Station Services Group. The excerpt from page 67 of the 2011 Capital Expenditure Plan is included below.

“Kootenay Operations Centre

This project was prompted by the aging and inadequate sizing of current facilities at Generation, Castlegar and System Control Centre as well as opportunities to integrate certain work, such as station maintenance between Generation and Network Services. The Generation facilities in particular require a significant investment to continue to utilize the existing aged buildings. “

10.3.1 When did FBC decide to add the Kootenay Station Services to the KOC?

Response:

Please refer to the response to BCUC IR 1.10.3.

10.4 Considering the BCC move was not included in the description of the Kootenay Long Term Facilities Strategy in FBC’s original PBR application and is not part of the KOC facility, what is FBC’s opinion on whether or not the BCC move should be viewed as a separate project funded under the PBR formula. Please explain.

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1 **Response:**

2 FBC did not define the detailed requirements of the KOC Project in the overview provided in the
3 FBC PBR Application as the project options analysis had not been completed or evaluated at
4 that time. The purpose of this CPCN Application is to fully define and describe the scope of the
5 Project.

6 It is the Company's position that addressing the requirements for the BCC should be included
7 within the scope of the KOC Project because the Project will mitigate the SCC and BCC space
8 constraints and the risks associated with hazards in close proximity to both facilities such that
9 one single event could impact both facilities simultaneously.

10 In its responses to BCUC Confidential IRs 1.2.1 and 1.6.4, FBC provides details about how the
11 BCC space constraints are mitigated by the KOC Project estimated at a cost of \$10 thousand.
12 FBC believes it to be appropriate to consider the BCC as part of this Project due to the
13 opportunities provided by the Project for the BCC at this time.

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17 10.5 Considering a future Castlegar Office move to the KOC was included in the
18 description of the Kootenay Long Term Facilities Strategy in FBC's original PBR
19 application, please explain how FBC intends to treat the costs of any such future
20 move with respect to FBC's PBR plan.

21

22 **Response:**

23 Based on information currently available to FBC, FBC expects that any future requirements for
24 the Castlegar District Office will be addressed outside of the current PBR term. Please refer to
25 the responses to BCUC IRs 1.8.1 and 1.8.1.1.

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30 On page 175 of the FBC PBR Decision, the Commission recommended the following:

31 ...if capital associated with a particular CPCN is excluded from the formula, the
32 CPCN review of that project should include an assessment by the Commission of
33 any potential impact of the project on O&M. If appropriate, an adjustment to the
34 formula based O&M spending envelope should then be made.

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On page 121 of the FBC PBR Application, FBC states:

The Generation department at FBC manages, operates and maintains the Company's four generating stations along the Kootenay River...The department employs approximately 100 employees annually comprised of approximately 65 full time and 30-35 temporary employees...the full time employees in the Generation department include management, engineering, planning , project management and safety and environment staff.

Table C4-2 on page 113 of the FBC PBR Application shows Base O&M amounts for Generation of \$2,556 thousand.

10.6 Provide a detailed breakdown and explanation of the changes to the Generation O&M Department which will occur as a result of FBC's implementation of the proposed alternative.

Response:

There will be no change to the Maintenance crew assigned to the Kootenay River plants (P1-P5) as they will continue to be headquartered at the South Slocan Generation Site. Non-routine and Annual Inspection work will continue to be resourced from the Major Maintenance crew which will work out of the new KOC.

10.7 Please discuss any changes in the full time or temporary employee count expected in the Generation Department due to the centralization of the Kootenay facilities. If no changes are expected, please explain why not.

Response:

FBC does not expect centralization of the Kootenay facilities to result in a reduction in the full time complement of crews and staff at Generation as there is no change in the volume of work expected for planning, engineering or execution. The Company will continue to use Contractors and Temporary Employees to augment its full time resources as volumes of work fluctuate.

10.8 Estimate the total O&M savings which will result from the implementation of the project. Please separately quantify savings which relate to O&M outside of the

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PBR formula (such as property tax) and to O&M which is inside the PBR formula. Please explain how FBC proposes to treat any PBR formula-driven O&M savings directly related to the project and why FBC believes this treatment is appropriate. If FBC does not anticipate there to be any PBR formula-driven O&M savings, please explain why not.

Response:

The net O&M savings from this Project is forecast to be \$25 thousand, comprised of \$175 thousand in operating costs less \$200 thousand savings (Tables 5-1 and 5-2). This represents less than 0.05 percent of the forecast formula O&M Expense in 2016 (\$53.6 million) and is not significant enough to warrant a change to base O&M Expense under the PBR Plan.

The incremental property taxes are estimated to be \$419,000 as shown in Table 5-6. Property taxes are not included in O&M Expense and therefore are not subject to determination by formula under the PBR Plan. All property tax variances from the amounts included in revenue requirements are recorded in the Flow-through deferral account and returned to, or recovered from, customers in the subsequent year under the PBR Plan.

Table C5-2 on page 181 of the FBC PBR Application provides a detailed breakdown of the calculation of FBC's PBR Base Capital.

10.9 For the facilities at each of Warfield, South Slocan, Trail Office and Castlegar District Office, please identify the current annual amount of Sustainment, Growth and Other Capital spending at the facility and the forecast annual amount of Sustainment, Growth and Other Capital spending with KOC in service. Please identify significant assumptions used in the analysis.

Response:

Capital expenditures required for the ongoing use of Warfield Complex, South Slocan Generation Site, Trail Office Building and Castlegar District Office are managed and will continue to be managed within the formula capital expenditure envelope. These capital costs are necessary to ensure the buildings remain operational and support the function of the groups that will remain at these facilities. The sustainment and other formula base capital expenditures approved in Order G-139-14 included approximately \$ 0.91 million per year for facility capital expenditures.¹⁶

¹⁶ Exhibit B-1, PBR Application, Table 5-3, p. 182.

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As discussed in the response to BCUC IR 1.10.2, the KOC Project represents spending incremental to formula derived capital expenditures, thus, there is no difference in the capital expenditures for the ongoing use of the facilities noted above in this IR with the KOC in service.¹⁷

The majority of General Plant Capital spending over the next 10 years will be directed to sustainment of FBC's buildings as 85% of the sites are over 20 years in age and require "Fittings and Fixture" replacements. In the past five years, FBC has not budgeted or allocated capital funding for the Generation Facilities or Castlegar District Office, other than emergency funding to deal with safety issues, as it has been identified in the Capital Expenditure Plan that the project would be filed as a CPCN because these facilities have reached or are nearing end of life. As stated above, none of the KOC expenditures will replace expenditures accounted for under the PBR formula.

10.9.1 Please confirm that FBC's PBR formula-driven capital cost base should be reduced by the net overall amount of capital cost reductions resulting with KOC, or explain otherwise.

Response:

Not confirmed. FBC does not believe that base capital expenditures should be reduced. FBC's response to BCUC IR 1.10.9 explains the need for sustainment capital to support the ongoing use of all of the FBC facilities, which is managed within the PBR formula capital expenditure envelope. There will not be any net reduction to sustainment capital expenditures following the construction of the KOC.¹⁸

10.9.2 If FBC does not anticipate there to be any PBR formula-driven capital savings, please explain why not.

¹⁷ In the response to BCOAPO IR 1.5.4, FBC identified potential capital cost savings associated with reduced travel time due to the change in location of pole storage.

¹⁸ As noted in the response to BCOAPO IR 1.5.4, there may be the potential for savings related to the change in location for pole storage; however, if they occur, these savings would vary depending on the number of the trips and work locations and are not expected to be material.

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- 1 **Response:**
- 2 Please refer to the response to BCUC IR 1.10.9.1.
- 3

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11.0 Reference: PROJECT ALTERNATIVES

Exhibit B-1, Section 5.2.5, pp. 57-8

O&M Savings with KOC and Treatment Under PBR

FBC estimates net annual O&M costs of \$175,000 for KOC in Table 5.1 and in Table 5.2 forecasts other O&M savings of \$200,000 per year, for an annual overall O&M saving of \$25,000.

11.1 Please explain why Table 5.2 does not include a number for O&M savings related to the Generation Administration Office and the Warehouse at South Slocan.

Response:

Table 5-2 does not show savings related to the Generation Facilities because there is a net cost to Generation as a result of the KOC Project. Because only the office staff and Major Maintenance Crews are being relocated to the KOC, access to, and maintenance of, the existing trade shop areas and surrounding lands at the South Slocan Generation Site will still be required. The net O&M impact to Generation as a result of the relocation to the KOC is estimated at \$40,000 (included in KOC Operating Costs in Table 5-1), in addition to the incremental Generation travel cost of \$30 thousand. Please refer to the response to BCUC IR 1.1.3.

11.1.1 What is the current annual O&M costs related to these buildings, for such matters as maintenance, heat, electrical, cleaning, and snow removal?

Response:

The current Generation Overhead cost for maintenance, heat, electrical, cleaning and snow removal related to the Generation Administration Office and the Warehouse at the South Slocan Generation Site is approximately \$132 thousand per year. The expected Generation O&M costs after recoveries is estimated at \$29 thousand (2015\$).

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1 11.2 Please confirm that FBC's PBR O&M cost base should be reduced by the net
2 overall amount of O&M savings resulting with KOC, or explain otherwise.
3

4 **Response:**

5 Please refer to the response to BCUC IR 1.10.8.

6

FortisBC Inc. (FBC or the Company) Application for a Certificate of Public Convenience and Necessity (CPCN) for the Kootenay Operations Centre (the Application)	Submission Date: September 25, 2015
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I. NON-REGULATED BUSINESS

12.0 Reference: DESCRIPTION OF GENERATION DEPARTMENT

**FBC Application for Approval of a PBR Plan for 2014-2018, section
4.4.1**

Stranded Asset Risk

FBC states:

The Generation department at FBC manages, operates and maintains the Company's four generating stations along the Kootenay River, forming an integral part of the power supply system...In addition to the operations and maintenance of these four facilities, the department also manages under various contracts, an additional 950 MW of generation in four additional facilities owned by third parties. Where the provision of services for these contracts is performed for a non-regulated affiliate, the services are governed by FBC's COC and TPP, which were reviewed and approved by the Commission via Order G-5-10A.

In assessing the application for risks to ratepayers, it is difficult to understand how the Non-Regulated Business activities impact the facilities' requirements for the existing facilities and the proposed KOC.

12.1 Please provide a map or maps showing each of the FBC owned facilities and facilities owned by third parties serviced by the Generation and Stations Services groups.

Response:

A map showing each of the FBC owned facilities and facilities owned by third parties serviced by the Generation and Stations Services Groups is included as Attachment 12.1.

12.2 Provide a list of the service contracts with third parties under which employees who are moving to the KOC could potentially conduct Non-Regulated Business. For each contract please provide the contracted term of service, remaining term and penalties applicable to the counter parties upon early termination.

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1 **Response:**

2 There are three service agreements between FortisBC Inc. (or its predecessor) and FortisBC
3 Pacific Holdings Inc. (FPHI) under which FBC employees potentially perform services to non-
4 regulated businesses. The requested relevant terms are provided below for each agreement.

- 5 • Subcontractor Agreement, dated December 18, 2003, relating to Arrow Lakes Hydro
6 Generating Station and associated facilities and equipment:
- 7 ○ Term: It continues in tandem with the Management Agreement between FPHI
8 and the owner of the Arrow Lakes Hydro Generating Station.
- 9 ○ Penalties upon Early Termination: The Subcontractor Agreement is subject to
10 early termination under circumstances such as default and bankruptcy, in
11 addition to all other remedies available in law or in equity. There is no specific
12 “penalty” provision upon early termination.
- 13 • Subcontractor Agreement, dated October 1, 2010, relating to Waneta Expansion and
14 associated facilities and equipment:
- 15 ○ Term: It continues in tandem with the Service Agreement between FPHI and the
16 owner of the Waneta Expansion.
- 17 ○ Penalties upon Early Termination: The Subcontractor Agreement is subject to
18 early termination under circumstances such as default and bankruptcy, in
19 addition to all other remedies available in law or in equity. There is no specific
20 “penalty” provision upon early termination.
- 21 • Subcontractor Agreement, dated November 1, 2011, relating to the Brilliant Expansion
22 and associated facilities and equipment:
- 23 ○ Term: It continues in tandem with the Management Agreement between FPHI
24 and the owner of the Brilliant Expansion.
- 25 ○ Penalties upon Early Termination: The Subcontractor Agreement is subject to
26 early termination under circumstances such as default and bankruptcy, in
27 addition to all other remedies available in law or in equity. There is no specific
28 “penalty” provision upon early termination.

29
30

31
32 12.3 What benefit, if any, would rate payers receive from early termination fees if a
33 service contract were to be canceled?
34

FortisBC Inc. (FBC or the Company) Application for a Certificate of Public Convenience and Necessity (CPCN) for the Kootenay Operations Centre (the Application)	Submission Date: September 25, 2015
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1 **Response:**

2 The ratepayers do not benefit if any of the service contracts that allow Company to perform
3 work at non-regulated facilities are terminated. Cancellation of one or all of the NRB service
4 contracts would adversely impact the ratepayers, resulting in an increase in customer rates.

5 The Company conducts its interactions with NRBs in accordance with the Revised Code of
6 Conduct and Transfer Pricing Policy. Revenues generated by the NRB service contracts have a
7 positive impact on ratepayers by reducing the revenue requirements. Since 2010, the benefit to
8 rate payers as a result of work performed under NRB contracts varied from approximately \$1
9 million to \$1.3 million annually.

10 The NRB contracts also provide intangible benefits to the labour force. Participation in the NRB
11 contracts, for example, provides FBC with economies of scale. The employees also gain
12 experience, and are trained in a wide variety of systems and equipment, improving their skills
13 and providing value to the regulated portion of the business. Exposure to new facilities provides
14 employees the opportunity to remain current with technology and strengthens their
15 understanding of good utility practices. The larger workforce also enables better response
16 times during emergency situations.

17

18

19

20 12.3.1 Please estimate on an annual basis the annual Non-Regulated
21 Business Contract Revenue applicable to employees at the KOC over
22 the next 20 years.

23

24 **Response:**

25 Please see an estimated 20 year forecast of non-regulated contract revenue applicable to
26 employees at the KOC. The estimate is based on an escalation from 2014 actuals as FBC
27 cannot predict the annual work levels and capital spending at each NRB facility which will be
28 dictated by the Owner. Please also refer to the response to BCUC IR 1.12.3.

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20 Year Estimated NRB Revenue Attributable to Employees Relocating to KOC												
Assumes a 2% increase per year.												
(\$'000)												
			Actual									
Year			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Transfer Price Revenue			128	131	133	136	139	141	144	147	150	153
Year			2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Transfer Price Revenue			156	159	162	166	169	172	176	179	183	186

12.4 Please explain how FBC records the costs incurred to provide services to third parties, as well as the revenue received from such services. In your response, please specifically describe where the costs and revenues are recorded, and whether any amounts are included within the PBR formula-driven O&M.

Response:

All costs and related overheads incurred to provide services to third parties are invoiced to the third party customer. Therefore, FBC's regulated O&M expense excludes the costs to provide service to third parties.

At the time of invoicing the third party, transfer pricing profit margin (for non-regulated business) or management fees (for regulated business) which is made up of revenues less costs, is recorded in Other Income, which is not formula-driven. The profit margin and management fees are a reduction to the revenue requirement and are trued up by way of the Flow-through Deferral Account mechanism under the PBR Plan so that customers receive the full benefit of revenues earned from FBC's contracts with third parties.

12.4.1 Will the centralization of the Kootenay Operation Centre impact the contracts and/or services provided to the four facilities owned by third parties? If not, please explain why not. If yes, please explain how and whether these changes are expected to impact the amount of actual O&M incurred either inside or outside the PBR spending envelope.

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1

2 **Response:**

3 The services provided by the Company at third party facilities are defined in the various
4 management and service agreements. None of the contracted services change as a result of
5 the relocation to the KOC facility.

6

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13.0 Reference: REVISED CODE OF CONDUCT AND TRANSFER PRICING POLICY

Section 2.d, p. 4

Determination of Facilities Rental

FBC's Revised Code of Conduct and Transfer Pricing Policy states on page 4 "If [Non-Regulated Business ("NRB")] activity results in incremental costs for facilities, including buildings, furniture and fixtures or computer equipment or software, the incremental costs, including carrying cost calculated at the weighted average cost of capital plus depreciation, will be direct charged to the NRB."

13.1 Approximately, what portion of time of each of the Generation, SCC and the Station Services Groups is billed as Non-Regulated Business?

Response:

For 2014, the following portion of time was charged directly to NRBs for the employees relocating to the KOC:

- Generation: 13.8%
- SCC: 0.4%
- Station Services: 3.1%

It should be noted that the Station Services hours for 2014 were a direct result of commissioning activities for the newly constructed Waneta Expansion facility. For 2011 and 2012 the Station Services group averaged less than a 0.5% direct charge out rate to NRB facilities.

13.1.1 How does FBC propose to calculate the incremental costs, if any, for the KOC facilities for each of the NRBs?

Response:

There are no incremental capital costs for the KOC facility caused by NRB activity. The NRBs provide, at their cost, facilities and the necessary infrastructure to support the permanent operations crews, including washrooms, lunchrooms and specialty tools. The FBC employees being relocated to the KOC (Major Maintenance Crews and technical support staff) are required to meet the operating, maintenance and sustaining capital requirements for the regulated assets owned and operated by the Company.

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The ongoing operations and maintenance costs for the KOC facility attributable to the Generation employees will be included in the Generation overhead costs. The allocation of the generation overhead costs, based on the absorption costing model, is transparent and permits the regulated business to fully recover costs for all services provided to third parties.

Please also refer to the response to BCUC IR 1.12.3.

13.1.2 Please describe the mechanisms in the NRB service contracts that would allow for the incremental costs for the KOC facilities to be directly charged to the NRBs? Is preapproval required?

Response:

Any incremental costs that would arise through the provision of services to NRBs would be charged to the NRB in accordance with the subcontractor agreements. The subcontractor agreements between FBC and FPHI contain the following similar language:

FPHI agrees to pay to FBC the aggregate of:

(a) the actual cost to FBC of providing the services; and

(b) the applicable loadings and profit margin contemplated by the transfer pricing policy of FBC approved by the Commission and in effect from time to time for the performance of the services,

all in accordance with the terms of the transfer pricing policy.

No preapproval is required. To date there have been no incremental capital costs resulting from NRB activities.

13.2 Please list by site any items or portions of facilities that were previously directly charged to NRBs.

Response:

FBC's contracts with NRBs have not resulted in any incremental requirements for building space, furniture, fixtures, computer equipment or software, and therefore no incremental

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charges to NRBs have been required for facilities-related items. If items or equipment are purchased by FBC on behalf of the NRBs intended for use specifically at the NRB facilities, such as equipment, material or spare parts, they are billed directly to the NRB in accordance with the Revised Code of Conduct and Transfer Pricing Policy. Please also refer to the response to BCUC IR 1.13.1.1.

13.2.1 What costs, if any, does FBC expect there to be associated with the move or disposal of these items? Please break the costs down by site, if applicable.

Response:

Please refer to the response to BCUC IR 1.13.2.

13.3 Please provide an updated version of the Alternative 5: New KOC on New Site table on page 3 of the Appendix G-1 adding a column containing the estimated incremental costs that are expected to be charged to NRB activity at the KOC. If any NRB related incremental costs were previously subtracted from the total project Capital Cost, please provide an additional column showing the previously subtracted NRB costs.

Response:

As stated in the response to BCUC IR 1.13.1.1, there are no incremental capital costs for the KOC facility caused by NRB activity.

13.3.1 Have the parties to whom the above NRB charges would be billed been informed of and agreed to the KOC and associated charges?

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1 **Response:**

2 As stated in the response to BCUC IR 1.13.1.1, there are no incremental capital costs for the
3 KOC facility caused by NRB activity. FBC is not required to obtain the approval of the third
4 party NRBs in regard to the KOC project.

5

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1 **J. TREATMENT OF VACATED PROPERTY**

2 **14.0 Reference: EXISTING ASSETS**

3 **Section 5, Appendix G, pp. 46-63**

4 **Site Location Plans**

5 Section 52 – Restraint on Disposition of the Utilities Commission Act states:

6 (1) Except for a disposition of its property in the ordinary course of business, a public
7 utility must not, without first obtaining the commission's approval,

8 (a) dispose of or encumber the whole or a part of its property, franchises,
9 licences, permits, concessions, privileges or rights, or

10 (b) by any means, direct or indirect, merge, amalgamate or consolidate in
11 whole or in part its property, franchises, licences, permits, concessions,
12 privileges or rights with those of another person.

13 (2) The commission may give its approval under this section subject to conditions
14 and requirements considered necessary or desirable in the public interest.

15 14.1 For each of the four facilities impacted by the centralization of the Kootenay
16 Operations Centre, please explain in detail the changes which will occur at each
17 site location and facility once the centralized operations centre is complete.

18

19 **Response:**

20 Warfield Complex - The vacated space will be reassigned to Warehousing to provide additional
21 storage for the Central Warehouse.

22 Generation Administration Office - The Generation Administration Office at the South Slocan
23 Generation Site will be demolished. The area will be incorporated into its surroundings in a
24 manner similar to the adjacent parkland.

25 Generation Warehouse - The Warehouse at the South Slocan Generation Site will be
26 demolished and the area will be used for outside storage and parking.

27 Trail Office Building - The 175 sq. ft. of vacated space will be included in general office use.

28

29

30

31 14.2 Please elaborate on FBC's plans for the existing assets for each site location if
32 the proposed alternative is implemented.

FortisBC Inc. (FBC or the Company) Application for a Certificate of Public Convenience and Necessity (CPCN) for the Kootenay Operations Centre (the Application)	Submission Date: September 25, 2015
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Response:

Please refer to the response to BCUC IR 1.14.1. FBC has no plans to dispose of the South Slokan generating facility and workshops, Warfield Complex or the Trail Office Building if the proposed alternative is implemented. The existing Generation Administration Office and Warehouse will be demolished as they have reached their end of life.

14.3 Does FBC intend to dispose of the assets at any of the locations? If yes, please explain which assets at each location FBC plans to dispose of and how FBC will record the gains/losses on disposal of these assets. If FBC does not intend to dispose of any of the assets, please explain why not and how they will remain used and useful.

Response:

Please refer to the responses to BCUC IRs 1.14.1 and 1.14.2. FBC does not plan to dispose of the assets at any of the locations.

FBC will continue to use the South Slokan Generation Site as it will still have the other structures for the essential Powerhouse and Generating Plant functions and operations. Please refer to the response to CEC Confidential IR 1.9.1 regarding the Warfield Complex and the continuing operational necessity of that site.

When the Generation Administration Office and Warehouse buildings are demolished the book value of these buildings in the Electric Plant in Service will be credited and the offsetting debit will be to Accumulated Depreciation. The charges for the demolition will be booked to Accumulated Depreciation. When the next depreciation study is undertaken it will include this residual value in determining the recommended depreciation rates for the asset class(es). This is in alignment with the usual treatment for asset retirements as set out on page 16 of the BCUC Uniform System of Accounts for Electric Utilities.

14.3.1 If FBC intends to dispose of any assets, does FBC plan to seek Commission approval under Section 52 of the Utilities Commission Act? If not, please explain.

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1 **Response:**

2 FBC does not plan to dispose of any assets as a result of the proposed KOC Project.

3 If FBC were to dispose of any assets not in the ordinary course of business, section 52 of the
4 Utilities Commission Act would apply and FBC would seek necessary Commission approval.

5

6

7

8 14.3.2 Does FBC intend to rent, lease or sell any of the land or building space
9 associated with these four facilities? If yes, please explain how any
10 proceeds will be treated.

11

12 **Response:**

13 FBC does not plan to rent, lease or sell any of the land or building space associated with the
14 four facilities affected as a result of constructing the KOC Project. However, should a situation
15 arise whereby there is rent or lease income generated as a result of the KOC Project, it is
16 expected that such proceeds would be treated as other income which would reduce the
17 Company's revenue requirement from what it otherwise would be.

18

Attachment 2.4

FILED CONFIDENTIALLY

Attachment 9.2.2

(Provided in electronic format only due to document size and in order to conserve paper)



2014 DEPRECIATION STUDY

**CALCULATED ANNUAL DEPRECIATION
ACCRUAL RATES APPLICABLE TO ELECTRIC
GENERATION, TRANSMISSION AND
DISTRIBUTION PLANT IN SERVICE
AS OF DECEMBER 31, 2014**

Prepared by:



FORTISBC INC.
Kelowna, British Columbia

2014 DEPRECIATION STUDY
CALCULATED ANNUAL DEPRECIATION ACCRUAL RATES
APPLICABLE TO PLANT IN SERVICE
AS OF DECEMBER 31, 2014

GANNETT FLEMING CANADA ULC

Calgary, Alberta



August 21, 2015

FortisBC Inc.
Suite 100, 1975 Springfield Road
Kelowna, BC
V1Y 7V7

Attention: Mr. Sreekanta Banerjee
Manager, Budgets & Forecasting

Ladies and Gentlemen:

Pursuant to your request, we have conducted a depreciation study related to the electric generation, transmission and distribution system of FortisBC, Inc. as of December 31, 2014. Our report presents a description of the methods used in the estimation of depreciation and net salvage, the statistical analyses of service life and the summary and detailed tabulations of annual and accrued depreciation.

The calculated annual depreciation accrual rates presented in the report are applicable to plant in service as of December 31, 2014. The depreciation rates are based on the straight-line method, the remaining life basis, using the average service life group procedure. A periodic review of the depreciation rates using the same estimates and methods is recommended.

Respectfully submitted,

GANNETT FLEMING CANADA ULC

A handwritten signature in black ink, appearing to read "L. Kennedy".

LARRY E. KENNEDY
Vice President

LEK/hac
Project #059459

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FORTISBC INC. DEPRECIATION STUDY

EXECUTIVE SUMMARY

Pursuant to FortisBC Inc.'s ("FortisBC") request, Gannett Fleming Canada ULC ("Gannett Fleming") conducted a depreciation study related to the electric generation, transmission, distribution and general plant assets of FortisBC Inc. as of December 31, 2014. The purpose of this study was to determine the annual depreciation accrual rates and amounts for book and ratemaking objectives.

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 forecasting net salvage characteristic for each depreciable group of assets.

FortisBC's accounting policy has not changed since the last depreciation study was prepared. This study anticipates that FortisBC will continue to book actual costs of removal to the accumulated depreciation account in the year of expenditure in accordance with the long standing approval of the British Columbia Utilities Commission (BCUC"). However, this study does introduce the estimation and recovery of the future costs of removal over the average service of the assets, and therefore, includes estimated cost of removal percentages into the depreciation rate calculations. In this manner a provision for the eventual costs of removal is appropriately collected over the useful life of the assets within the company's accumulated depreciation account, which will be offset by the actual costs of removal at the time of the asset's retirement.

Gannett Fleming recommends the calculated annual depreciation accrual rates set forth herein apply specifically to electric plant in service as of December 31, 2014 as summarized by Tables 1 and 2 of the study by account detail. Supporting data and calculations are provided as well within the study.

Finally, this study results in an annual depreciation expense accrual of \$59.1 million when applied to depreciable plant balances as December 31, 2014 of \$1.8 billion. The report study results are summarized at an aggregate functional group level as follows:

SUMMARY OF ORIGINAL COST, ACCRUAL PERCENTAGES AND AMOUNTS

PLANT GROUP (1)	ORIGINAL COST \$'s (2)	ANNUAL ACCRUAL	
		% 's (3)	\$'s (4)
GENERATION	232,752,634	1.90	4,416,057
TRANSMISSION	437,746,434	2.46	10,775,391
DISTRIBUTION	879,251,104	3.68	32,372,946
GENERAL	206,952,176	5.58	11,552,160
TOTAL PLANT IN SERVICE	1,756,702,347	3.37	59,116,554

PART I. INTRODUCTION

FORTISBC INC.
DEPRECIATION STUDY
PART I. INTRODUCTION

SCOPE

This report sets forth the results of the depreciation study for FortisBC Inc. to determine the annual depreciation accrual rates and amounts for book purposes applicable to the original cost of electric plant at December 31, 2014. 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 electric plant in service as of December 31, 2014.

The service life and net salvage estimates resulting from the study were based on: informed engineering judgment which incorporated analyses of historical plant retirement data as recorded through December 31, 2014; a review of Company practice and outlook as they relate to plant operation and retirement; and consideration of current practice in the electric industry, including knowledge of service lives and net salvage estimates used for other electric 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. Development of Depreciation Parameters, presents descriptions of the methods used and factors considered in the service life and net salvage studies. Part III. Calculation of Annual and Accrued Depreciation presents the methods and procedures used in the calculation of depreciation. Part IV. Results of Study, presents summaries by depreciable group of annual and accrued depreciation. Part V presents the results of the Retirement Rate and Service Life Statistics and Part VI presents Net Salvage Analysis. Detailed tabulations of annual and accrued depreciation are presented in Part VII of this report. An overview of Iowa curves and the Retirement Rate Analysis are set forth in Appendix A of the report. An overview of the net salvage analysis is presented in Appendix B of this report.

BASIS OF THE STUDY

Depreciation

For most accounts, the annual and accrued depreciation were calculated by the straight line method using the average service life procedure. For certain General Plant accounts, the annual and accrued depreciation are based on amortization accounting. Both types of calculations were based on original cost, attained ages, and estimates of service lives and 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 recommended 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. Many electric utilities in North America have received approval to adopt amortization accounting for these accounts.

Service Life and Net Salvage Estimates

The service life and 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 electric utility industry, and comparisons of the service life and net salvage estimates from our studies of other electric utilities. The use of survivor curves to reflect the expected dispersion of retirement provides a consistent method of estimating depreciation for electric 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.

The depreciation rates should be reviewed periodically to reflect the changes that result from plant and reserve account activity.

PART II. DEVELOPMENT OF DEPRECIATIONS PARAMETERS

PART II. DEVELOPMENT OF DEPRECIATION PARAMETERS

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 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 electric 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.

The calculation of annual and accrued depreciation based on the straight line method requires the estimation of survivor curves and is described in the following sections of this report. The development of the proposed depreciation rates also requires the selection of group depreciation procedures, as discussed in Part III of this report.

ESTIMATION OF SURVIVOR CURVES AND NET SALVAGE

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 using the retirement rate method of analysis.

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 relative height of the modes. The left-moded curves are those in which the greatest frequency of retirement occurs to the left of, or prior to, average service life. The symmetrical-moded curves are those in which the greatest frequency of retirement occurs at average service life. The right-moded curves are those in which the greatest frequency occurs to the right of, or after, the average service life. The origin-moded curves are those in which the greatest frequency of retirement occurs at the origin, or immediately after age 0. The letter designation of each family of curves (L, S, R or O) represents the mode of the associated frequency curve with respect to the average service life. The numerical subscripts represent the relative heights of the modes of the frequency curves within each family.

A discussion of the general concept of survivor curves and retirement rate method is presented in Appendix A of this report.

Survivor Curve and Net Salvage Judgments

The survivor curve estimates were based on judgment which considered a number of factors. The primary factors were the statistical analysis of data; current policies and outlook as determined during conversations with management personnel and on the knowledge Gannett Fleming developed through the completion of numerous electric utility studies.

The estimates of net salvage were based in part on historical data related to actual retirement activity through the year 2014 for most accounts. Gross salvage and cost of removal as recorded to the depreciation reserve account and related to experienced retirements were used. Percentages of the cost of plant retired were calculated for each component of net salvage on both annual and five-year moving average bases.

Historically, FortisBC has not included net salvage percentages in the depreciation rate calculations. In the proceeding related to the FortisBC Application for

2012–2013 Revenue Requirement, a significant amount of testimony dealt with the manner in which the costs of removal are recovered. Gannett Fleming understands that prior depreciation rates have not included the estimated costs of removal of assets. Recovery of the actual costs of removal (or retirement) were historically charged to the accumulated depreciation account, with no prior recovery of a provision related to these amounts, resulting in a recovery of costs of removal over the future toll-payers rather than over the life of the asset. Gannett Fleming recommends that FortisBC now include the estimated costs of retirement into the depreciation rates which will build a provision within the accumulated depreciation account for the eventual removal of the assets. This will better provide for the toll-payer who has access to the assets in service bearing the total cost responsibility (including the costs to retire). A general discussion of the methods used in the development of the net salvage percentages is included as Appendix B of this report.

While this study incorporates the estimated future costs of removal into the depreciation rate calculations, it is also recognized that there has been no previous provision for net salvage to date. While Gannett Fleming believes that the recommended net salvage percentages are reasonable, it is noted that future depreciation studies may need to increase the estimated costs of removal.

The following discussion, dealing with a number of accounts which comprise the majority of the investment analyzed, presents an overview of the factors considered by Gannett Fleming in the determination of the average service life and net salvage estimates. The survivor curve estimates for the remainder of the accounts not discussed in the following sections were based on similar considerations.

Account 365.00 - Distribution - Conductors and Devices, represents 16.3% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1950-2014 were analyzed by the retirement rate method. The original survivor curve as plotted on page V-44 indicates retirement ratios that begin to increase at age 13 and continue with high retirement ratios thereafter. Discussions with operational and management staff have indicated that the historic retirement patterns of the distribution system will be typical of the expectation going forward. This account has experienced a sufficient amount of retirement activity (over \$12 million analyzed)

which provides a solid foundation for the historic analysis. The life of this account has been increased from 45 to 49. As such, the Iowa 49-R3 selected for this account fits well to the historic retirement patterns and is expected to be indicative of the future retirement patterns.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 301 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 86 percent. A three-year moving average indicates a range from 0 percent to negative 203 percent with the most recent five-year average being negative 165 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 50 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 30 percent as a reasonable percentage at this time.

Account 362.00 - Distribution - Station Equipment, represents 12.9% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1950 through 2014 were analyzed by the retirement rate method. The original survivor curve as plotted on page IV-38 indicates retirement ratios starting early in the account's life and continuing at a relatively constant pace throughout all age intervals. The retirement rate analysis has indicated that a reduction in the average service life estimate from the current Iowa 55-S3 to the Iowa 50-R3 is required. The Iowa 50-R3 provides a good interpretation of the historical retirement experience and

recognizes the expectation that future retirements will most likely follow the same trends as the past.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 219 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 39 percent. A three-year moving average indicates a range from 0 percent to negative 167 percent with the most recent five-year average being negative 92 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 40 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 25 percent as a reasonable percentage at this time.

Account 353.00 - Transmission - Substation Equipment, represents 12.8% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1940 through 2014 were analyzed by the retirement rate method. This account consists primarily of the investment in transmission substations which include large voltage transformers, station isolating and circuit breaking equipment, control systems, bus work, bus work support, and other ancillary equipment. As indicated in the original survivor curve as plotted at page V-23, this account has witnessed a material amount of retirement activity, in particular over the past few years. Recently FortisBC has constructed a number of new terminal stations as well as rebuilt some of the existing substations. While it is not expected that the recent level of activity will

continue at the same pace over the foreseeable future, it is expected that the retirement and age of retirements as observed in the observed life table are indicative of the long term future.

The Iowa 50-R4 provides a good fit to the historic retirement information, which is believed by management to be indicative of the long term future retirement pattern. As such, the Iowa 50-R4 is recommended by Gannett Fleming and has been included in the depreciation rate calculations.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1996, ranging from 0% to over negative 699 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 54 percent. A three-year moving average indicates a range from negative 1 percent to negative 530 percent with the most recent five-year average being negative 58 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 40 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 25 percent as a reasonable percentage at this time.

Account 364.00 – Distribution - Poles, Towers and Fixtures, represents 10.0% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1940 through 2014 were analyzed by the retirement rate method. This account consists of the distribution power poles, the insulators and attachments to the power poles such as cross arms and guy wires. As indicated in the original survivor

curve as plotted on page V-41 this account has witnessed a significant amount of retirement activity within the experience band analyzed, with the pace of retirement ratios increasing at approximately age 27. While it is expected that this account will continue to experience growth over the next number of years, it is also expected that the retirement activity in this account in the future will follow a similar dispersion as that witnessed over the last number of years. As such the Iowa 50-R2.5 was selected reflecting a better match for the historical data than the current Iowa 50-R3. The Iowa 50-R2.5 provides a reasonable interpretation of the historical retirement experience and recognizes the expectation that future retirements will most likely follow the same trends as the past.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 309 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 73 percent. A three-year moving average indicates a range from 0 percent to negative 226 percent with the most recent five-year average being negative 132 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 60 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 30 percent as a reasonable percentage at this time.

Account 368.00 - Distribution - Line Transformers, represents 7.5% of the depreciable plant studied. The retirements, additions and other plant transactions for

the period 1940 through 2014 were analyzed by the retirement rate method. This account consists mainly of the lower voltage overhead and pad mounted line transformers used in the distribution of electric power within the company's service area. The original survivor curve as plotted on page V-47 indicates retirement ratios that begin early in the account's life and continue with relatively consistent retirement ratios through age 35, with remaining plant retiring quickly thereafter. While the best fit to the observed life table would indicate the Iowa 40-R2.5, it is noted that a significant amount of retirements have recently been completed related to a program to retire transformers that contain PCB's. This program, started in 2010 was completed in 2014, and has resulted in retirements at an age that are not expected to re-occur in the future. While it is considered that this account will experience growth over the next few years and given expected growth in the distribution service areas, the currently approved Iowa 45-R4 has been retained and is considered to be indicative of future retirement patterns.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 69 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 28 percent. A three-year moving average indicates a range from 0 percent to negative 55 percent with the most recent five-year average being negative 47 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 30 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett

Fleming recommends that a moderate and conservative negative 15 percent as a reasonable percentage at this time.

Account 355.00 – Transmission - Poles, Towers and Fixtures, represents 5.9% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1950 through 2014 were analyzed by the retirement rate method. This account consists of the transmission, towers, poles, insulators and attachments, such as guy wires and anchors. In 2004, 350 km of 60Kv transmission lines were removed. Additionally, since the period of the last study, a number of transmission lines have been retired. As such, this account has witnessed over \$4.1 million in retired investment since the last study and \$8.0 overall over the entire life of the account.

Discussions with operating staff confirmed that the account did experience a significant level of plant retirements over the past few years due to required system improvements and upgrades of aging plant. Management has indicated future builds and retirements will occur as needed but are not expected to be similar in number or significance as the past years but should be considered as indicative of the manner in which the transmission lines may retire over the long term. As such, the Iowa 50-R1.5 which provides a good fit to the historic retirement data is recommended by Gannett Fleming to be indicative of the long term retirement patterns. Therefore, the Iowa 50-R1.5 has been used in the depreciation rate calculations.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 851 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 75 percent. A three-year moving average indicates a range from 0 percent to negative 795 percent with the most recent five-year average being negative 101 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 55 percent after giving consideration to the historic trends and the approved percentages of

a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 25 percent as a reasonable percentage at this time.

Account 356.00 - Transmission - Conductors and Devices, represents 5.7% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1940 through 2014 were analyzed by the retirement rate method. This account consists mainly of the transmission conductor and related material required for the electric transmission of electricity. As indicated in the original survivor curve as plotted at page V-29, this account has witnessed a significant amount of retirement activity within the experience band analyzed. Retirements in this account have begun at a relatively early age and have continued through the entire account's life. In 2004, 380 km of 60Kv transmission lines were removed. Additionally, since the period of the last study, a number of transmission lines have been retired. As such, this account has witnessed over \$3.7 million in retired investment since the last study and \$7.6 overall over the entire life of the account.

Discussions with operating staff confirmed that the account did experience a significant level of plant retirements over past few years due to required system improvements and upgrades of aging plant. Management has indicated future builds and retirements will occur as needed but are not expected to be similar in number or significance as the past years but should be considered as indicative of the manner in which the transmission lines may retire over the long term. As such the Iowa 53-R1.5, which provides a good fit to the historic retirement data, is recommended by Gannett Fleming to be indicative of the long term retirement patterns. Therefore, the Iowa 53-R1.5 has been used in the depreciation rate calculations.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 592 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 97 percent. A three-

year moving average indicates a range from 0 percent to negative 733 percent with the most recent five-year average being negative 121 percent. All the bands indicate a higher level of negative net salvage in the periods since 2010 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 65 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past five-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 25 percent as a reasonable percentage at this time.

Account 333.00 - Generation Plant - Water Wheels, Turbines and Waterways, represents 5.5% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1960 through 2014 were analyzed by the retirement rate method. This account consists mainly of the rotating generating equipment including turbines required for the hydro-electric generation of electricity. As indicated in the original survivor curve as plotted at page V-9, this account has witnessed approximately \$1.4 million of retirement activity within the experience band analyzed. While the retirement rate analysis does provide for some meaningful average service life indications, Gannett Fleming also reviewed the average service lives of peer hydro-electric generation plants throughout Canada. The peer review indicated that this account has approved life estimates ranging from 35 years to 60 years. Given that the peer analysis produced average service life estimates lower than the results of the retirement rate analysis which proved an Iowa 70-R2.5, Gannett Fleming has recommended a reduction from the currently approved Iowa 75-R3 to the Iowa 70-R2.5 for use in the depreciation rate calculations.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1995, ranging from 0% to over negative 219 percent with a full depth band (i.e. cumulative from 1995 to 2014) value of negative 91 percent. A three-year moving average indicates a range from 0 percent to negative 409 percent with the most recent five-year average being negative 408 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming recommends that a negative 20 percent is a reasonable percentage for this initial implementation.

Account 335.00 - Generation Plant - Other Power Plant Equipment, represents 2.5% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1957 through 2014 were analyzed by the retirement rate method. This account consists of the equipment related to generation of power from the hydro-electric stations not included in other generation accounts. As indicated in the original survivor curve as plotted at page V-15, this account has witnessed approximately \$1.8 million of retirement activity within the experience band analyzed. While the retirement rate analysis does provide for some meaningful average service life indications, Gannett Fleming also reviewed the average service lives of peer hydro-electric generation plants throughout Canada. The peer review indicated that this account has approved life estimates ranging from 40 years to 50 years. Given that the longest life of the peer analysis produced average service life estimates similar to the results of the retirement rate analysis which proved an Iowa 51-R4, Gannett Fleming has recommended the Iowa 51-R4 for use in the depreciation rate calculations.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 2000, ranging from 0% to over negative 184 percent with a full depth band (i.e. cumulative from 2000 to 2014) value of negative 14 percent. A three-year moving average indicates a range from 0 percent to negative 20 percent with the most recent five year average being negative 23 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier

years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming recommends that a negative 10 percent is a reasonable percentage for this initial implementation.

Account 334.00 - Generation Plant - Accessory Electrical Equipment, represents 2.4% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1950 through 2014 were analyzed by the retirement rate method. As indicated in the original survivor curve as plotted at page V-12, this account has witnessed approximately \$3.6 million of retirement activity within the experience band analyzed. Retirements in this account have begun at a relatively early age with significant levels of retirements occurring from ages 8.5 through to 22.5. This retirement activity has provided a significant amount of historic retirement information. The retirement rate analysis has indicated the Iowa 50-R1.5. Gannett Fleming also reviewed the average service lives of peer hydro-electric generation plants throughout Canada. The peer review indicated that this account has approved life estimates ranging from 25 years to 55 years.

Discussions with management and company staff indicate that further retirement activity will likely be similar to the historic levels. The Iowa 50-R1.5 is similar to the currently approved Iowa 50-R3, and is within the range of the industry peers. As such the Iowa 50-R1.5 is considered to provide a reasonable interpretation of the historical retirement experience and recognizes the expectation that future retirements will occur in a similar pattern as the historic retirement activity and is, therefore, used in the depreciation rate calculations in this study.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 1999, ranging from 0% to over negative 134 percent with a full depth band (i.e. cumulative from 1999 to 2014) value of negative 33 percent. A three-year moving average indicates a range from 0 percent to negative 67 percent with the most recent five-year average being negative 35 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff

indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 30 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 20 percent as a reasonable percentage at this time.

Account 332.00 - Reservoirs, Dams and Waterways represents 1.8% of the depreciable plant studied. The retirements, additions and other plant transactions for the period 1940 through 2014 were analyzed by the retirement rate method. As indicated in the original survivor curve as plotted on page V-6 this account has not witnessed a significant amount of retirement activity within the experience band analyzed, with less \$1.0 million retired to date. However, discussion with management and operational staff has indicated that some enhancements are planned at the Corra Linn generating station over the next few years. While it is expected that this account will continue to experience growth over the next number of years, it is also expected that the retirement activity in this account may increase. While there is not sufficient information to recommend a change from the currently approved 70-year average service life, Gannett Fleming is recommending a small change in the Iowa curve shape from the currently approved R-4 to the Iowa S2.5 based on the indications in the retirement rate study. As such, Gannett Fleming has recommended the Iowa 70-S2.5 for use in the depreciation rate calculations.

This account has witnessed a significant amount of net salvage (i.e. cost of removal) activity since 2004, ranging from 0% to over negative 375 percent with a full depth band (i.e. cumulative from 2004 to 2014) value of negative 64 percent. A three-year moving average indicates a range from 0 percent to negative 737 percent with the

most recent five-year average being negative 179 percent. All the bands indicate a higher level of negative net salvage in the periods since 2009 compared to the earlier years. The discussions held with the company operations and engineering staff indicated that the historical indications would be reasonable to consider in the development of future expectations for the equipment in this account. Considering the historical results and the comments from the operations and engineering staff, Gannett Fleming would normally have recommended a net salvage percentage of negative 25 percent after giving consideration to the historic trends and the approved percentages of a peer group. However, this recommendation would have been heavily influenced by the past six-year period where this account has witnessed a large amount of retirement activity indicating very significant amounts of costs of removal. In order to avoid over-reaction to these recent indications of large net negative salvage requirements in this initial inclusion of costs of removal into the depreciation rate calculations, Gannett Fleming recommends that a moderate and conservative negative 15 percent as a reasonable percentage at this time.

Account 370.00 – Meters represents 0.8% of the depreciable plant studied. The investment in this account relates to the conventional meters that will be replaced once the Automated Metering Interface (AMI) program is completed. In accordance with the directives contained in the BCUC Decision C-7-13 related to the replacement of these legacy meters, a one-year remaining life has been assigned to this account. The depreciation rate as indicated on Table 1 of this report is in accordance with the BCUC Decision C-7-13, dated July 23, 2013. It is noted that an immaterial dollar amount will remain in this account relating to a few vintage meters that will not be replaced in the AMI program, however, given the immaterial amount of the remaining investment, Gannett Fleming is not recommending a specific depreciation rate for the remaining investment.

Account 370.10 – AMI Meters; Account 391.60 – AMI Computer Software; and Account 397.20 - AMI Communications Structure and Equipment all related to the investment associated with the AMI project. As this project is not yet fully in service as of the depreciation study date of December 31, 2014, the depreciation rates for these accounts as indicated in Table 1 of this report, are in accordance with the depreciation

rates as prescribed in the BCUC Decision C-7-13. In accordance with the provisions of the BCUC Decision C-7-13, these assets will be studied for the first time during the next full depreciation study.

Other Accounts

The above analysis provides the consideration relating to almost 86% of the depreciable plant. The accounts related to the remaining 14% of the depreciable plant studied as of December 31, 2014 were analyzed using similar methods and considered similar factors including review of operational comments, peer reviews and experience of Gannett Fleming.

PART III. CALCULATION OF ANNUAL AND ACCRUED DEPRECIATION

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CALCULATION OF ANNUAL AND ACCRUED DEPRECIATION

Group Depreciation Procedures

When more than a single item of property is under consideration, a group procedure for depreciation is appropriate because normally all of 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, the average service life and equal life group procedures.

In the average service life procedure, the rate of annual depreciation is based on the average service 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 the 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.

In the equal life group procedure, also known as the unit summation procedure, the property group is subdivided according to service life. That is, each equal life group includes that portion of the property which experiences the life of that specific group. The relative size of each equal life group is determined from the property's life dispersion curve. The calculated depreciation for the property group is the summation of the calculated depreciation based on the service life of each equal life unit.

In the determination of the depreciation rates in this study, the use of the average service life procedure has been continued. While the equal life group procedure provides an enhanced matching of depreciation expense to the consumption of service value, the average service life procedure is widely used throughout North America and was used in order to conform to past Company practices and approvals by the British Columbia Utilities Commission.

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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 electric plant in service. The accounts and their amortization periods are as follows:

<u>ACCOUNT</u>	<u>TITLE</u>	AMORTIZATION PERIOD, <u>YEARS</u>
391.10	Office Furniture and Equipment	15
391.10	Computer Hardware	5
391.20	Computer Software	8
391.60	AMI Computer Software	10
394.00	Tools and Work Equipment	15
397.00	Communications Structures and Equipment	15
397.20	AMI Communications Structures and Equipment	15

For the purpose of calculating annual amortization amounts as of December 31, 2014, 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 IV. RESULTS OF STUDY

PART IV. 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 and the accrued depreciation were calculated in accordance with the straight line method, using the average service life procedure based on estimates which reflect considerations of current historical evidence and expected future conditions.

DESCRIPTION OF DETAILED TABULATIONS

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 electric utilities. The results of the statistical analysis of service life are presented in the section beginning on page V-2 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 were 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 tables of the calculated annual depreciation applicable to depreciable assets as of December are presented in account sequence starting on page VII-2 of the

supporting documents. The tables indicate the estimated average survivor curves used in the calculations. The tables set forth, for each installation year, the original cost, calculated accrued depreciation, and the calculated annual accrual.

FORTISBC INC.

TABLE 1. ESTIMATED SURVIVOR CURVE, ORIGINAL COST, BOOK DEPRECIATION RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO UTILITY PLANT AS OF DECEMBER 31, 2014
DEPRECIATION RELATED TO RECOVERY OF ORIGINAL COST OF INVESTMENT

ACCOUNT	ACCOUNT DESCRIPTION (1)	SURVIVOR CURVE (2)	NET SALVAGE (%) (3)	ORIGINAL COST AS OF DECEMBER 31, 2014 (4)	BOOK DEPRECIATION RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL AMOUNT (7)	CALCULATED ANNUAL ACCRUAL RATE (8)=(7)/(4)	COMPOSITE REMAINING LIFE (9)=(6)/(7)
330.10	GENERATION PLANT								
331.00	LAND RIGHTS	75-R4	-	961,358	(549,854)	1,511,212	25,018	2.60	60.4
332.00	STRUCTURES AND IMPROVEMENTS	68-S2.5	-	14,871,098	5,031,785	9,839,313	177,194	1.19	55.4
333.00	RESERVOIRS, DAMS AND WATERWAYS	70-S2.5	-	31,722,604	5,577,922	26,144,682	475,628	1.50	54.6
334.00	WATER WHEELS, TURBINES AND GENERATORS	70-R2.5	-	96,839,221	11,347,980	85,491,241	1,406,673	1.45	60.5
335.00	ACCESSORY ELECTRICAL EQUIPMENT	50-R1.5	-	42,712,705	9,169,201	33,543,504	756,490	1.77	43.2
336.00	OTHER POWER PLANT EQUIPMENT	51-R4	-	44,358,214	12,393,174	31,965,040	794,393	1.79	40.1
	ROADS, RAILROADS AND BRIDGES	75-S4	-	1,287,434	324,723	962,711	18,928	1.47	50.9
	TOTAL GENERATION PLANT			232,752,634	43,294,931	189,457,703	3,654,324	1.57	
350.20	TRANSMISSION PLANT								
353.00	SURFACE AND MINERAL	75-R4	-	8,046,804	1,815,297	6,231,507	99,326	1.23	62.7
355.00	SUBSTATION EQUIPMENT	50-R4	-	225,450,535	58,306,547	167,144,988	4,034,910	1.79	40.5
356.00	POLES, TOWERS AND FIXTURES	50-R1.5	-	103,103,429	21,362,218	81,741,211	1,952,026	1.89	41.3
359.00	CONDUCTORS AND DEVICES	53-R1.5	-	100,024,736	15,642,707	84,382,029	1,925,658	1.93	43.4
	ROADS AND TRAILS	40-R3	-	1,120,930	210,319	910,611	32,336	2.88	28.2
	TOTAL TRANSMISSION PLANT			437,746,434	97,336,088	340,410,346	8,044,256	1.84	
360.20	DISTRIBUTION PLANT								
362.00	SURFACE AND MINERAL	75-R4	-	10,455,571	1,672,212	8,783,359	128,902	1.23	68.1
364.00	SUBSTATION EQUIPMENT	50-R3	-	227,207,210	47,652,225	179,554,985	4,358,667	1.92	40.5
365.00	POLES, TOWERS AND FIXTURES	50-R2.5	-	177,311,677	48,806,768	130,504,909	3,257,159	1.84	38.8
366.00	CONDUCTORS AND DEVICES	49-R3	-	286,885,219	74,317,561	212,567,658	5,667,373	1.98	36.0
368.00	LINE TRANSFORMERS	45-R4	-	132,456,798	25,583,987	106,872,811	3,028,991	2.29	34.9
369.00	SERVICES	75-R4	-	9,520,831	6,586,048	2,934,783	47,190	0.50	62.2
370.00	METERS	20-R1	-	14,209,792	5,471,584	8,738,208	8,738,207	61.49	1.0 *
371.00	AMI METERS	20-SQ	-	8,137,057	-	8,137,057	406,853	5.00 *	19.5
373.00	INSTALLATIONS ON CUSTOMERS PREMISES	20-R1	-	937,832	937,832	-	-	-	-
	STREET LIGHTING AND SIGNAL SYSTEMS	27-L2	-	12,129,115	2,397,873	9,731,242	500,662	4.13	19.4
	TOTAL DISTRIBUTION PLANT			879,251,104	211,426,090	667,825,012	26,134,004	2.97	
390.00	GENERAL PLANT								
390.10	STRUCTURES - FRAME AND IRON	51-S1.5	-	337,364	279,280	58,084	1,898	0.56	30.6
390.20	STRUCTURES - MASONRY	41-S3	-	23,724,849	5,767,963	17,956,886	758,275	3.20	23.7
391.00	OPERATIONS BUILDINGS	40-R4	-	16,035,423	5,648,397	10,387,026	343,620	2.14	30.2
391.10	OFFICE FURNITURE AND EQUIPMENT	15-SQ	-	6,283,337	5,308,117	975,220	105,506	1.68	9.2
391.20	COMPUTER HARDWARE	5-SQ	-	24,463,351	18,954,687	5,508,664	2,410,847	9.85	2.3
391.60	COMPUTER SOFTWARE	8-SQ	-	62,151,528	44,992,946	17,158,582	3,832,923	6.17	4.5
392.10	AMI COMPUTER SOFTWARE	10-SQ	-	6,166,997	-	6,166,997	616,700	10.00 *	7.5
392.20	LIGHT DUTY VEHICLES	10-L1	25	8,754,983	2,945,159	3,621,078	549,221	6.27	6.6
392.30	HEAVY DUTY VEHICLES	15-L3	25	15,209,197	3,175,734	8,231,164	890,642	5.86	9.2
394.00	TOOLS AND WORK EQUIPMENT	15-SQ	-	13,056,692	9,841,426	3,215,266	325,685	2.49	9.9
397.00	COMMUNICATIONS STRUCTURES AND EQUIPMENT	15-SQ	-	28,493,761	15,904,116	12,589,645	1,565,121	5.49	8.0
397.20	AMI COMMUNICATIONS STRUCTURE AND EQUIPMENT	15-SQ	-	2,274,693	-	2,274,693	151,722	6.67 *	14.5
	TOTAL GENERAL PLANT			206,952,176	112,817,825	88,143,305	11,552,160	5.58	
	TOTAL DEPRECIABLE PLANT			1,756,702,347	464,874,934	1,285,836,366	49,384,744	2.81	
114.00	PLANT NOT STUDIED								
350.10	UTILITY PLANT ACQUISITION ADJUSTMENT			11,912,000	5,769,850				
360.10	LAND RIGHTS			8,816,733	(183,430)				
369.00	LAND			4,575,942	-				
390.90	LEASEHOLD IMPROVEMENTS			11,116,222	(11,145)				
999.90	CONTRIBUTION IN AID OF CONSTRUCTION			3,340,330	(57,087,751)				
	TOTAL NON - DEPRECIABLE PLANT			(119,634,423)	(48,172,146)				
	TOTAL PLANT			1,637,067,924	416,702,788	1,285,836,366	49,384,744		

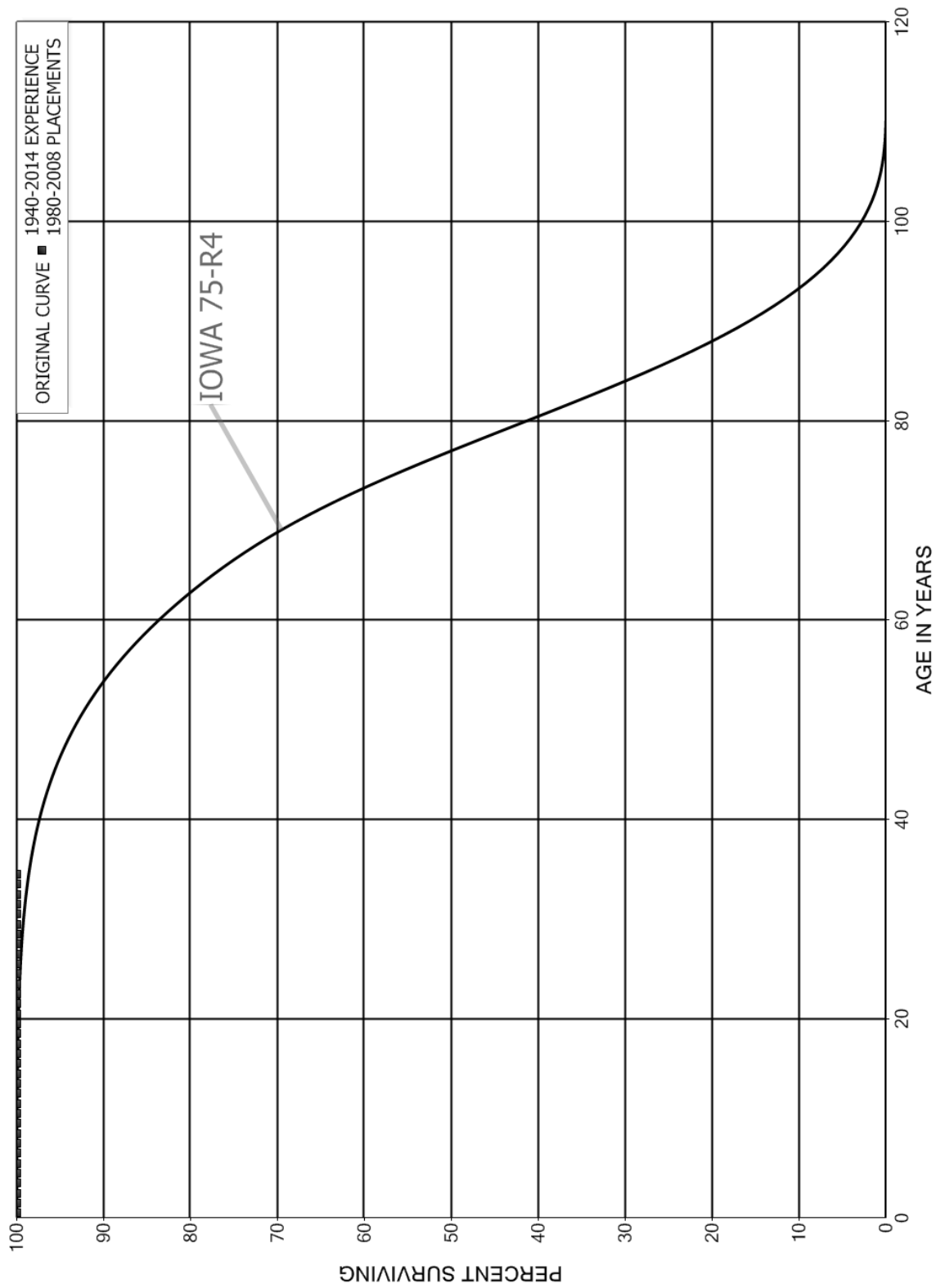
* In accordance with the rates as per BCUC Decision C-7-13 dated July 23, 2013.

FORTISBC INC.

TABLE 2. ESTIMATED SURVIVOR CURVE, ORIGINAL COST, BOOK DEPRECIATION RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO UTILITY PLANT AS OF DECEMBER 31, 2014
DEPRECIATION RELATED TO RECOVERY OF COST OF REMOVAL

ACCOUNT	ACCOUNT DESCRIPTION (1)	SURVIVOR CURVE (2)	NET SALVAGE (%) (3)	ORIGINAL COST AS OF DECEMBER 31, 2014 (4)	BOOK DEPRECIATION RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL AMOUNT (7)	ACCRUAL RATE (8)=(7)/(4)	COMPOSITE REMAINING LIFE (9)=(6)/(7)
GENERATION PLANT									
330.10	LAND RIGHTS	75-R4	-	961,358	-	-	-	-	-
331.00	STRUCTURES AND IMPROVEMENTS	68-S2.5	(5)	14,871,098	-	743,555	13,951	0.10	55.4
332.00	RESERVOIRS, DAMS AND WATERWAYS	70-S2.5	(15)	31,722,604	-	4,758,390	90,382	0.28	54.6
333.00	WATER WHEELS, TURBINES AND GENERATORS	70-R2.5	(20)	96,839,221	-	19,367,845	325,886	0.34	60.5
334.00	ACCESSORY ELECTRICAL EQUIPMENT	50-R1.5	(20)	42,712,705	-	8,542,541	218,201	0.51	43.2
335.00	OTHER POWER PLANT EQUIPMENT	51-R4	(10)	44,358,214	-	4,435,821	113,343	0.26	40.1
336.00	ROADS, RAILROADS AND BRIDGES	75-S4	-	1,287,434	-	-	-	-	-
	TOTAL GENERATION PLANT			232,752,634		37,848,152	761,733	0.33	
TRANSMISSION PLANT									
350.20	SURFACE AND MINERAL	75-R4	-	8,046,804	-	-	-	-	-
353.00	SUBSTATION EQUIPMENT	50-R4	(25)	225,450,535	-	56,362,634	1,484,796	0.66	40.5
355.00	POLES, TOWERS AND FIXTURES	50-R1.5	(25)	103,103,429	-	25,775,857	662,785	0.64	41.3
356.00	CONDUCTORS AND DEVICES	53-R1.5	(25)	100,024,736	-	25,006,184	593,554	0.59	43.4
359.00	ROADS AND TRAILS	40-R3	-	1,120,930	-	-	-	-	-
	TOTAL TRANSMISSION PLANT			437,746,434		107,144,675	2,731,135	0.62	
DISTRIBUTION PLANT									
360.20	SURFACE AND MINERAL	75-R4	-	10,455,571	-	-	-	-	-
362.00	SUBSTATION EQUIPMENT	50-R3	(25)	227,207,210	-	56,801,802	1,471,560	0.65	40.5
364.00	POLES, TOWERS AND FIXTURES	50-R2.5	(30)	177,311,677	-	53,193,503	1,479,718	0.83	38.8
365.00	CONDUCTORS AND DEVICES	49-R3	(30)	286,885,219	-	86,065,566	2,623,892	0.91	36.0
368.00	LINE TRANSFORMERS	45-R4	(15)	132,466,798	-	19,868,520	600,285	0.45	34.9
369.00	SERVICES	75-R4	-	9,520,831	-	-	-	-	-
370.00	METERS	20-R1	-	14,209,792	-	-	-	-	-
370.10	AMI METERS	20-SQ	-	8,137,057	-	-	-	-	-
371.00	INSTALLATIONS ON CUSTOMERS PREMISES	20-R1	-	937,832	-	-	-	-	-
373.00	STREET LIGHTING AND SIGNAL SYSTEMS	27-L2	(10)	12,129,115	-	1,212,912	63,477	0.52	19.4
	TOTAL DISTRIBUTION PLANT			879,251,104		217,142,303	6,238,942	0.71	
GENERAL PLANT									
390.00	STRUCTURES - FRAME AND IRON	51-S1.5	-	337,364	-	-	-	-	-
390.10	STRUCTURES - MASONRY	41-S3	-	23,724,849	-	-	-	-	-
390.20	OPERATIONS BUILDINGS	40-R4	-	16,036,423	-	-	-	-	-
391.00	OFFICE FURNITURE AND EQUIPMENT	15-SQ	-	6,283,337	-	-	-	-	-
391.10	COMPUTER HARDWARE	5-SQ	-	24,463,351	-	-	-	-	-
391.20	COMPUTER SOFTWARE	8-SQ	-	62,151,528	-	-	-	-	-
391.60	AMI COMPUTER SOFTWARE	10-SQ	-	6,166,997	-	-	-	-	-
392.10	LIGHT DUTY VEHICLES	10-L1	-	8,754,963	-	-	-	-	-
392.20	HEAVY DUTY VEHICLES	15-L3	25	15,209,197	-	-	-	-	-
394.00	TOOLS AND WORK EQUIPMENT	15-SQ	-	13,056,692	-	-	-	-	-
397.00	COMMUNICATIONS STRUCTURES AND EQUIPMENT	15-SQ	-	28,493,761	-	-	-	-	-
397.20	AMI COMMUNICATIONS STRUCTURE AND EQUIPMENT	15-SQ	-	2,274,693	-	-	-	-	-
	TOTAL GENERAL PLANT			206,952,176		-	-	-	-
	TOTAL DEPRECIABLE PLANT			1,756,702,347		362,135,130	9,731,810	0.55	
PLANT NOT STUDIED									
114.00	UTILITY PLANT ACQUISITION ADJUSTMENT			11,912,000	-	-	-	-	-
350.10	LAND RIGHTS			8,816,733	-	-	-	-	-
360.10	LAND RIGHTS			4,575,942	-	-	-	-	-
389.00	LAND			11,116,222	-	-	-	-	-
390.90	LEASEHOLD IMPROVEMENTS			3,728,028	-	-	-	-	-
999.90	CONTRIBUTION IN AID OF CONSTRUCTION			(159,783,349)	-	-	-	-	-
	TOTAL NON - DEPRECIABLE PLANT			(119,634,423)		-	-	-	-
	TOTAL PLANT			1,637,067,924		362,135,130	9,731,810		

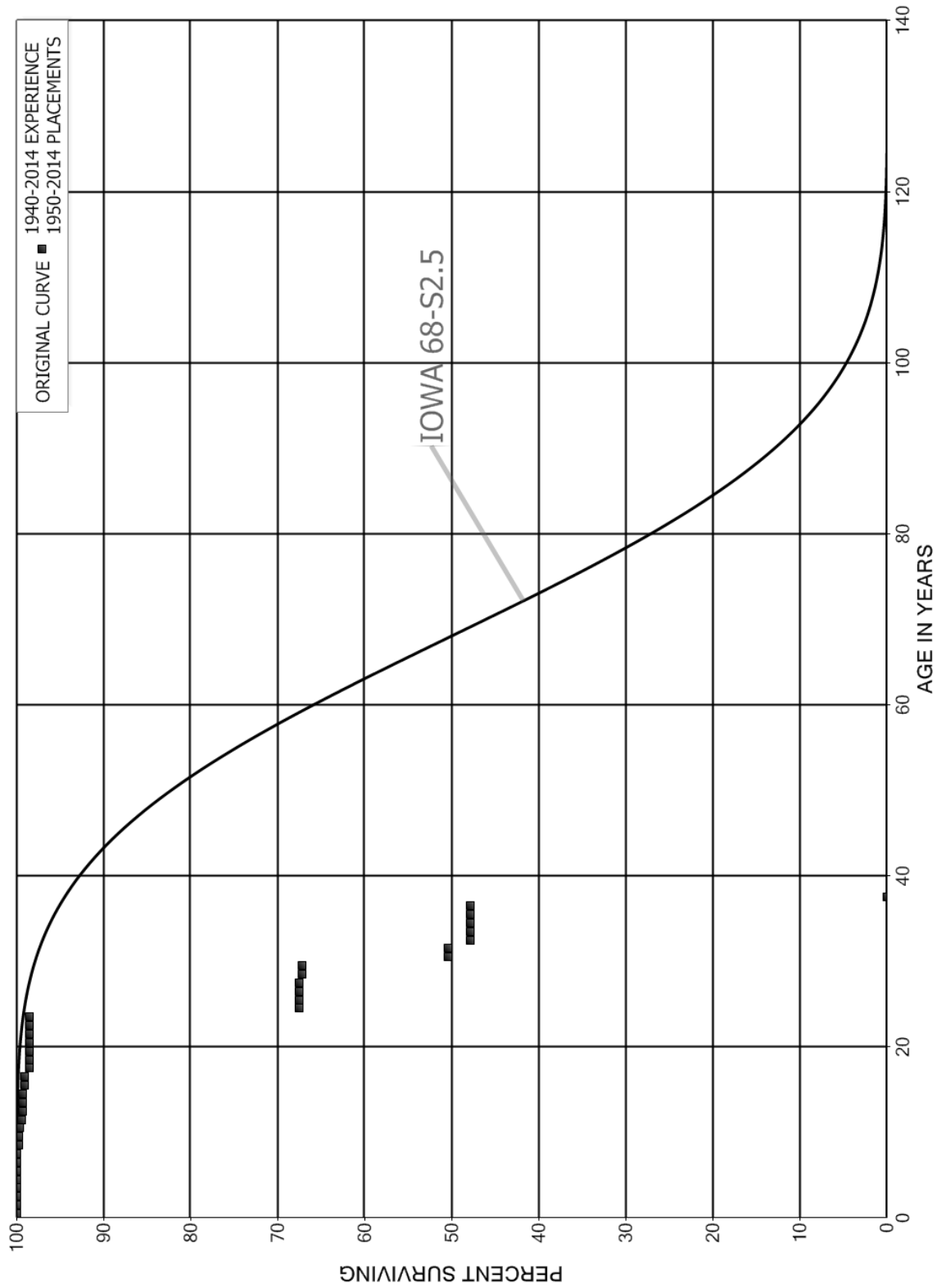
PART V. SERVICE LIFE STATISTICS



PLACEMENT BAND 1980-2008

EXPERIENCE BAND 1940-2014

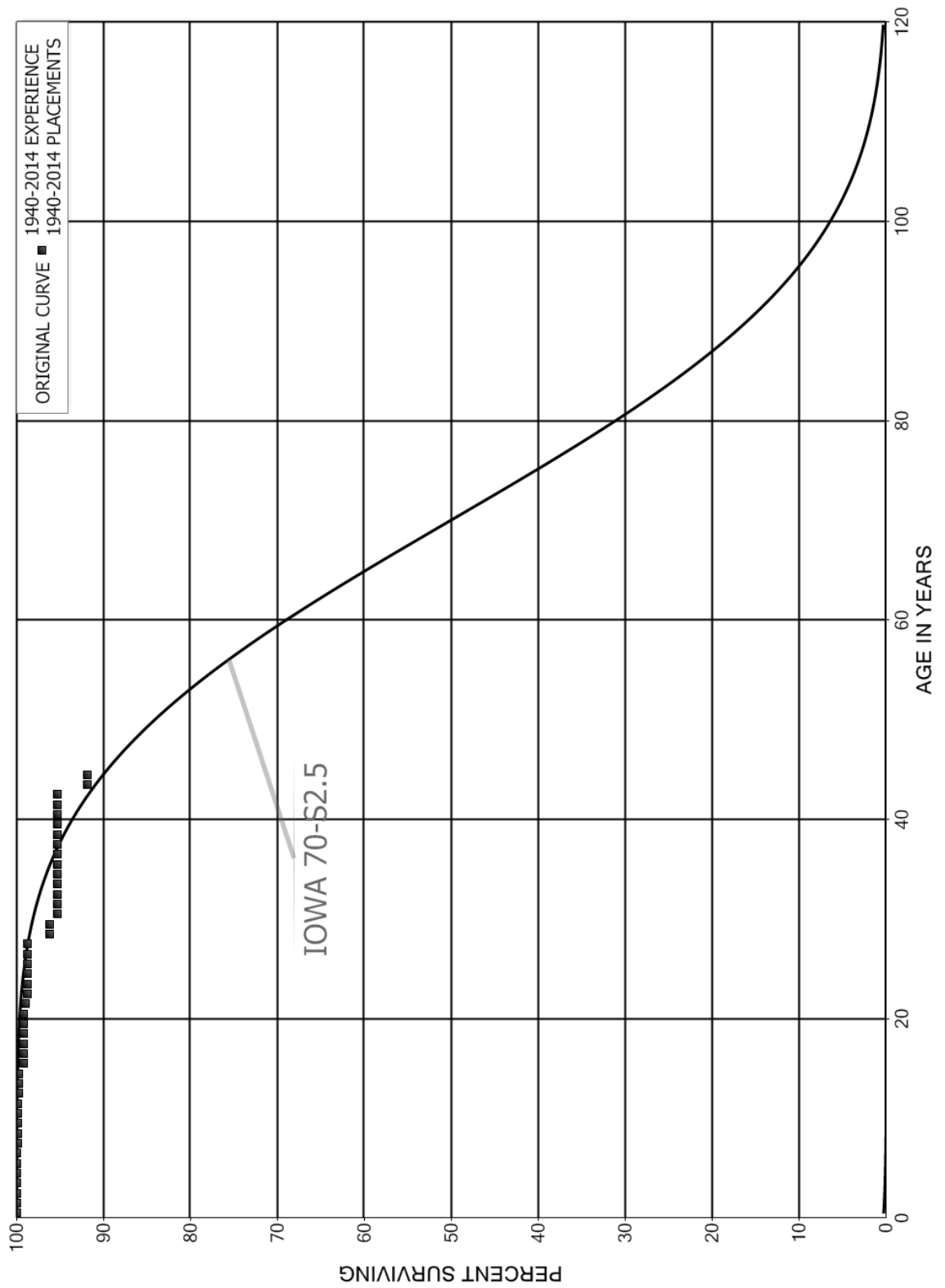
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
0.0	961,358		0.0000	1.0000	100.00
0.5	961,358		0.0000	1.0000	100.00
1.5	961,358		0.0000	1.0000	100.00
2.5	961,358		0.0000	1.0000	100.00
3.5	961,358		0.0000	1.0000	100.00
4.5	961,358		0.0000	1.0000	100.00
5.5	961,358		0.0000	1.0000	100.00
6.5	846,775		0.0000	1.0000	100.00
7.5	119,897		0.0000	1.0000	100.00
8.5	119,897		0.0000	1.0000	100.00
9.5	98,939		0.0000	1.0000	100.00
10.5	98,939		0.0000	1.0000	100.00
11.5	98,939		0.0000	1.0000	100.00
12.5	98,939		0.0000	1.0000	100.00
13.5	98,939		0.0000	1.0000	100.00
14.5	98,939		0.0000	1.0000	100.00
15.5	98,939		0.0000	1.0000	100.00
16.5	98,939		0.0000	1.0000	100.00
17.5	98,939		0.0000	1.0000	100.00
18.5	98,939		0.0000	1.0000	100.00
19.5	98,939		0.0000	1.0000	100.00
20.5	98,939		0.0000	1.0000	100.00
21.5	98,939		0.0000	1.0000	100.00
22.5	98,939		0.0000	1.0000	100.00
23.5	98,939		0.0000	1.0000	100.00
24.5	98,939		0.0000	1.0000	100.00
25.5	98,939		0.0000	1.0000	100.00
26.5	98,939		0.0000	1.0000	100.00
27.5	98,939		0.0000	1.0000	100.00
28.5	98,939		0.0000	1.0000	100.00
29.5	98,939		0.0000	1.0000	100.00
30.5	98,939		0.0000	1.0000	100.00
31.5	83,965		0.0000	1.0000	100.00
32.5	83,965		0.0000	1.0000	100.00
33.5	83,965		0.0000	1.0000	100.00
34.5					100.00



PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

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	15,360,780	5	0.0000	1.0000	100.00
0.5	14,459,155	2	0.0000	1.0000	100.00
1.5	14,282,999		0.0000	1.0000	100.00
2.5	13,257,441	1	0.0000	1.0000	100.00
3.5	13,073,271	24	0.0000	1.0000	100.00
4.5	12,477,294	15	0.0000	1.0000	100.00
5.5	12,181,831		0.0000	1.0000	100.00
6.5	11,409,875	3,658	0.0003	0.9997	100.00
7.5	10,785,208	24,712	0.0023	0.9977	99.97
8.5	10,543,066	4,112	0.0004	0.9996	99.74
9.5	10,137,604	7,531	0.0007	0.9993	99.70
10.5	9,920,124	20,649	0.0021	0.9979	99.63
11.5	9,323,283	10,523	0.0011	0.9989	99.42
12.5	8,935,137	3,804	0.0004	0.9996	99.31
13.5	7,909,942		0.0000	1.0000	99.26
14.5	7,444,971	12,106	0.0016	0.9984	99.26
15.5	7,362,560		0.0000	1.0000	99.10
16.5	6,907,132	39,184	0.0057	0.9943	99.10
17.5	6,773,252		0.0000	1.0000	98.54
18.5	6,617,078	2,932	0.0004	0.9996	98.54
19.5	4,428,978		0.0000	1.0000	98.50
20.5	3,025,207		0.0000	1.0000	98.50
21.5	1,864,963		0.0000	1.0000	98.50
22.5	1,597,365		0.0000	1.0000	98.50
23.5	786,281	247,630	0.3149	0.6851	98.50
24.5	431,972		0.0000	1.0000	67.48
25.5	402,933		0.0000	1.0000	67.48
26.5	382,076		0.0000	1.0000	67.48
27.5	366,435	1,634	0.0045	0.9955	67.48
28.5	308,239		0.0000	1.0000	67.18
29.5	279,351	69,778	0.2498	0.7502	67.18
30.5	205,915		0.0000	1.0000	50.40
31.5	205,915	10,451	0.0508	0.9492	50.40
32.5	30,931		0.0000	1.0000	47.84
33.5	30,931		0.0000	1.0000	47.84
34.5	30,931		0.0000	1.0000	47.84
35.5	30,931		0.0000	1.0000	47.84
36.5	30,931	30,931	1.0000		47.84
37.5					



PLACEMENT BAND 1940-2014

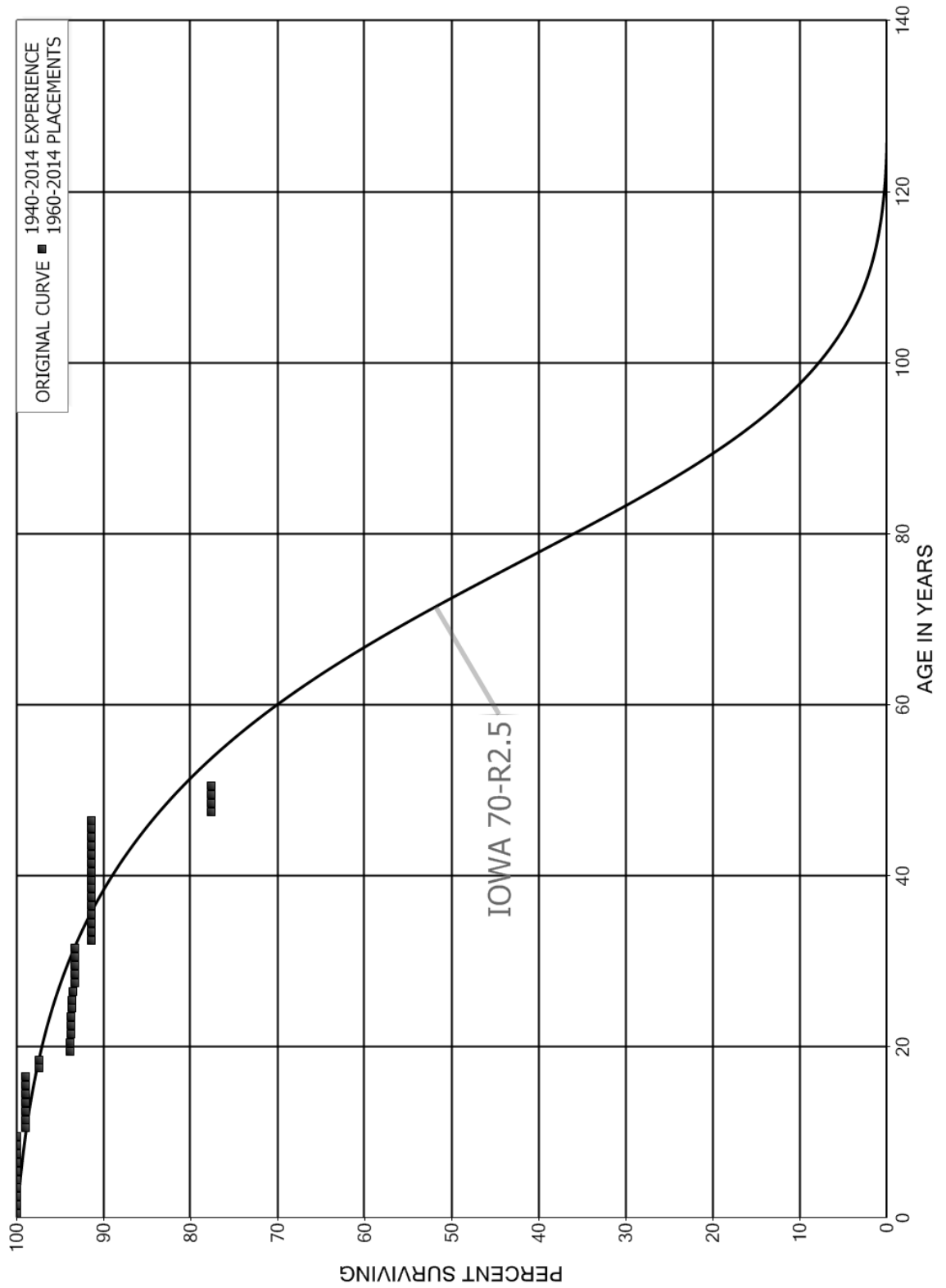
EXPERIENCE BAND 1940-2014

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	32,677,973		0.0000	1.0000	100.00
0.5	30,513,630	8,191	0.0003	0.9997	100.00
1.5	30,273,405	13	0.0000	1.0000	99.97
2.5	28,192,695	859	0.0000	1.0000	99.97
3.5	27,486,488	6	0.0000	1.0000	99.97
4.5	25,276,645	145	0.0000	1.0000	99.97
5.5	23,727,939	108	0.0000	1.0000	99.97
6.5	20,241,439	23,135	0.0011	0.9989	99.97
7.5	18,030,313	3,130	0.0002	0.9998	99.85
8.5	15,129,810	1	0.0000	1.0000	99.84
9.5	14,886,387	2,949	0.0002	0.9998	99.84
10.5	13,779,066	2,491	0.0002	0.9998	99.82
11.5	12,928,809	8,049	0.0006	0.9994	99.80
12.5	12,920,760	14	0.0000	1.0000	99.74
13.5	12,916,120		0.0000	1.0000	99.74
14.5	12,534,792	67,547	0.0054	0.9946	99.74
15.5	12,467,245	88	0.0000	1.0000	99.20
16.5	11,769,579	698	0.0001	0.9999	99.20
17.5	11,737,423	167	0.0000	1.0000	99.19
18.5	11,718,278	3,289	0.0003	0.9997	99.19
19.5	11,714,989		0.0000	1.0000	99.16
20.5	11,207,828	20,086	0.0018	0.9982	99.16
21.5	10,434,321	26,030	0.0025	0.9975	98.99
22.5	10,408,291		0.0000	1.0000	98.74
23.5	10,392,941		0.0000	1.0000	98.74
24.5	10,392,941		0.0000	1.0000	98.74
25.5	10,327,873		0.0000	1.0000	98.74
26.5	10,327,873		0.0000	1.0000	98.74
27.5	10,240,090	271,167	0.0265	0.9735	98.74
28.5	9,968,923		0.0000	1.0000	96.12
29.5	9,968,923	85,735	0.0086	0.9914	96.12
30.5	9,883,188	50	0.0000	1.0000	95.30
31.5	9,883,138	1,528	0.0002	0.9998	95.30
32.5	430,634		0.0000	1.0000	95.28
33.5	430,634		0.0000	1.0000	95.28
34.5	430,634		0.0000	1.0000	95.28
35.5	430,634		0.0000	1.0000	95.28
36.5	430,634	0	0.0000	1.0000	95.28
37.5	430,634		0.0000	1.0000	95.28
38.5	430,634		0.0000	1.0000	95.28

PLACEMENT BAND 1940-2014

EXPERIENCE BAND 1940-2014

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	430,634		0.0000	1.0000	95.28
40.5	430,634		0.0000	1.0000	95.28
41.5	430,634		0.0000	1.0000	95.28
42.5	430,634	15,405	0.0358	0.9642	95.28
43.5	415,229		0.0000	1.0000	91.87
44.5	415,229		0.0000	1.0000	91.87
45.5	422,498		0.0000	1.0000	91.87
46.5	422,498	367,027	0.8687	0.1313	91.87
47.5	55,471		0.0000	1.0000	12.06
48.5	55,471	55,471	1.0000		12.06
49.5					



PLACEMENT BAND 1960-2014

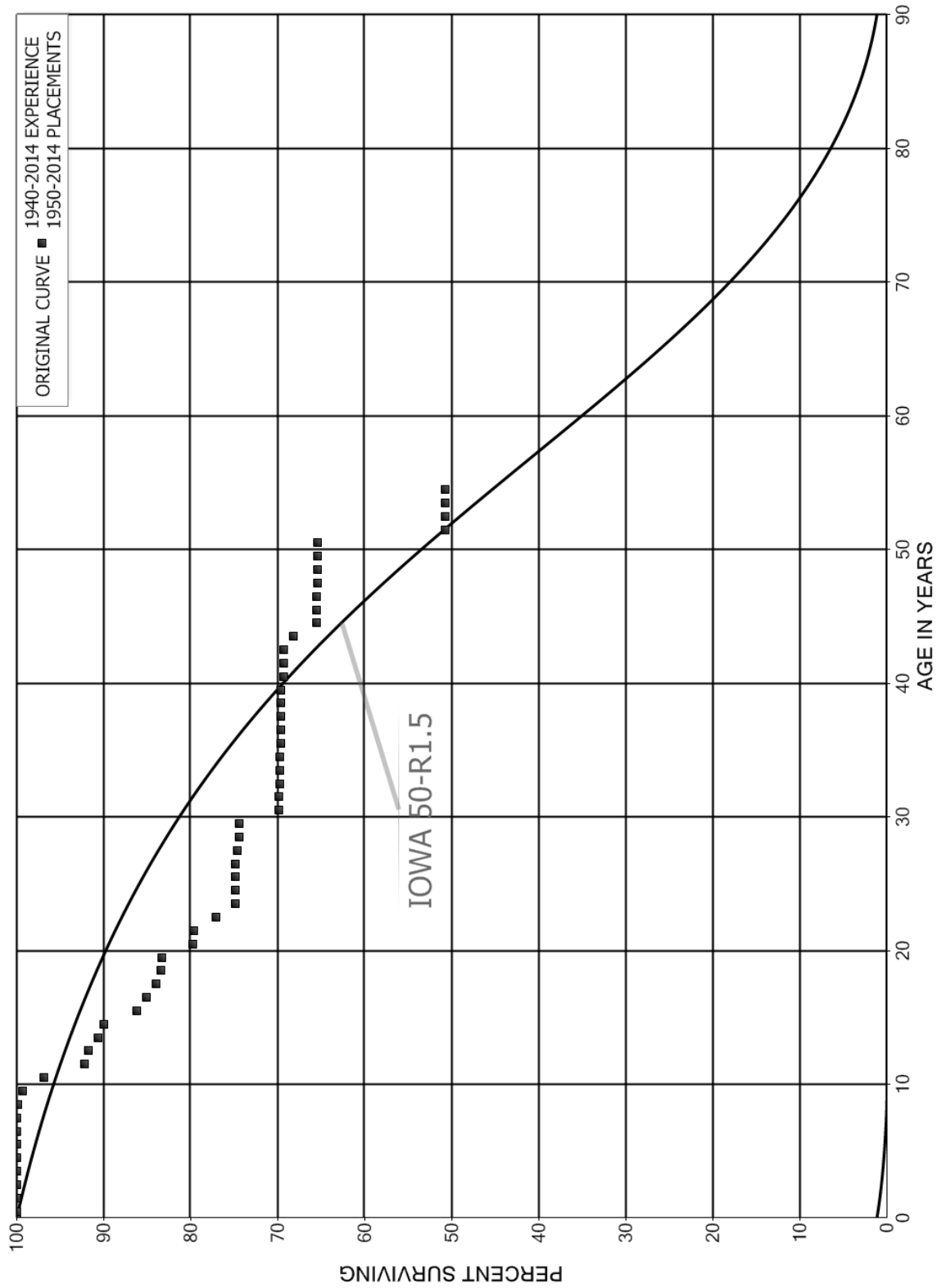
EXPERIENCE BAND 1940-2014

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	99,092,983	2	0.0000	1.0000	100.00
0.5	97,975,970	81	0.0000	1.0000	100.00
1.5	97,749,335		0.0000	1.0000	100.00
2.5	96,362,507	11,780	0.0001	0.9999	100.00
3.5	75,686,206	143	0.0000	1.0000	99.99
4.5	63,358,591	12,549	0.0002	0.9998	99.99
5.5	55,089,999		0.0000	1.0000	99.97
6.5	55,089,999	442	0.0000	1.0000	99.97
7.5	47,283,212	919	0.0000	1.0000	99.97
8.5	37,144,636	13,082	0.0004	0.9996	99.96
9.5	36,904,908	357,852	0.0097	0.9903	99.93
10.5	22,736,964		0.0000	1.0000	98.96
11.5	22,625,422		0.0000	1.0000	98.96
12.5	22,457,480		0.0000	1.0000	98.96
13.5	20,779,970	3,850	0.0002	0.9998	98.96
14.5	11,792,129	34	0.0000	1.0000	98.94
15.5	11,616,511	200	0.0000	1.0000	98.94
16.5	11,052,366	169,288	0.0153	0.9847	98.94
17.5	10,640,607	1,844	0.0002	0.9998	97.42
18.5	10,028,979	370,968	0.0370	0.9630	97.41
19.5	9,394,508		0.0000	1.0000	93.81
20.5	9,192,161	11,543	0.0013	0.9987	93.81
21.5	9,105,619		0.0000	1.0000	93.69
22.5	9,028,856		0.0000	1.0000	93.69
23.5	8,764,178	4,535	0.0005	0.9995	93.69
24.5	8,689,445		0.0000	1.0000	93.64
25.5	8,564,605	8,624	0.0010	0.9990	93.64
26.5	8,535,649	26,293	0.0031	0.9969	93.54
27.5	8,486,117		0.0000	1.0000	93.26
28.5	8,344,444		0.0000	1.0000	93.26
29.5	8,320,182		0.0000	1.0000	93.26
30.5	8,243,785		0.0000	1.0000	93.26
31.5	8,243,759	166,278	0.0202	0.9798	93.26
32.5	1,778,626		0.0000	1.0000	91.38
33.5	1,778,626		0.0000	1.0000	91.38
34.5	1,778,626		0.0000	1.0000	91.38
35.5	1,778,626		0.0000	1.0000	91.38
36.5	1,778,626		0.0000	1.0000	91.38
37.5	1,773,174	112	0.0001	0.9999	91.38
38.5	1,773,062		0.0000	1.0000	91.37

PLACEMENT BAND 1960-2014

EXPERIENCE BAND 1940-2014

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	1,773,062		0.0000	1.0000	91.37
40.5	1,773,062		0.0000	1.0000	91.37
41.5	1,773,062		0.0000	1.0000	91.37
42.5	1,773,062		0.0000	1.0000	91.37
43.5	1,772,742		0.0000	1.0000	91.37
44.5	1,772,742		0.0000	1.0000	91.37
45.5	1,772,446		0.0000	1.0000	91.37
46.5	1,772,446	266,032	0.1501	0.8499	91.37
47.5	1,506,414		0.0000	1.0000	77.66
48.5	1,506,414		0.0000	1.0000	77.66
49.5	1,506,148		0.0000	1.0000	77.66
50.5	671,949		0.0000	1.0000	77.66
51.5	10,021		0.0000	1.0000	77.66
52.5	10,021		0.0000	1.0000	77.66
53.5	10,021		0.0000	1.0000	77.66
54.5					77.66



PLACEMENT BAND 1950-2014

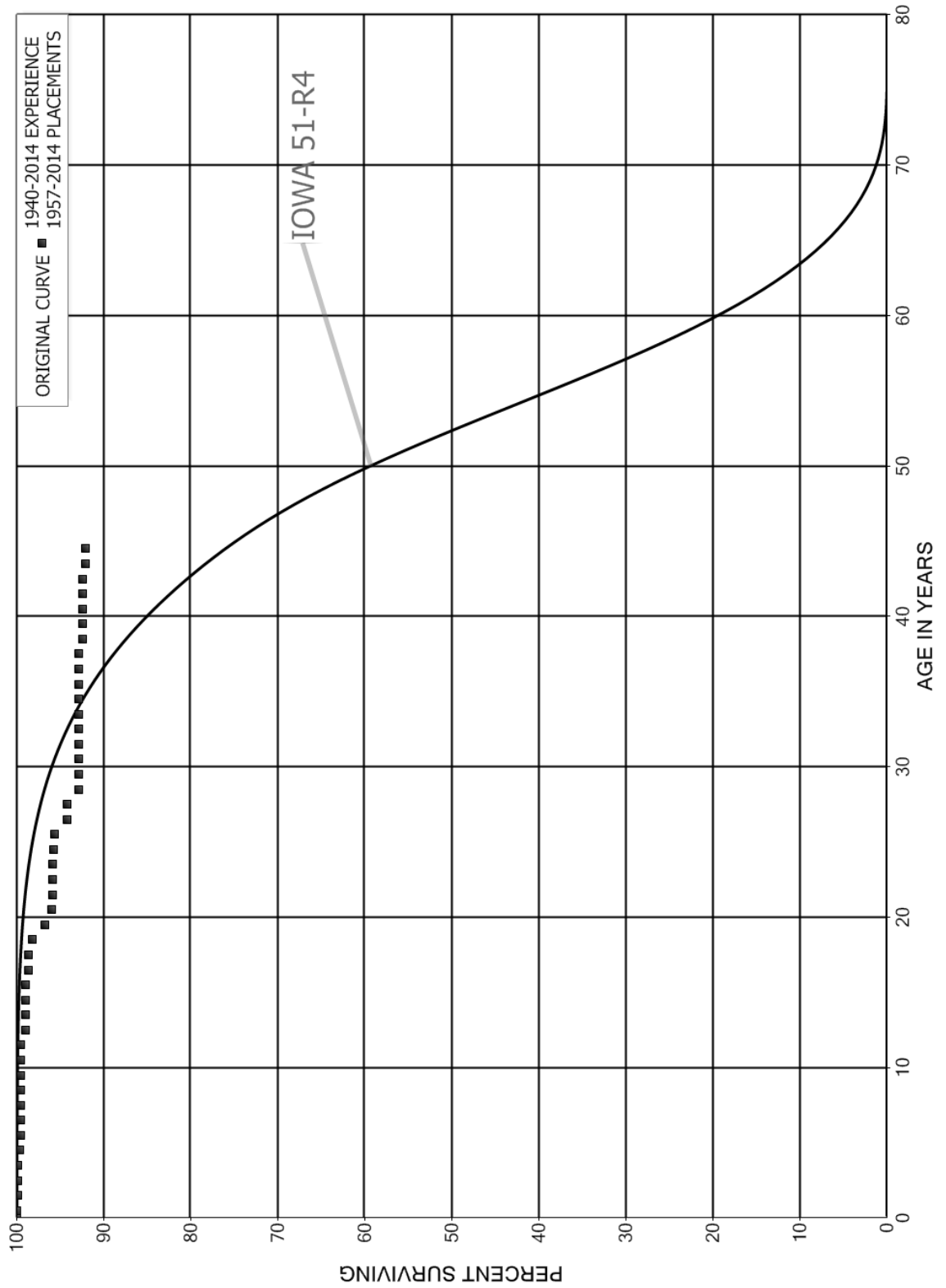
EXPERIENCE BAND 1940-2014

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	46,287,962	8	0.0000	1.0000	100.00
0.5	45,397,962		0.0000	1.0000	100.00
1.5	44,856,157	11,938	0.0003	0.9997	100.00
2.5	41,370,510	6,685	0.0002	0.9998	99.97
3.5	34,715,069	1	0.0000	1.0000	99.96
4.5	28,895,768		0.0000	1.0000	99.96
5.5	24,012,699	12,203	0.0005	0.9995	99.96
6.5	23,472,953	6	0.0000	1.0000	99.91
7.5	20,700,402	16,472	0.0008	0.9992	99.91
8.5	18,583,121	102,496	0.0055	0.9945	99.83
9.5	18,375,670	444,870	0.0242	0.9758	99.28
10.5	12,671,673	611,492	0.0483	0.9517	96.87
11.5	11,863,857	65,309	0.0055	0.9945	92.20
12.5	11,330,770	133,290	0.0118	0.9882	91.69
13.5	7,235,534	50,660	0.0070	0.9930	90.61
14.5	5,908,136	252,891	0.0428	0.9572	89.98
15.5	5,618,478	71,759	0.0128	0.9872	86.13
16.5	5,201,025	67,855	0.0130	0.9870	85.03
17.5	5,102,357	33,268	0.0065	0.9935	83.92
18.5	4,868,577	5,911	0.0012	0.9988	83.37
19.5	4,862,666	206,860	0.0425	0.9575	83.27
20.5	4,655,573	7,707	0.0017	0.9983	79.73
21.5	4,571,917	147,574	0.0323	0.9677	79.59
22.5	4,376,417	126,619	0.0289	0.9711	77.03
23.5	4,115,343		0.0000	1.0000	74.80
24.5	4,081,092		0.0000	1.0000	74.80
25.5	4,026,114		0.0000	1.0000	74.80
26.5	4,022,924	11,492	0.0029	0.9971	74.80
27.5	4,011,432	7,386	0.0018	0.9982	74.58
28.5	3,907,055		0.0000	1.0000	74.45
29.5	3,907,055	241,006	0.0617	0.9383	74.45
30.5	3,624,758		0.0000	1.0000	69.85
31.5	3,624,758	4,594	0.0013	0.9987	69.85
32.5	3,620,164		0.0000	1.0000	69.76
33.5	3,620,164		0.0000	1.0000	69.76
34.5	3,620,164	5,466	0.0015	0.9985	69.76
35.5	3,612,373		0.0000	1.0000	69.66
36.5	3,599,863		0.0000	1.0000	69.66
37.5	3,595,664		0.0000	1.0000	69.66
38.5	3,585,574		0.0000	1.0000	69.66

PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

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	3,585,332	21,593	0.0060	0.9940	69.66
40.5	3,557,577		0.0000	1.0000	69.24
41.5	3,554,533		0.0000	1.0000	69.24
42.5	3,554,533	56,212	0.0158	0.9842	69.24
43.5	3,332,279	130,039	0.0390	0.9610	68.15
44.5	3,202,240		0.0000	1.0000	65.49
45.5	3,197,708		0.0000	1.0000	65.49
46.5	3,194,558	4,140	0.0013	0.9987	65.49
47.5	3,190,419		0.0000	1.0000	65.40
48.5	3,189,485		0.0000	1.0000	65.40
49.5	3,189,485		0.0000	1.0000	65.40
50.5	3,185,109	717,072	0.2251	0.7749	65.40
51.5	2,432,028		0.0000	1.0000	50.68
52.5	2,432,028		0.0000	1.0000	50.68
53.5	2,432,028		0.0000	1.0000	50.68
54.5					50.68



PLACEMENT BAND 1957-2014

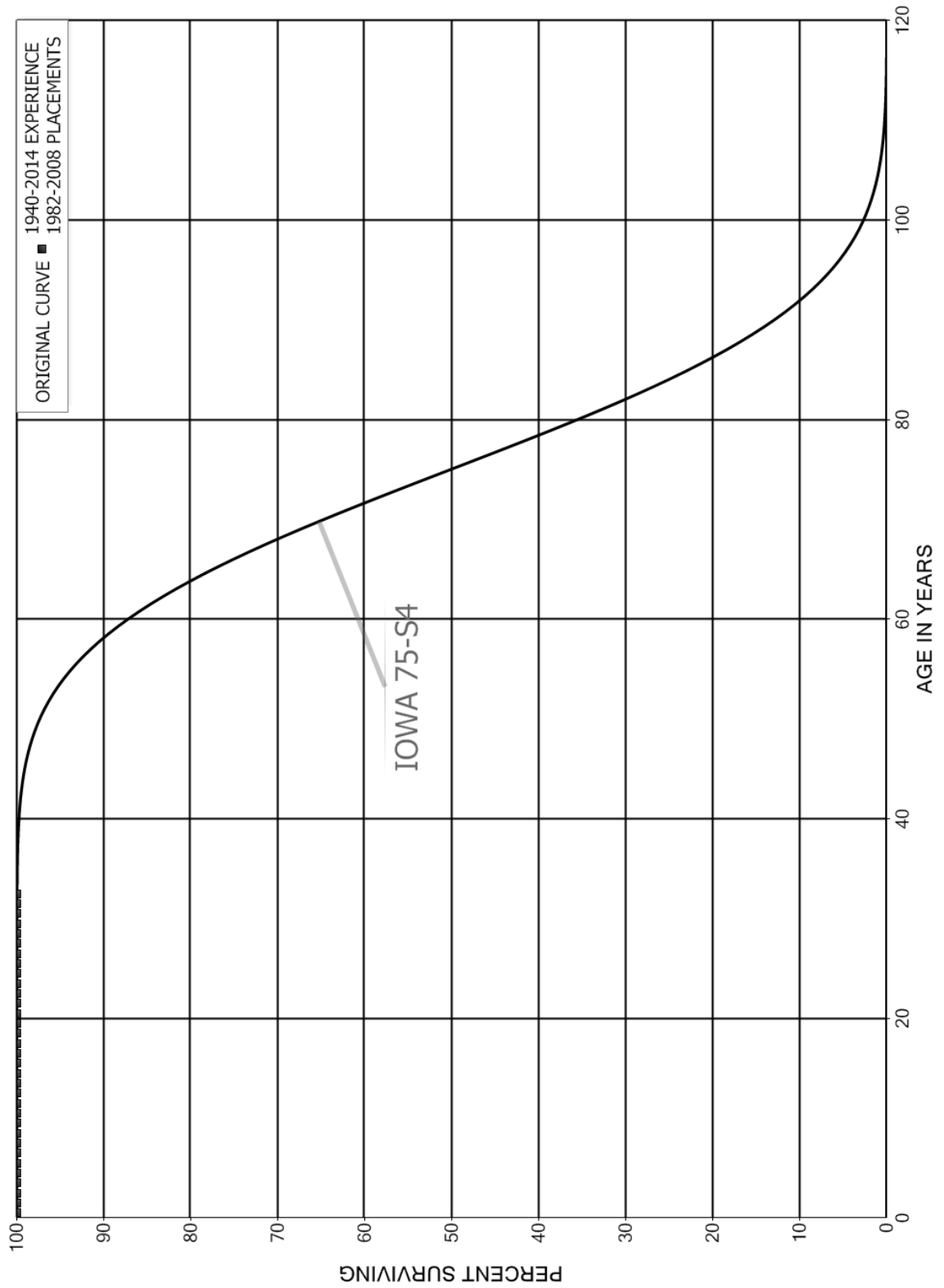
EXPERIENCE BAND 1940-2014

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	49,363,810	272	0.0000	1.0000	100.00
0.5	48,131,554	95,862	0.0020	0.9980	100.00
1.5	47,916,237		0.0000	1.0000	99.80
2.5	46,412,376	2,565	0.0001	0.9999	99.80
3.5	46,150,597	81,442	0.0018	0.9982	99.79
4.5	45,313,227	36,311	0.0008	0.9992	99.62
5.5	42,968,478	2,919	0.0001	0.9999	99.54
6.5	42,592,269	2,315	0.0001	0.9999	99.53
7.5	41,905,798	680	0.0000	1.0000	99.53
8.5	41,127,508	3,046	0.0001	0.9999	99.53
9.5	40,202,352	9,262	0.0002	0.9998	99.52
10.5	29,789,751		0.0000	1.0000	99.49
11.5	11,551,143	60,396	0.0052	0.9948	99.49
12.5	10,995,637	1,580	0.0001	0.9999	98.97
13.5	10,994,056		0.0000	1.0000	98.96
14.5	9,019,175		0.0000	1.0000	98.96
15.5	8,465,986	25,182	0.0030	0.9970	98.96
16.5	5,612,664		0.0000	1.0000	98.67
17.5	5,029,674	22,758	0.0045	0.9955	98.67
18.5	4,510,854	68,021	0.0151	0.9849	98.22
19.5	4,182,440	33,312	0.0080	0.9920	96.74
20.5	3,914,344	5,827	0.0015	0.9985	95.97
21.5	3,698,405		0.0000	1.0000	95.83
22.5	3,622,934		0.0000	1.0000	95.83
23.5	3,443,401	3,529	0.0010	0.9990	95.83
24.5	3,036,947	3,994	0.0013	0.9987	95.73
25.5	2,874,934	42,951	0.0149	0.9851	95.60
26.5	2,671,223		0.0000	1.0000	94.17
27.5	2,481,259	36,609	0.0148	0.9852	94.17
28.5	2,131,013		0.0000	1.0000	92.78
29.5	2,047,668		0.0000	1.0000	92.78
30.5	1,986,502		0.0000	1.0000	92.78
31.5	1,986,502		0.0000	1.0000	92.78
32.5	1,661,190		0.0000	1.0000	92.78
33.5	1,661,190		0.0000	1.0000	92.78
34.5	1,661,190		0.0000	1.0000	92.78
35.5	1,661,185		0.0000	1.0000	92.78
36.5	1,640,350		0.0000	1.0000	92.78
37.5	1,619,320	6,310	0.0039	0.9961	92.78
38.5	1,599,976		0.0000	1.0000	92.42

PLACEMENT BAND 1957-2014

EXPERIENCE BAND 1940-2014

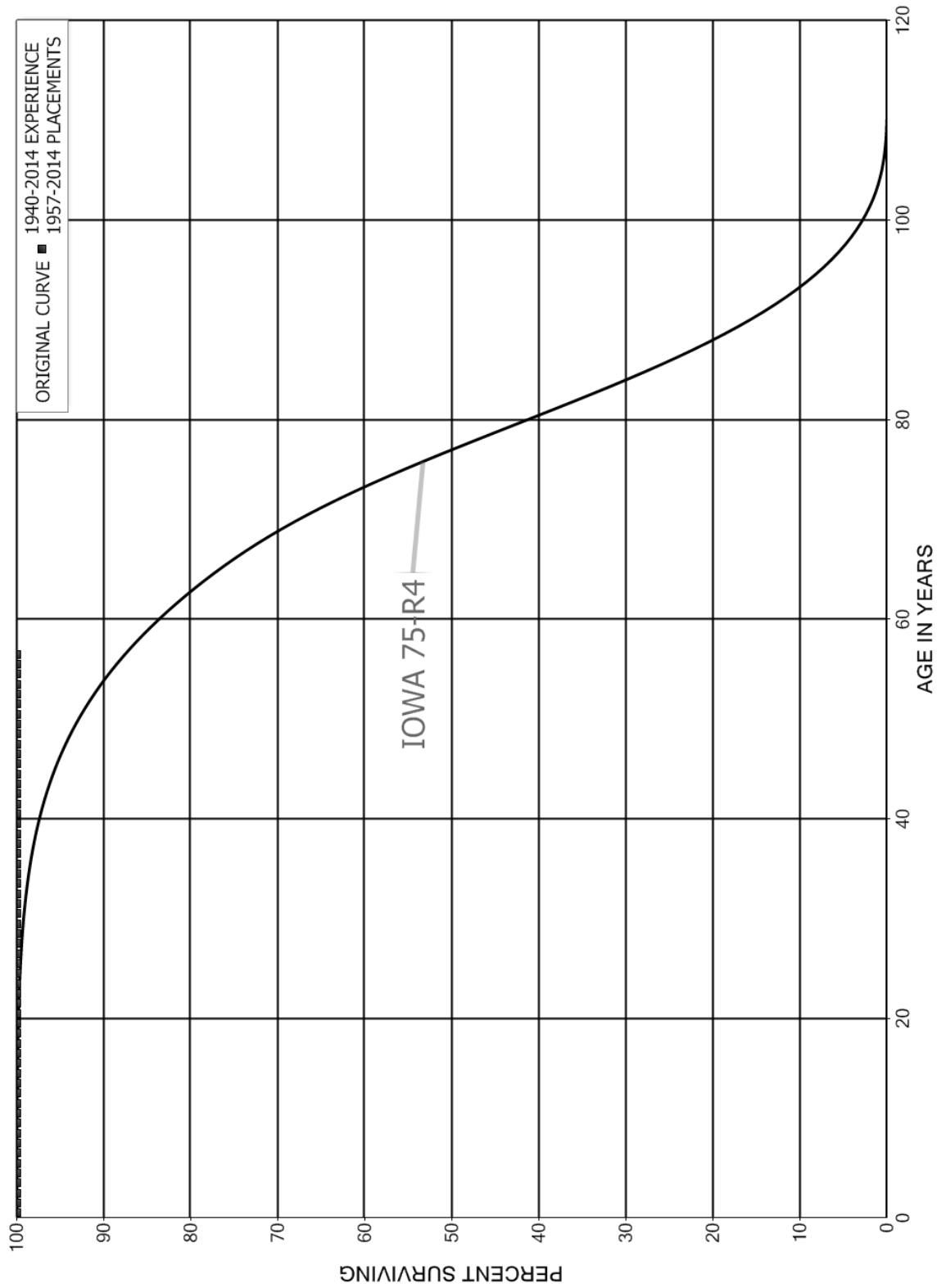
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
39.5	1,598,416		0.0000	1.0000	92.42
40.5	1,597,496		0.0000	1.0000	92.42
41.5	1,597,496		0.0000	1.0000	92.42
42.5	1,597,496	6,006	0.0038	0.9962	92.42
43.5	1,591,490		0.0000	1.0000	92.07
44.5	1,591,490		0.0000	1.0000	92.07
45.5	1,591,490	7,418	0.0047	0.9953	92.07
46.5	1,584,072	970,828	0.6129	0.3871	91.65
47.5	613,244	297,278	0.4848	0.5152	35.48
48.5	312,171	15,472	0.0496	0.9504	18.28
49.5	296,699		0.0000	1.0000	17.37
50.5	296,699		0.0000	1.0000	17.37
51.5	296,699		0.0000	1.0000	17.37
52.5	296,699		0.0000	1.0000	17.37
53.5	296,699		0.0000	1.0000	17.37
54.5					17.37



PLACEMENT BAND 1982-2008

EXPERIENCE BAND 1940-2014

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	1,287,434		0.0000	1.0000	100.00
0.5	1,287,434		0.0000	1.0000	100.00
1.5	1,287,434		0.0000	1.0000	100.00
2.5	1,287,434		0.0000	1.0000	100.00
3.5	1,287,434		0.0000	1.0000	100.00
4.5	1,287,434		0.0000	1.0000	100.00
5.5	1,287,434		0.0000	1.0000	100.00
6.5	1,053,045		0.0000	1.0000	100.00
7.5	1,053,045		0.0000	1.0000	100.00
8.5	1,046,226		0.0000	1.0000	100.00
9.5	1,046,226		0.0000	1.0000	100.00
10.5	1,045,307		0.0000	1.0000	100.00
11.5	1,043,069		0.0000	1.0000	100.00
12.5	1,043,069		0.0000	1.0000	100.00
13.5	998,633		0.0000	1.0000	100.00
14.5	998,633		0.0000	1.0000	100.00
15.5	895,359		0.0000	1.0000	100.00
16.5	895,359		0.0000	1.0000	100.00
17.5	895,359		0.0000	1.0000	100.00
18.5	895,359		0.0000	1.0000	100.00
19.5	895,359		0.0000	1.0000	100.00
20.5	895,359		0.0000	1.0000	100.00
21.5	895,359		0.0000	1.0000	100.00
22.5	794,709		0.0000	1.0000	100.00
23.5	783,776		0.0000	1.0000	100.00
24.5	659,334		0.0000	1.0000	100.00
25.5	625,867		0.0000	1.0000	100.00
26.5	613,505		0.0000	1.0000	100.00
27.5	613,505		0.0000	1.0000	100.00
28.5	613,505		0.0000	1.0000	100.00
29.5	613,505		0.0000	1.0000	100.00
30.5	589,100		0.0000	1.0000	100.00
31.5	589,100		0.0000	1.0000	100.00
32.5					100.00



PLACEMENT BAND 1957-2014

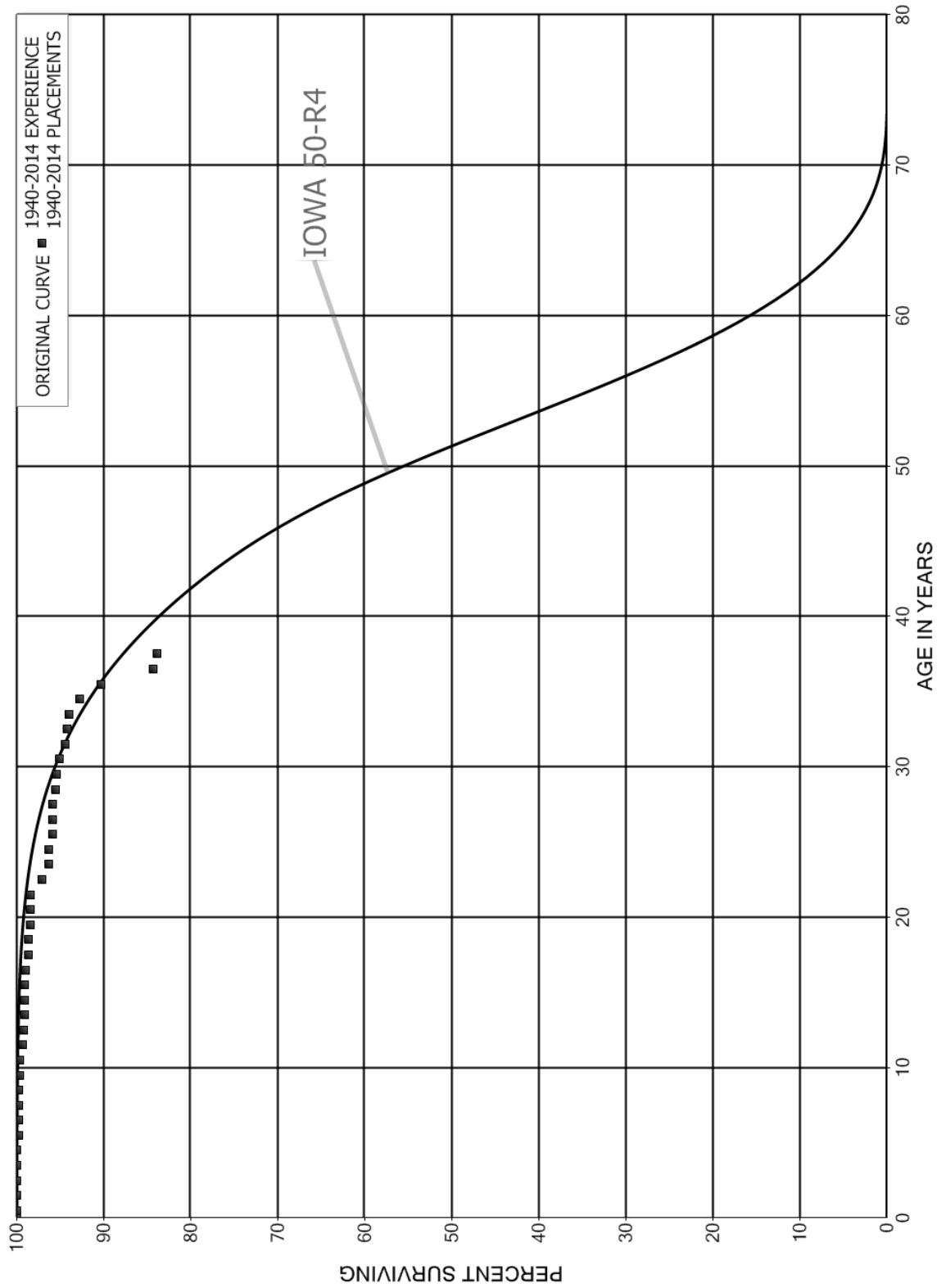
EXPERIENCE BAND 1940-2014

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	8,046,804		0.0000	1.0000	100.00
0.5	7,993,273		0.0000	1.0000	100.00
1.5	7,980,696		0.0000	1.0000	100.00
2.5	7,936,064		0.0000	1.0000	100.00
3.5	7,849,780		0.0000	1.0000	100.00
4.5	7,412,230		0.0000	1.0000	100.00
5.5	6,961,797		0.0000	1.0000	100.00
6.5	5,847,236		0.0000	1.0000	100.00
7.5	4,363,677		0.0000	1.0000	100.00
8.5	4,292,061		0.0000	1.0000	100.00
9.5	3,202,451		0.0000	1.0000	100.00
10.5	3,032,990		0.0000	1.0000	100.00
11.5	2,743,465		0.0000	1.0000	100.00
12.5	2,743,465		0.0000	1.0000	100.00
13.5	2,623,386		0.0000	1.0000	100.00
14.5	2,398,250		0.0000	1.0000	100.00
15.5	2,320,120		0.0000	1.0000	100.00
16.5	2,107,190		0.0000	1.0000	100.00
17.5	2,032,945		0.0000	1.0000	100.00
18.5	1,716,420		0.0000	1.0000	100.00
19.5	1,665,506		0.0000	1.0000	100.00
20.5	1,355,675		0.0000	1.0000	100.00
21.5	1,294,168		0.0000	1.0000	100.00
22.5	1,244,067		0.0000	1.0000	100.00
23.5	1,178,569		0.0000	1.0000	100.00
24.5	1,119,640		0.0000	1.0000	100.00
25.5	1,070,424		0.0000	1.0000	100.00
26.5	973,976		0.0000	1.0000	100.00
27.5	893,749		0.0000	1.0000	100.00
28.5	762,809		0.0000	1.0000	100.00
29.5	658,417		0.0000	1.0000	100.00
30.5	520,434		0.0000	1.0000	100.00
31.5	470,331		0.0000	1.0000	100.00
32.5	428,696		0.0000	1.0000	100.00
33.5	408,973		0.0000	1.0000	100.00
34.5	357,588		0.0000	1.0000	100.00
35.5	331,094		0.0000	1.0000	100.00
36.5	320,262		0.0000	1.0000	100.00
37.5	310,199		0.0000	1.0000	100.00
38.5	224,331		0.0000	1.0000	100.00

PLACEMENT BAND 1957-2014

EXPERIENCE BAND 1940-2014

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	216,135		0.0000	1.0000	100.00
40.5	211,637		0.0000	1.0000	100.00
41.5	210,804		0.0000	1.0000	100.00
42.5	210,325		0.0000	1.0000	100.00
43.5	208,682		0.0000	1.0000	100.00
44.5	207,813		0.0000	1.0000	100.00
45.5	206,616		0.0000	1.0000	100.00
46.5	206,020		0.0000	1.0000	100.00
47.5	203,661		0.0000	1.0000	100.00
48.5	199,710		0.0000	1.0000	100.00
49.5	180,436		0.0000	1.0000	100.00
50.5	163,443		0.0000	1.0000	100.00
51.5	132,182		0.0000	1.0000	100.00
52.5	112,026		0.0000	1.0000	100.00
53.5	109,176		0.0000	1.0000	100.00
54.5	108,593		0.0000	1.0000	100.00
55.5	105,830		0.0000	1.0000	100.00
56.5	71,278		0.0000	1.0000	100.00
57.5					100.00



PLACEMENT BAND 1940-2014

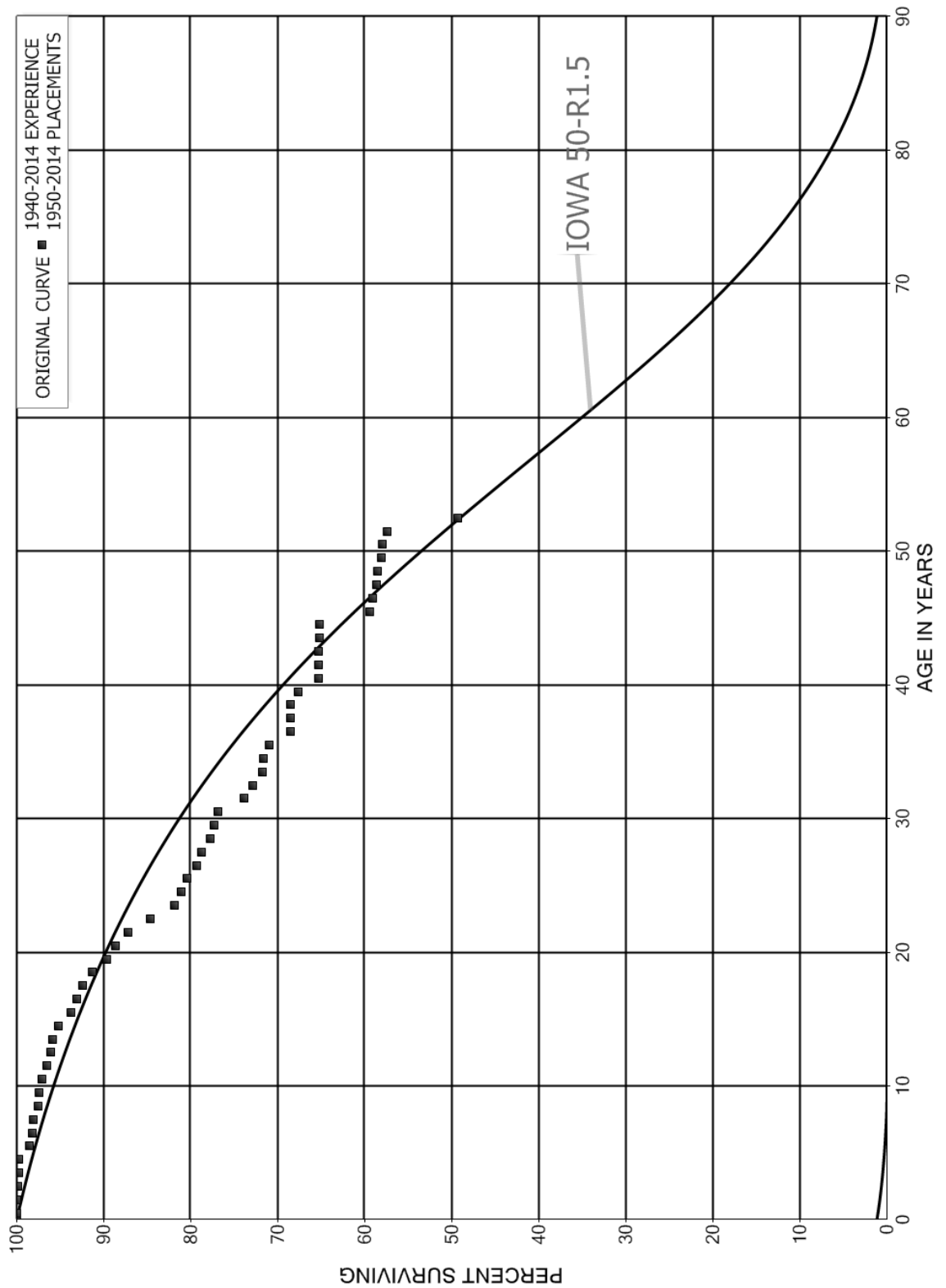
EXPERIENCE BAND 1940-2014

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	182,971,780	61,913	0.0003	0.9997	100.00
0.5	176,455,072	12,672	0.0001	0.9999	99.97
1.5	175,862,134	889	0.0000	1.0000	99.96
2.5	170,895,788	1,895	0.0000	1.0000	99.96
3.5	131,066,286	3,359	0.0000	1.0000	99.96
4.5	120,933,140	243,714	0.0020	0.9980	99.95
5.5	118,932,087	60,553	0.0005	0.9995	99.75
6.5	118,711,000	22,102	0.0002	0.9998	99.70
7.5	104,981,825	4,635	0.0000	1.0000	99.68
8.5	92,830,366	11,949	0.0001	0.9999	99.68
9.5	47,763,361	6,909	0.0001	0.9999	99.67
10.5	38,692,655	162,000	0.0042	0.9958	99.65
11.5	28,322,655	12,448	0.0004	0.9996	99.24
12.5	28,276,476	42,330	0.0015	0.9985	99.19
13.5	26,943,010	574	0.0000	1.0000	99.04
14.5	26,579,557	6,244	0.0002	0.9998	99.04
15.5	26,257,199	22,135	0.0008	0.9992	99.02
16.5	25,430,717	93,327	0.0037	0.9963	98.93
17.5	25,034,505		0.0000	1.0000	98.57
18.5	21,333,892	30,539	0.0014	0.9986	98.57
19.5	21,093,224	10,705	0.0005	0.9995	98.43
20.5	20,444,416	510	0.0000	1.0000	98.38
21.5	18,775,837	251,691	0.0134	0.9866	98.38
22.5	18,094,469	150,320	0.0083	0.9917	97.06
23.5	17,846,137		0.0000	1.0000	96.25
24.5	17,650,948	78,454	0.0044	0.9956	96.25
25.5	17,372,968	2,403	0.0001	0.9999	95.82
26.5	17,336,120		0.0000	1.0000	95.81
27.5	14,765,378	54,795	0.0037	0.9963	95.81
28.5	14,224,939	7,596	0.0005	0.9995	95.46
29.5	10,423,427	32,412	0.0031	0.9969	95.40
30.5	9,613,603	68,117	0.0071	0.9929	95.11
31.5	9,484,389	30,205	0.0032	0.9968	94.43
32.5	6,755,641	10,998	0.0016	0.9984	94.13
33.5	6,740,298	92,236	0.0137	0.9863	93.98
34.5	6,548,200	166,394	0.0254	0.9746	92.69
35.5	4,803,348	320,075	0.0666	0.9334	90.34
36.5	3,075,382	17,358	0.0056	0.9944	84.32
37.5	1,572,533		0.0000	1.0000	83.84
38.5	1,570,382	372,043	0.2369	0.7631	83.84

PLACEMENT BAND 1940-2014

EXPERIENCE BAND 1940-2014

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	1,192,645	38,120	0.0320	0.9680	63.98
40.5	1,153,194	76,264	0.0661	0.9339	61.93
41.5	1,074,322	1,257	0.0012	0.9988	57.84
42.5	1,072,306	2,354	0.0022	0.9978	57.77
43.5	1,057,254	1,267	0.0012	0.9988	57.64
44.5	1,046,743	73,764	0.0705	0.9295	57.58
45.5	845,381	299,212	0.3539	0.6461	53.52
46.5	546,169	323	0.0006	0.9994	34.58
47.5	520,576	2,276	0.0044	0.9956	34.56
48.5	343,819	93	0.0003	0.9997	34.40
49.5	343,726	470	0.0014	0.9986	34.40
50.5	343,256		0.0000	1.0000	34.35
51.5	343,256		0.0000	1.0000	34.35
52.5	343,256	312,038	0.9091	0.0909	34.35
53.5	31,217	3,189	0.1022	0.8978	3.12
54.5	28,028	13,920	0.4967	0.5033	2.80
55.5	14,107		0.0000	1.0000	1.41
56.5	14,107	14,107	1.0000		1.41
57.5					



PLACEMENT BAND 1950-2014

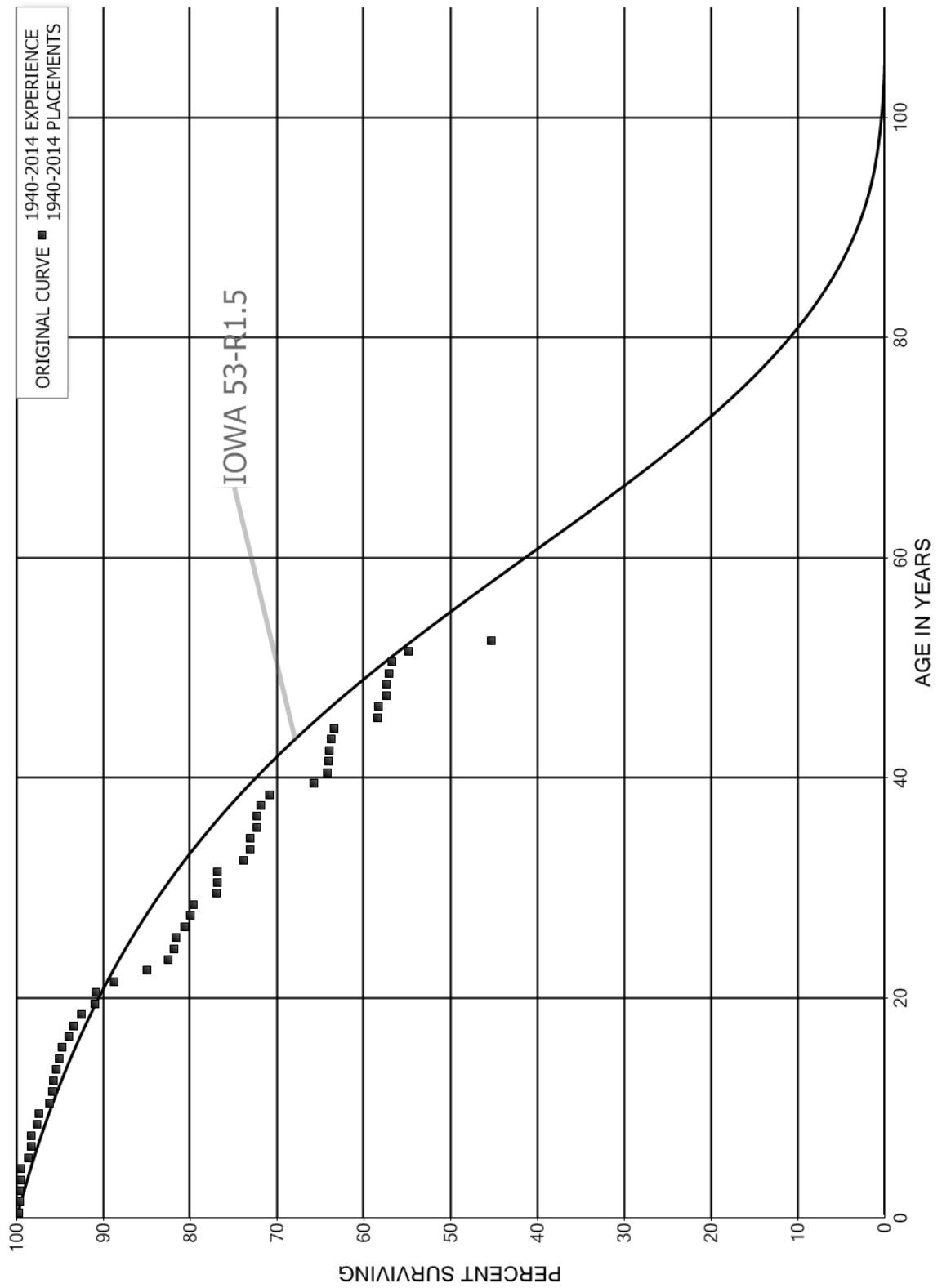
EXPERIENCE BAND 1940-2014

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	111,060,600	3,015	0.0000	1.0000	100.00
0.5	102,210,756	68,974	0.0007	0.9993	100.00
1.5	101,561,896	150,928	0.0015	0.9985	99.93
2.5	99,176,714	23,901	0.0002	0.9998	99.78
3.5	96,307,325	48,875	0.0005	0.9995	99.76
4.5	75,883,224	882,493	0.0116	0.9884	99.71
5.5	70,502,395	237,858	0.0034	0.9966	98.55
6.5	67,193,683	100,379	0.0015	0.9985	98.21
7.5	58,966,106	355,616	0.0060	0.9940	98.07
8.5	55,850,407	37,735	0.0007	0.9993	97.48
9.5	50,134,942	150,135	0.0030	0.9970	97.41
10.5	42,945,436	294,780	0.0069	0.9931	97.12
11.5	34,187,429	121,455	0.0036	0.9964	96.45
12.5	33,595,784	97,346	0.0029	0.9971	96.11
13.5	32,056,337	222,798	0.0070	0.9930	95.83
14.5	29,232,644	427,632	0.0146	0.9854	95.17
15.5	27,946,466	204,986	0.0073	0.9927	93.77
16.5	25,342,539	193,800	0.0076	0.9924	93.09
17.5	24,308,815	275,867	0.0113	0.9887	92.37
18.5	20,397,605	391,191	0.0192	0.9808	91.32
19.5	19,440,040	214,752	0.0110	0.9890	89.57
20.5	15,661,976	246,943	0.0158	0.9842	88.58
21.5	14,950,285	448,928	0.0300	0.9700	87.19
22.5	14,098,413	447,688	0.0318	0.9682	84.57
23.5	13,171,736	136,209	0.0103	0.9897	81.88
24.5	12,509,945	90,992	0.0073	0.9927	81.04
25.5	12,088,738	167,107	0.0138	0.9862	80.45
26.5	11,136,759	90,756	0.0081	0.9919	79.34
27.5	10,514,647	132,198	0.0126	0.9874	78.69
28.5	8,948,254	42,101	0.0047	0.9953	77.70
29.5	7,879,010	51,193	0.0065	0.9935	77.33
30.5	6,365,233	249,779	0.0392	0.9608	76.83
31.5	5,528,032	74,847	0.0135	0.9865	73.82
32.5	5,029,693	74,098	0.0147	0.9853	72.82
33.5	4,780,276	5,236	0.0011	0.9989	71.74
34.5	4,177,746	40,899	0.0098	0.9902	71.67
35.5	4,037,708	138,156	0.0342	0.9658	70.96
36.5	3,780,284	1,428	0.0004	0.9996	68.54
37.5	3,708,667	680	0.0002	0.9998	68.51
38.5	2,706,981	34,091	0.0126	0.9874	68.50

PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

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	2,579,100	88,503	0.0343	0.9657	67.64
40.5	2,459,201	1,995	0.0008	0.9992	65.31
41.5	2,450,961	136	0.0001	0.9999	65.26
42.5	2,447,005	3,560	0.0015	0.9985	65.26
43.5	2,439,693		0.0000	1.0000	65.16
44.5	2,436,662	216,149	0.0887	0.9113	65.16
45.5	2,214,692	11,960	0.0054	0.9946	59.38
46.5	2,199,043	17,905	0.0081	0.9919	59.06
47.5	2,159,202	3,243	0.0015	0.9985	58.58
48.5	2,121,097	14,331	0.0068	0.9932	58.49
49.5	2,053,356	4,140	0.0020	0.9980	58.10
50.5	1,877,724	18,208	0.0097	0.9903	57.98
51.5	1,537,359	218,881	0.1424	0.8576	57.42
52.5	1,101,794	330,581	0.3000	0.7000	49.24
53.5	766,508	3,189	0.0042	0.9958	34.47
54.5	752,171	15,363	0.0204	0.9796	34.32
55.5	638,767		0.0000	1.0000	33.62
56.5	436,458	31,184	0.0714	0.9286	33.62
57.5					31.22



PLACEMENT BAND 1940-2014

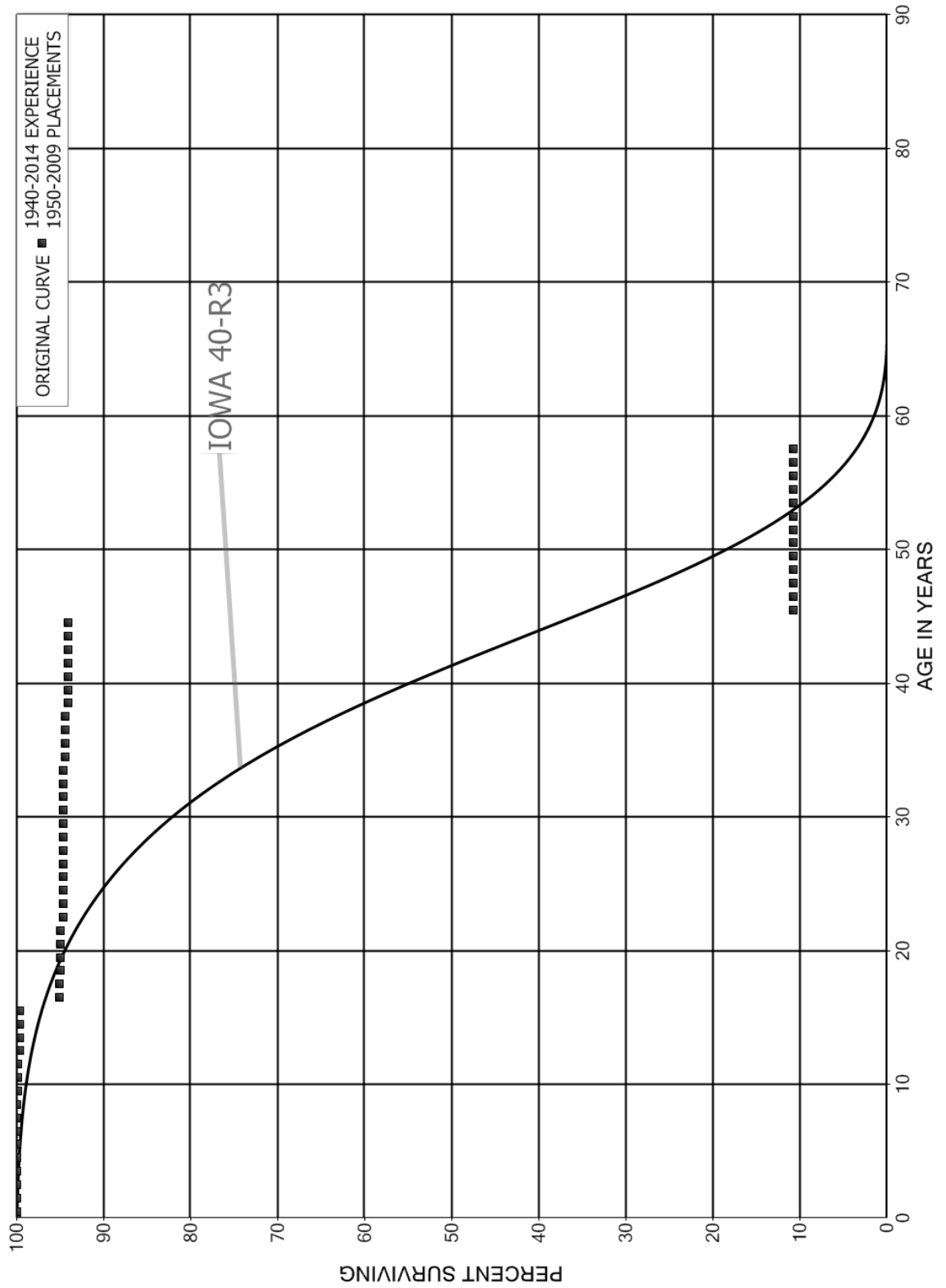
EXPERIENCE BAND 1940-2014

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	107,667,426	333,465	0.0031	0.9969	100.00
0.5	99,723,294	65,274	0.0007	0.9993	99.69
1.5	98,678,543	13,498	0.0001	0.9999	99.63
2.5	96,429,600	124,592	0.0013	0.9987	99.61
3.5	93,506,925	15,210	0.0002	0.9998	99.48
4.5	73,116,373	643,958	0.0088	0.9912	99.47
5.5	67,737,799	176,181	0.0026	0.9974	98.59
6.5	64,494,566	48,893	0.0008	0.9992	98.33
7.5	58,877,124	412,526	0.0070	0.9930	98.26
8.5	55,910,992	77,249	0.0014	0.9986	97.57
9.5	51,619,707	677,234	0.0131	0.9869	97.44
10.5	43,668,009	126,572	0.0029	0.9971	96.16
11.5	35,072,598	43,857	0.0013	0.9987	95.88
12.5	34,569,218	122,916	0.0036	0.9964	95.76
13.5	32,974,623	107,027	0.0032	0.9968	95.42
14.5	30,199,006	115,811	0.0038	0.9962	95.11
15.5	29,129,849	235,134	0.0081	0.9919	94.74
16.5	26,341,704	169,081	0.0064	0.9936	93.98
17.5	25,299,624	233,139	0.0092	0.9908	93.38
18.5	21,285,756	357,394	0.0168	0.9832	92.52
19.5	20,313,977	38,920	0.0019	0.9981	90.96
20.5	16,585,854	381,248	0.0230	0.9770	90.79
21.5	15,694,678	674,363	0.0430	0.9570	88.70
22.5	14,590,265	407,523	0.0279	0.9721	84.89
23.5	13,680,841	105,238	0.0077	0.9923	82.52
24.5	13,034,615	45,395	0.0035	0.9965	81.88
25.5	12,649,324	157,603	0.0125	0.9875	81.60
26.5	11,683,841	88,468	0.0076	0.9924	80.58
27.5	11,020,615	42,821	0.0039	0.9961	79.97
28.5	9,501,555	324,022	0.0341	0.9659	79.66
29.5	7,997,114	6,408	0.0008	0.9992	76.94
30.5	6,483,245	4,074	0.0006	0.9994	76.88
31.5	5,867,166	232,316	0.0396	0.9604	76.83
32.5	5,186,234	48,551	0.0094	0.9906	73.79
33.5	4,957,225	4,141	0.0008	0.9992	73.10
34.5	4,338,281	44,352	0.0102	0.9898	73.04
35.5	4,015,188	2,422	0.0006	0.9994	72.29
36.5	3,890,002	23,996	0.0062	0.9938	72.25
37.5	3,793,758	53,509	0.0141	0.9859	71.80
38.5	2,704,732	194,894	0.0721	0.9279	70.79

PLACEMENT BAND 1940-2014

EXPERIENCE BAND 1940-2014

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	2,412,449	55,466	0.0230	0.9770	65.69
40.5	2,324,666	5,517	0.0024	0.9976	64.18
41.5	2,312,721	2,669	0.0012	0.9988	64.03
42.5	2,306,120	10,091	0.0044	0.9956	63.95
43.5	2,292,167	11,970	0.0052	0.9948	63.67
44.5	2,277,077	176,823	0.0777	0.9223	63.34
45.5	2,094,263	4,858	0.0023	0.9977	58.42
46.5	2,085,608	29,993	0.0144	0.9856	58.29
47.5	2,033,037	3,120	0.0015	0.9985	57.45
48.5	1,994,033	10,908	0.0055	0.9945	57.36
49.5	1,926,881	11,650	0.0060	0.9940	57.05
50.5	1,723,044	57,430	0.0333	0.9667	56.70
51.5	1,323,725	230,172	0.1739	0.8261	54.81
52.5	872,846	20,768	0.0238	0.9762	45.28
53.5	833,203	30,980	0.0372	0.9628	44.20
54.5	790,748		0.0000	1.0000	42.56
55.5	688,048		0.0000	1.0000	42.56
56.5	479,808		0.0000	1.0000	42.56
57.5					42.56



PLACEMENT BAND 1950-2009

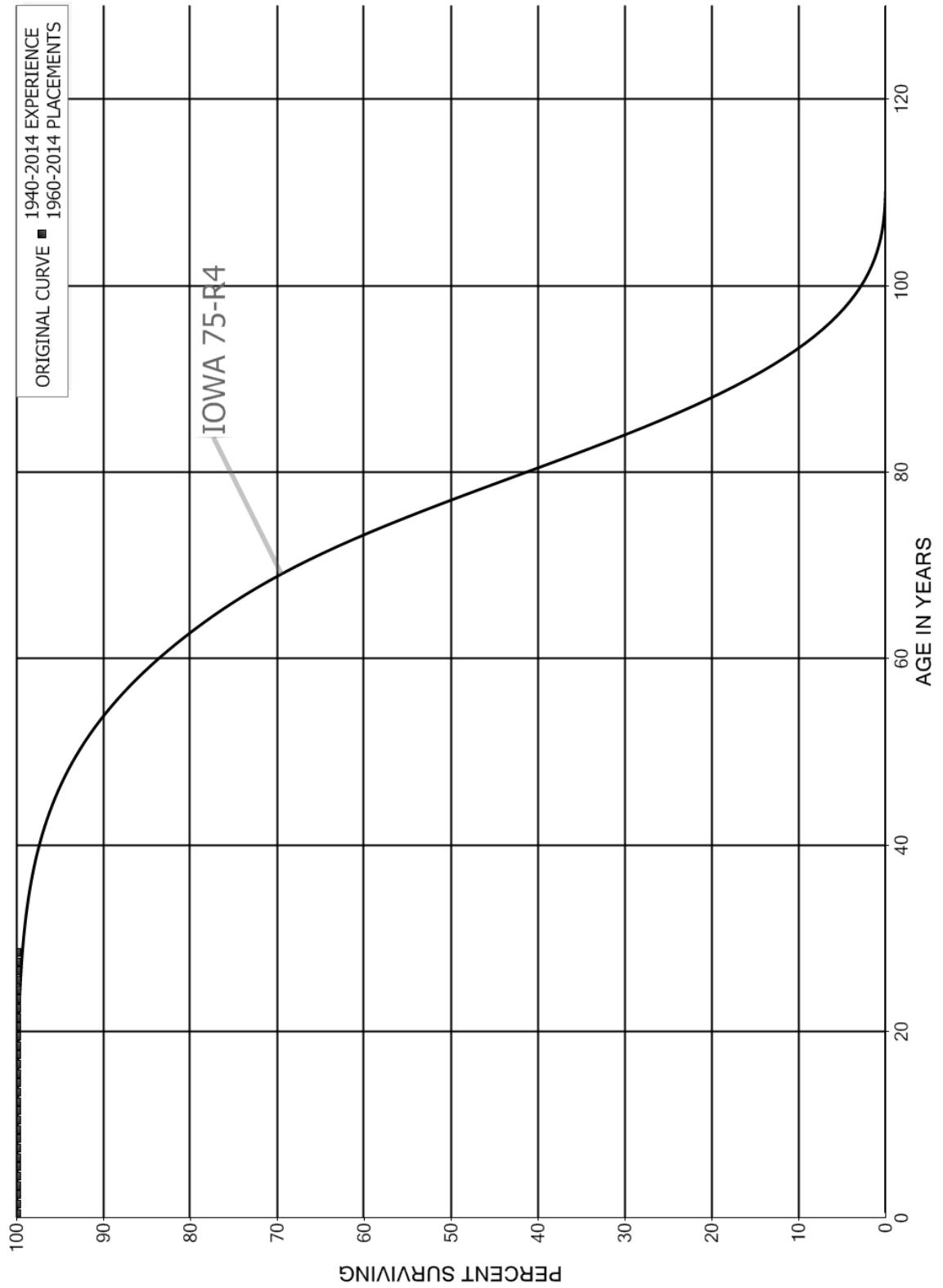
EXPERIENCE BAND 1940-2014

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	1,230,779	34	0.0000	1.0000	100.00
0.5	1,230,745		0.0000	1.0000	100.00
1.5	1,230,745	5	0.0000	1.0000	100.00
2.5	1,230,740	145	0.0001	0.9999	100.00
3.5	1,230,595	59	0.0000	1.0000	99.99
4.5	1,230,536	36	0.0000	1.0000	99.98
5.5	926,250	256	0.0003	0.9997	99.98
6.5	925,995	281	0.0003	0.9997	99.95
7.5	925,714	239	0.0003	0.9997	99.92
8.5	925,475	36	0.0000	1.0000	99.89
9.5	867,952	4	0.0000	1.0000	99.89
10.5	467,171	20	0.0000	1.0000	99.89
11.5	263,336	786	0.0030	0.9970	99.88
12.5	262,550	5	0.0000	1.0000	99.59
13.5	256,077	16	0.0001	0.9999	99.58
14.5	243,327	4	0.0000	1.0000	99.58
15.5	238,817	10,710	0.0448	0.9552	99.58
16.5	216,021		0.0000	1.0000	95.11
17.5	211,800	376	0.0018	0.9982	95.11
18.5	193,413		0.0000	1.0000	94.94
19.5	190,518	59	0.0003	0.9997	94.94
20.5	172,846		0.0000	1.0000	94.91
21.5	169,350	511	0.0030	0.9970	94.91
22.5	166,589		0.0000	1.0000	94.63
23.5	162,865		0.0000	1.0000	94.63
24.5	159,515		0.0000	1.0000	94.63
25.5	156,718		0.0000	1.0000	94.63
26.5	151,235		0.0000	1.0000	94.63
27.5	146,649	36	0.0002	0.9998	94.63
28.5	139,169		0.0000	1.0000	94.60
29.5	133,235		0.0000	1.0000	94.60
30.5	125,391		0.0000	1.0000	94.60
31.5	122,397		0.0000	1.0000	94.60
32.5	120,030		0.0000	1.0000	94.60
33.5	118,909	235	0.0020	0.9980	94.60
34.5	115,753		0.0000	1.0000	94.42
35.5	114,247		0.0000	1.0000	94.42
36.5	113,631		0.0000	1.0000	94.42
37.5	113,059	363	0.0032	0.9968	94.42
38.5	107,815	52	0.0005	0.9995	94.11

PLACEMENT BAND 1950-2009

EXPERIENCE BAND 1940-2014

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	107,297		0.0000	1.0000	94.07
40.5	107,042		0.0000	1.0000	94.07
41.5	106,994		0.0000	1.0000	94.07
42.5	106,967		0.0000	1.0000	94.07
43.5	106,874		0.0000	1.0000	94.07
44.5	106,824	94,582	0.8854	0.1146	94.07
45.5	12,174		0.0000	1.0000	10.78
46.5	12,140		0.0000	1.0000	10.78
47.5	12,006		0.0000	1.0000	10.78
48.5	11,778		0.0000	1.0000	10.78
49.5	10,682		0.0000	1.0000	10.78
50.5	9,716		0.0000	1.0000	10.78
51.5	7,939		0.0000	1.0000	10.78
52.5	6,793		0.0000	1.0000	10.78
53.5	6,631		0.0000	1.0000	10.78
54.5	6,557		0.0000	1.0000	10.78
55.5	6,016		0.0000	1.0000	10.78
56.5	4,052		0.0000	1.0000	10.78
57.5					10.78



PLACEMENT BAND 1960-2014

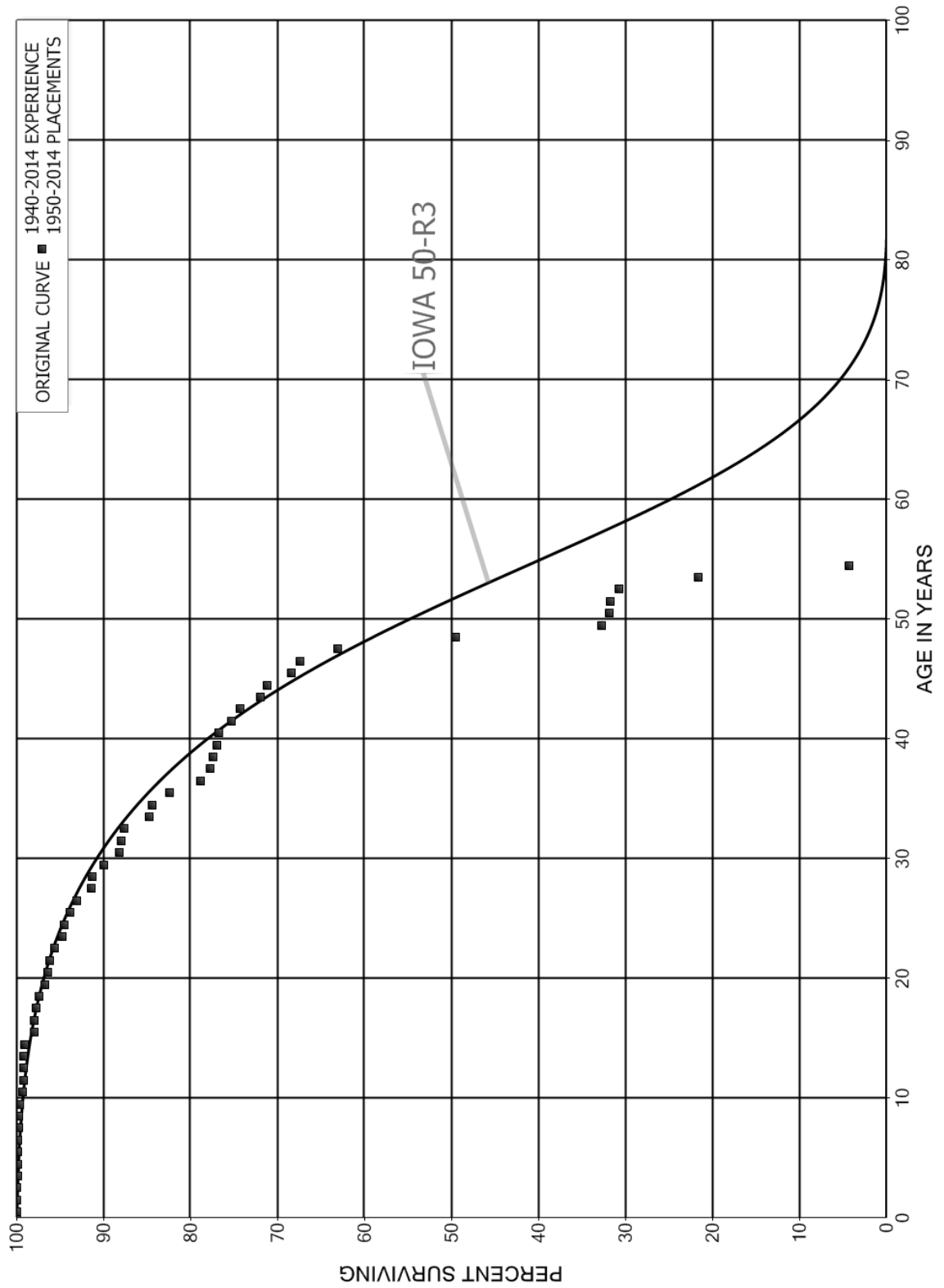
EXPERIENCE BAND 1940-2014

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	9,802,617		0.0000	1.0000	100.00
0.5	9,669,201		0.0000	1.0000	100.00
1.5	9,558,504		0.0000	1.0000	100.00
2.5	9,363,673		0.0000	1.0000	100.00
3.5	9,310,428		0.0000	1.0000	100.00
4.5	7,824,146		0.0000	1.0000	100.00
5.5	5,711,012		0.0000	1.0000	100.00
6.5	5,202,816		0.0000	1.0000	100.00
7.5	3,500,186		0.0000	1.0000	100.00
8.5	2,504,823		0.0000	1.0000	100.00
9.5	2,141,313		0.0000	1.0000	100.00
10.5	1,329,819		0.0000	1.0000	100.00
11.5	287,568		0.0000	1.0000	100.00
12.5	287,568		0.0000	1.0000	100.00
13.5	271,638		0.0000	1.0000	100.00
14.5	256,157		0.0000	1.0000	100.00
15.5	242,176		0.0000	1.0000	100.00
16.5	230,180		0.0000	1.0000	100.00
17.5	211,606		0.0000	1.0000	100.00
18.5	199,346		0.0000	1.0000	100.00
19.5	181,879		0.0000	1.0000	100.00
20.5	164,624		0.0000	1.0000	100.00
21.5	151,743		0.0000	1.0000	100.00
22.5	141,843		0.0000	1.0000	100.00
23.5	131,147		0.0000	1.0000	100.00
24.5	120,978		0.0000	1.0000	100.00
25.5	112,540		0.0000	1.0000	100.00
26.5	105,118		0.0000	1.0000	100.00
27.5	99,109		0.0000	1.0000	100.00
28.5	92,153		0.0000	1.0000	100.00
29.5	85,186		0.0000	1.0000	100.00
30.5	78,690		0.0000	1.0000	100.00
31.5	72,132		0.0000	1.0000	100.00
32.5	63,976		0.0000	1.0000	100.00
33.5	54,855		0.0000	1.0000	100.00
34.5	47,999		0.0000	1.0000	100.00
35.5	42,769		0.0000	1.0000	100.00
36.5	36,852		0.0000	1.0000	100.00
37.5	32,596		0.0000	1.0000	100.00
38.5	28,267		0.0000	1.0000	100.00

PLACEMENT BAND 1960-2014

EXPERIENCE BAND 1940-2014

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	24,741		0.0000	1.0000	100.00
40.5	22,375		0.0000	1.0000	100.00
41.5	20,903		0.0000	1.0000	100.00
42.5	19,522		0.0000	1.0000	100.00
43.5	18,470		0.0000	1.0000	100.00
44.5	17,492		0.0000	1.0000	100.00
45.5	16,460		0.0000	1.0000	100.00
46.5	15,447		0.0000	1.0000	100.00
47.5	14,490		0.0000	1.0000	100.00
48.5	13,548		0.0000	1.0000	100.00
49.5	11,575		0.0000	1.0000	100.00
50.5	10,897		0.0000	1.0000	100.00
51.5	10,064		0.0000	1.0000	100.00
52.5	9,375		0.0000	1.0000	100.00
53.5	8,862		0.0000	1.0000	100.00
54.5					100.00



PLACEMENT BAND 1950-2014

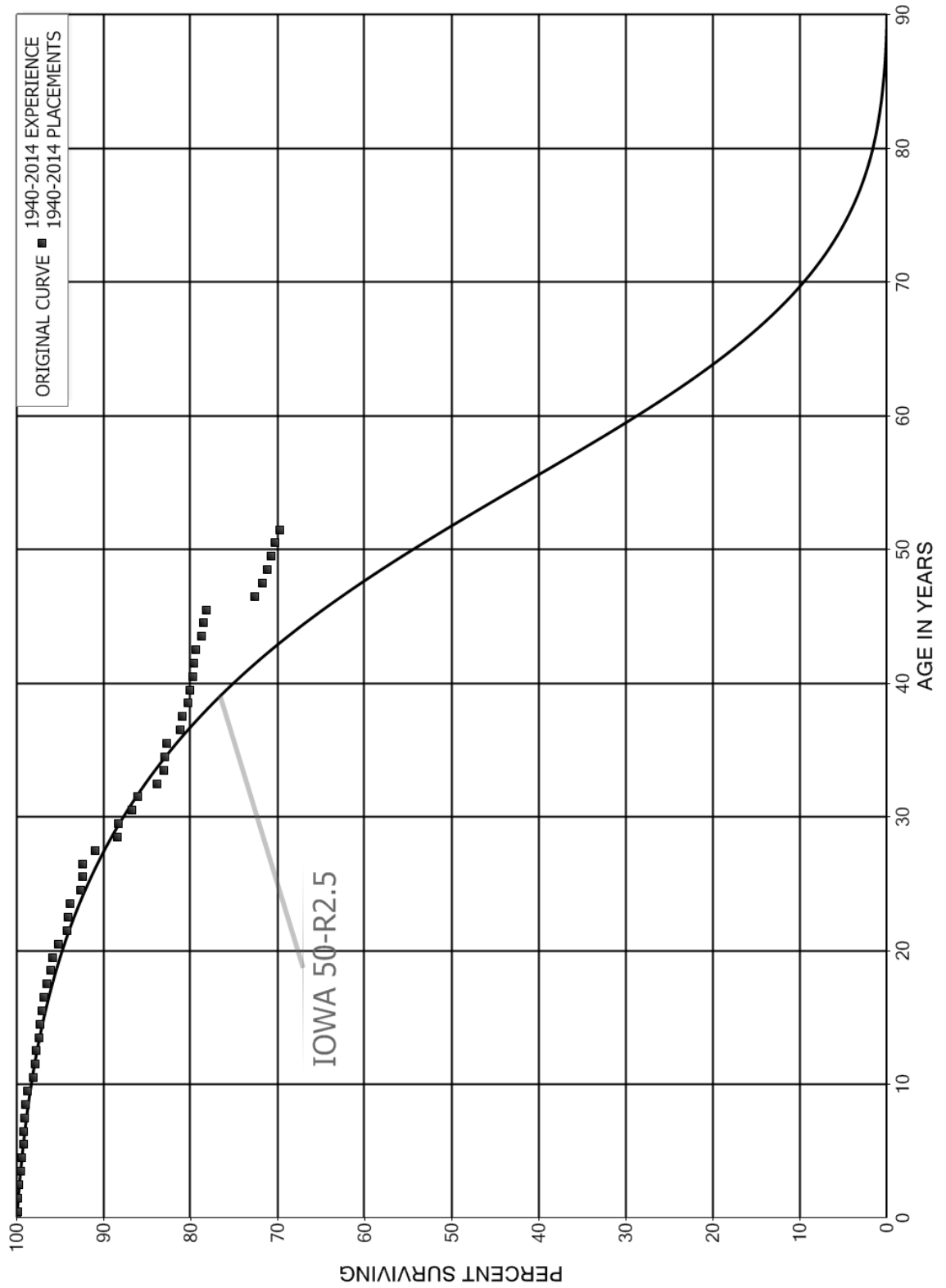
EXPERIENCE BAND 1940-2014

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	281,089,114	165,876	0.0006	0.9994	100.00
0.5	263,075,325	37,184	0.0001	0.9999	99.94
1.5	259,421,388	63,271	0.0002	0.9998	99.93
2.5	253,583,927	65,926	0.0003	0.9997	99.90
3.5	233,668,742	30,379	0.0001	0.9999	99.88
4.5	213,334,092	109,545	0.0005	0.9995	99.86
5.5	180,825,503	38,929	0.0002	0.9998	99.81
6.5	144,336,579	114,656	0.0008	0.9992	99.79
7.5	126,855,465	18,776	0.0001	0.9999	99.71
8.5	103,177,934	47,387	0.0005	0.9995	99.70
9.5	90,926,775	297,167	0.0033	0.9967	99.65
10.5	89,104,011	105,421	0.0012	0.9988	99.33
11.5	62,673,596	19,527	0.0003	0.9997	99.21
12.5	61,810,286	26,211	0.0004	0.9996	99.18
13.5	59,156,854	68,550	0.0012	0.9988	99.13
14.5	57,602,635	593,692	0.0103	0.9897	99.02
15.5	53,951,206	58,042	0.0011	0.9989	98.00
16.5	51,908,801	87,392	0.0017	0.9983	97.89
17.5	49,489,412	141,481	0.0029	0.9971	97.73
18.5	45,128,807	326,543	0.0072	0.9928	97.45
19.5	39,254,492	137,950	0.0035	0.9965	96.74
20.5	35,932,844	84,638	0.0024	0.9976	96.40
21.5	34,187,880	206,590	0.0060	0.9940	96.18
22.5	33,123,077	287,671	0.0087	0.9913	95.60
23.5	28,643,296	67,913	0.0024	0.9976	94.77
24.5	26,119,543	206,891	0.0079	0.9921	94.54
25.5	24,068,000	195,182	0.0081	0.9919	93.79
26.5	22,900,022	407,194	0.0178	0.9822	93.03
27.5	20,666,980	11,455	0.0006	0.9994	91.38
28.5	18,385,992	283,774	0.0154	0.9846	91.33
29.5	16,779,411	326,354	0.0194	0.9806	89.92
30.5	15,874,162	49,886	0.0031	0.9969	88.17
31.5	13,166,921	41,459	0.0031	0.9969	87.89
32.5	10,221,444	333,123	0.0326	0.9674	87.61
33.5	9,223,040	44,640	0.0048	0.9952	84.76
34.5	6,749,057	157,792	0.0234	0.9766	84.35
35.5	6,496,620	276,915	0.0426	0.9574	82.38
36.5	5,445,954	76,209	0.0140	0.9860	78.87
37.5	4,819,416	22,977	0.0048	0.9952	77.76
38.5	4,449,455	22,654	0.0051	0.9949	77.39

PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

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	4,120,781	14,659	0.0036	0.9964	77.00
40.5	3,856,122	70,086	0.0182	0.9818	76.72
41.5	3,773,813	53,319	0.0141	0.9859	75.33
42.5	3,315,742	102,993	0.0311	0.9689	74.26
43.5	3,159,319	34,499	0.0109	0.9891	71.96
44.5	3,066,063	120,783	0.0394	0.9606	71.17
45.5	2,553,093	36,402	0.0143	0.9857	68.37
46.5	2,490,539	159,804	0.0642	0.9358	67.39
47.5	2,329,312	499,328	0.2144	0.7856	63.07
48.5	1,548,320	525,989	0.3397	0.6603	49.55
49.5	986,026	27,189	0.0276	0.9724	32.72
50.5	947,352	3,162	0.0033	0.9967	31.81
51.5	943,723	29,422	0.0312	0.9688	31.71
52.5	887,138	263,905	0.2975	0.7025	30.72
53.5	622,449	500,232	0.8037	0.1963	21.58
54.5					4.24



PLACEMENT BAND 1940-2014

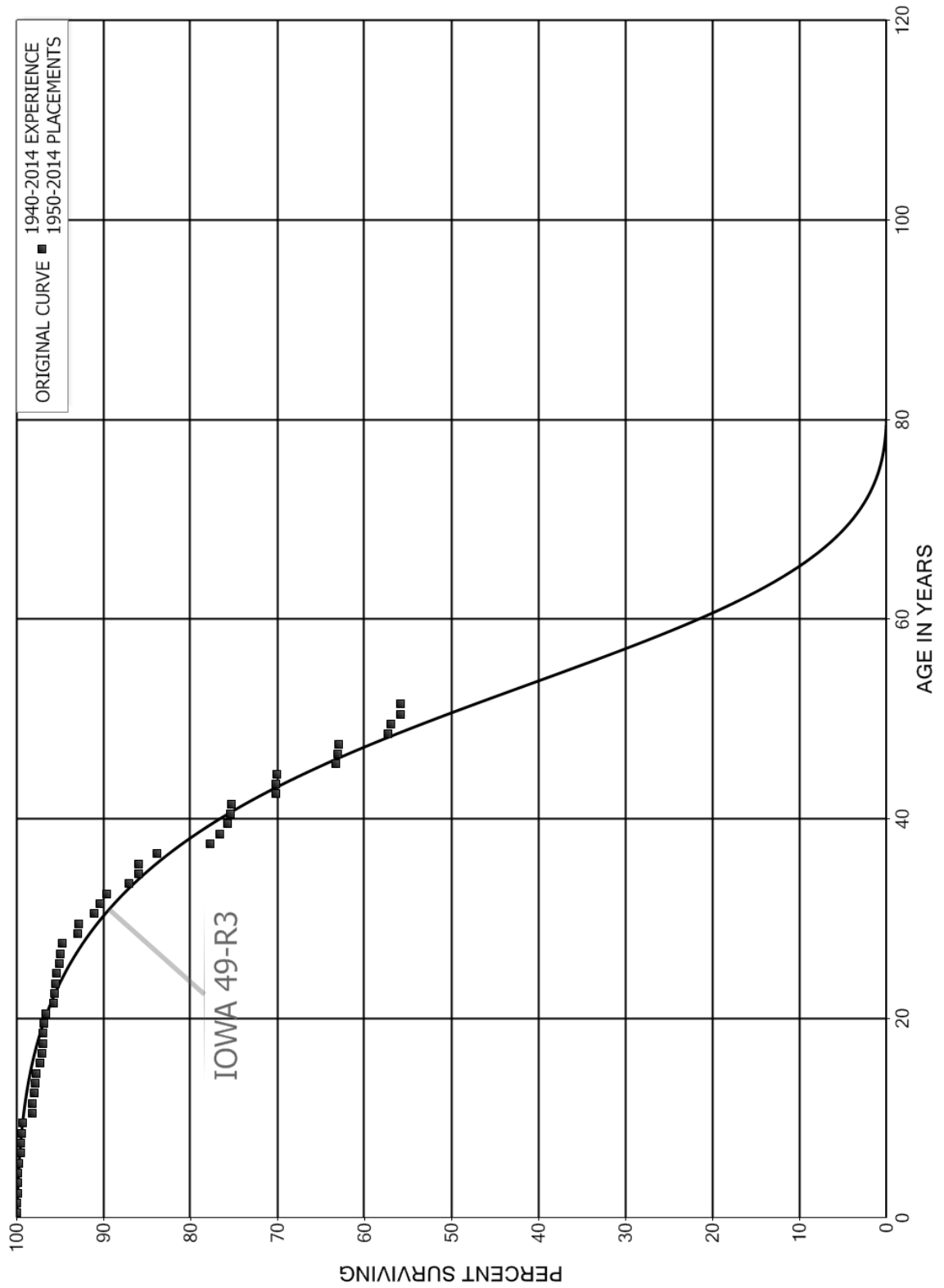
EXPERIENCE BAND 1940-2014

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	185,319,723	253,644	0.0014	0.9986	100.00
0.5	172,505,456	113,553	0.0007	0.9993	99.86
1.5	166,686,635	90,475	0.0005	0.9995	99.80
2.5	156,027,891	361,746	0.0023	0.9977	99.74
3.5	147,237,821	250,415	0.0017	0.9983	99.51
4.5	135,757,161	160,808	0.0012	0.9988	99.34
5.5	124,534,839	117,629	0.0009	0.9991	99.23
6.5	111,877,747	94,504	0.0008	0.9992	99.13
7.5	101,755,619	121,812	0.0012	0.9988	99.05
8.5	89,911,644	177,111	0.0020	0.9980	98.93
9.5	81,604,213	583,503	0.0072	0.9928	98.73
10.5	75,479,225	109,183	0.0014	0.9986	98.03
11.5	69,411,612	95,930	0.0014	0.9986	97.89
12.5	66,280,797	243,886	0.0037	0.9963	97.75
13.5	61,647,430	101,575	0.0016	0.9984	97.39
14.5	58,449,447	128,415	0.0022	0.9978	97.23
15.5	55,543,776	79,289	0.0014	0.9986	97.02
16.5	52,886,705	205,839	0.0039	0.9961	96.88
17.5	48,975,635	249,326	0.0051	0.9949	96.50
18.5	46,276,996	65,241	0.0014	0.9986	96.01
19.5	42,642,791	335,455	0.0079	0.9921	95.88
20.5	38,889,403	367,592	0.0095	0.9905	95.12
21.5	35,839,439	48,965	0.0014	0.9986	94.22
22.5	33,741,486	98,511	0.0029	0.9971	94.09
23.5	31,455,165	401,162	0.0128	0.9872	93.82
24.5	28,985,041	57,917	0.0020	0.9980	92.62
25.5	27,150,840	23,173	0.0009	0.9991	92.44
26.5	25,636,636	378,142	0.0148	0.9852	92.36
27.5	24,055,191	692,502	0.0288	0.9712	91.00
28.5	21,985,771	33,762	0.0015	0.9985	88.38
29.5	16,137,063	270,941	0.0168	0.9832	88.24
30.5	14,587,967	119,795	0.0082	0.9918	86.76
31.5	13,176,233	332,093	0.0252	0.9748	86.05
32.5	11,232,325	106,627	0.0095	0.9905	83.88
33.5	9,340,299	19,685	0.0021	0.9979	83.08
34.5	9,320,614	26,494	0.0028	0.9972	82.91
35.5	8,278,722	147,129	0.0178	0.9822	82.67
36.5	6,986,015	20,525	0.0029	0.9971	81.20
37.5	6,177,995	54,284	0.0088	0.9912	80.96
38.5	5,303,597	15,801	0.0030	0.9970	80.25

PLACEMENT BAND 1940-2014

EXPERIENCE BAND 1940-2014

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	4,625,238	13,664	0.0030	0.9970	80.01
40.5	4,171,011	8,982	0.0022	0.9978	79.78
41.5	3,876,570	10,777	0.0028	0.9972	79.60
42.5	3,612,283	29,525	0.0082	0.9918	79.38
43.5	3,383,908	10,526	0.0031	0.9969	78.73
44.5	3,200,670	13,882	0.0043	0.9957	78.49
45.5	2,998,088	212,533	0.0709	0.9291	78.15
46.5	2,601,174	33,474	0.0129	0.9871	72.61
47.5	2,381,819	17,001	0.0071	0.9929	71.67
48.5	2,201,614	12,356	0.0056	0.9944	71.16
49.5	1,980,854	12,138	0.0061	0.9939	70.76
50.5	1,848,169	16,445	0.0089	0.9911	70.33
51.5	1,677,839	5,577	0.0033	0.9967	69.70
52.5	1,546,781	4,263	0.0028	0.9972	69.47
53.5	1,450,586	440,909	0.3040	0.6960	69.28
54.5	11,555		0.0000	1.0000	48.22
55.5	11,555		0.0000	1.0000	48.22
56.5	11,555		0.0000	1.0000	48.22
57.5	11,555		0.0000	1.0000	48.22
58.5	11,555		0.0000	1.0000	48.22
59.5	11,555	11,555	1.0000		48.22
60.5					



PLACEMENT BAND 1950-2014

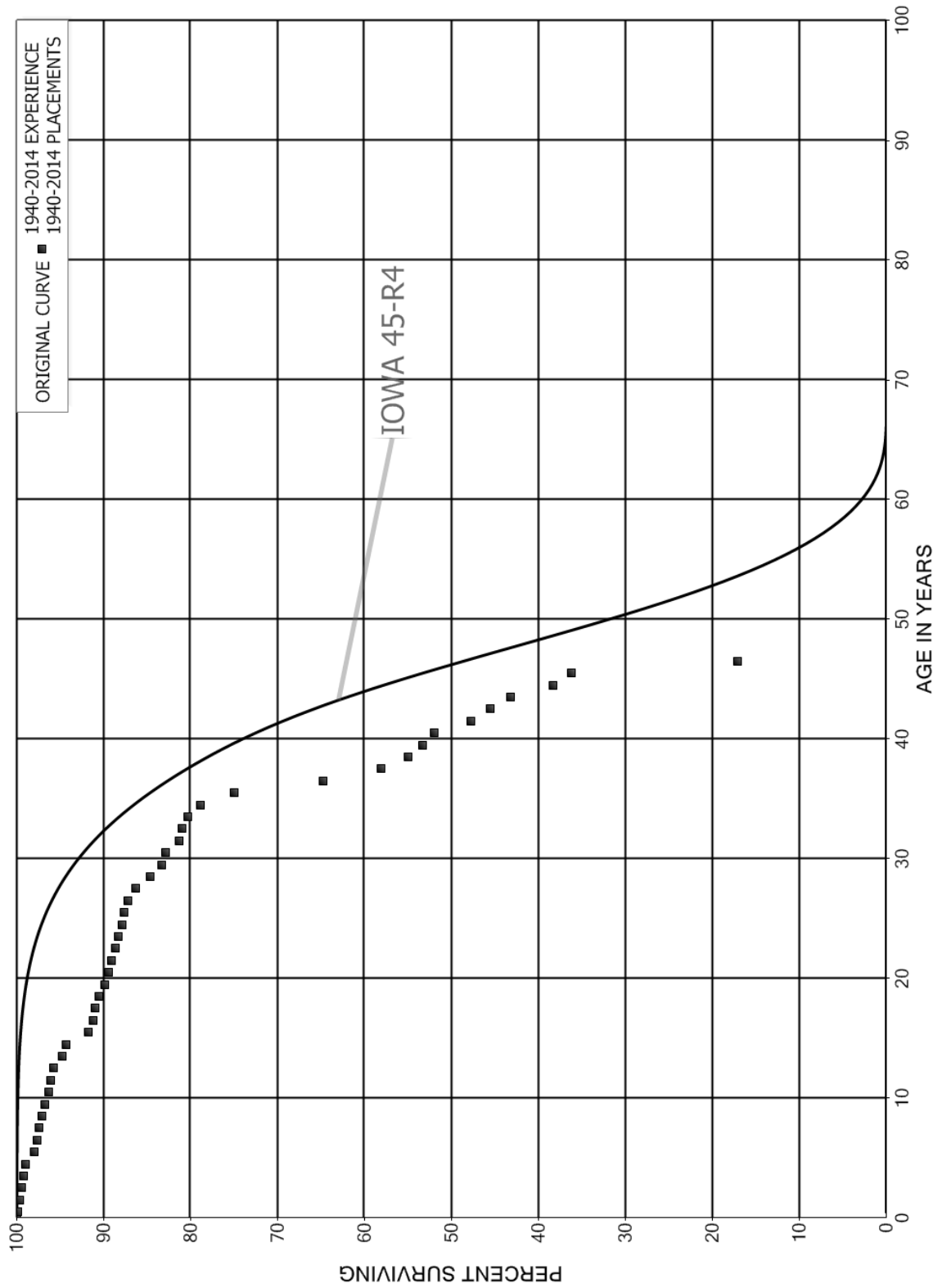
EXPERIENCE BAND 1940-2014

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	316,747,476	116,418	0.0004	0.9996	100.00
0.5	279,578,499	172,337	0.0006	0.9994	99.96
1.5	270,396,597	64,493	0.0002	0.9998	99.90
2.5	255,564,375	55,573	0.0002	0.9998	99.88
3.5	241,210,090	132,037	0.0005	0.9995	99.86
4.5	223,982,550	228,661	0.0010	0.9990	99.80
5.5	206,813,076	327,962	0.0016	0.9984	99.70
6.5	186,814,898	69,243	0.0004	0.9996	99.54
7.5	169,528,771	209,085	0.0012	0.9988	99.50
8.5	150,705,628	150,128	0.0010	0.9990	99.38
9.5	138,822,477	1,539,843	0.0111	0.9889	99.28
10.5	129,181,191	60,861	0.0005	0.9995	98.18
11.5	120,112,415	282,199	0.0023	0.9977	98.14
12.5	115,018,472	48,785	0.0004	0.9996	97.90
13.5	107,102,369	133,857	0.0012	0.9988	97.86
14.5	101,412,220	471,911	0.0047	0.9953	97.74
15.5	96,002,972	197,065	0.0021	0.9979	97.29
16.5	91,356,632	113,188	0.0012	0.9988	97.09
17.5	84,575,425	39,338	0.0005	0.9995	96.97
18.5	80,112,212	103,630	0.0013	0.9987	96.92
19.5	73,652,073	104,990	0.0014	0.9986	96.80
20.5	67,668,056	629,379	0.0093	0.9907	96.66
21.5	62,299,186	72,706	0.0012	0.9988	95.76
22.5	58,594,905	65,635	0.0011	0.9989	95.65
23.5	54,605,229	74,162	0.0014	0.9986	95.54
24.5	50,686,331	194,793	0.0038	0.9962	95.41
25.5	47,331,408	35,796	0.0008	0.9992	95.04
26.5	44,580,744	123,045	0.0028	0.9972	94.97
27.5	42,275,776	772,652	0.0183	0.9817	94.71
28.5	39,007,095	38,617	0.0010	0.9990	92.98
29.5	32,781,554	628,699	0.0192	0.9808	92.89
30.5	29,826,709	218,291	0.0073	0.9927	91.10
31.5	27,260,688	252,404	0.0093	0.9907	90.44
32.5	24,112,023	695,634	0.0289	0.9711	89.60
33.5	20,167,251	234,772	0.0116	0.9884	87.02
34.5	19,932,479	13,369	0.0007	0.9993	86.00
35.5	18,055,625	443,895	0.0246	0.9754	85.95
36.5	15,505,509	1,119,830	0.0722	0.9278	83.83
37.5	12,891,793	185,731	0.0144	0.9856	77.78
38.5	11,174,248	140,625	0.0126	0.9874	76.66

PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

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	9,796,709	39,184	0.0040	0.9960	75.69
40.5	8,923,086	14,471	0.0016	0.9984	75.39
41.5	8,385,219	566,631	0.0676	0.9324	75.27
42.5	7,340,854	5,447	0.0007	0.9993	70.18
43.5	6,963,036	5,069	0.0007	0.9993	70.13
44.5	6,623,947	640,252	0.0967	0.9033	70.08
45.5	5,621,986	25,326	0.0045	0.9955	63.30
46.5	5,241,319	3,301	0.0006	0.9994	63.02
47.5	4,896,668	446,463	0.0912	0.9088	62.98
48.5	4,146,657	18,042	0.0044	0.9956	57.24
49.5	3,731,319	73,409	0.0197	0.9803	56.99
50.5	3,422,271	1,772	0.0005	0.9995	55.87
51.5	3,127,610	1,188	0.0004	0.9996	55.84
52.5	2,885,083	776	0.0003	0.9997	55.82
53.5	2,709,473		0.0000	1.0000	55.80
54.5					55.80



PLACEMENT BAND 1940-2014

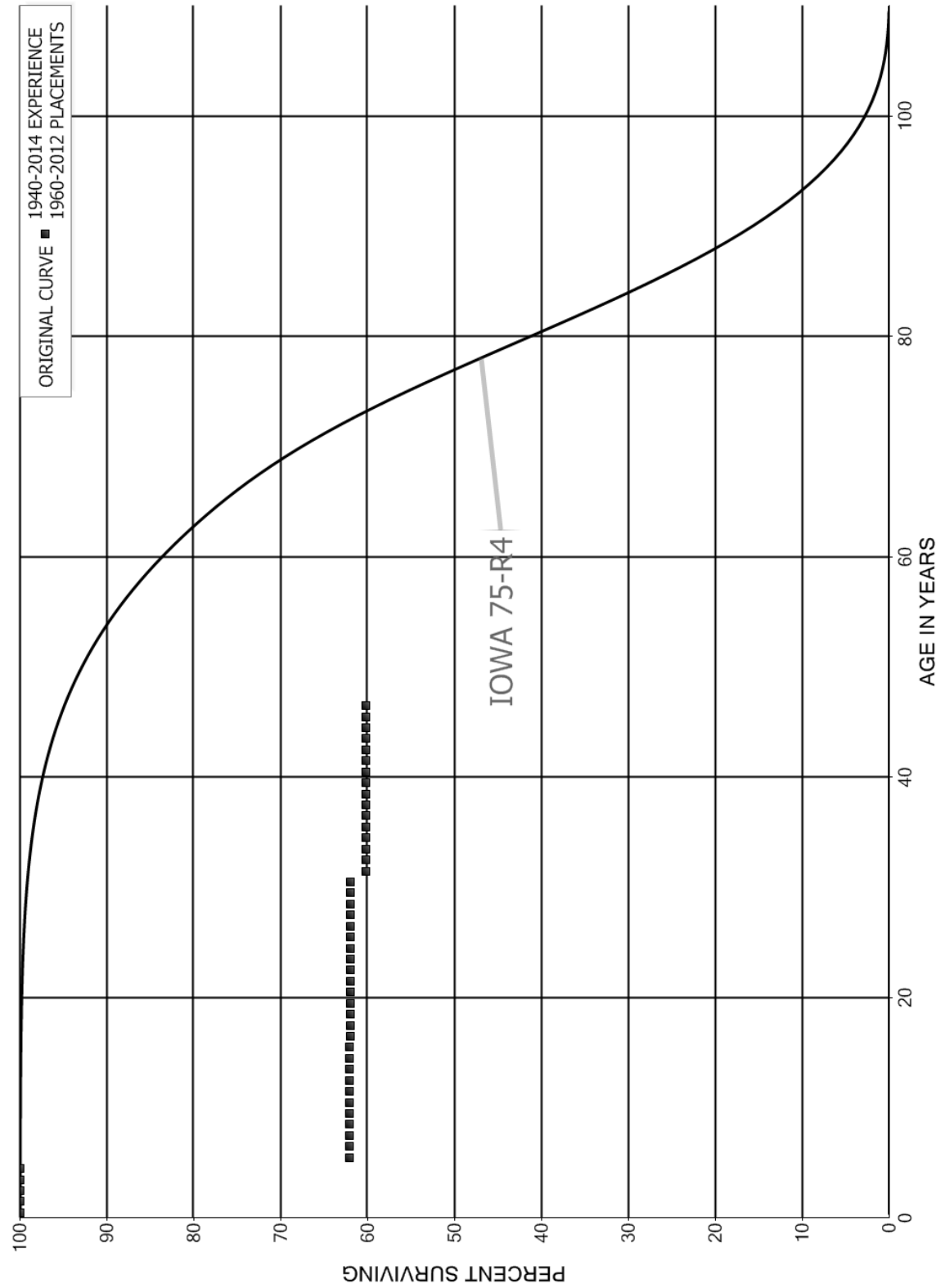
EXPERIENCE BAND 1940-2014

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	146,382,209	185,648	0.0013	0.9987	100.00
0.5	133,350,343	276,803	0.0021	0.9979	99.87
1.5	128,559,824	353,526	0.0027	0.9973	99.67
2.5	121,505,286	246,109	0.0020	0.9980	99.39
3.5	113,811,522	332,591	0.0029	0.9971	99.19
4.5	104,552,349	1,048,308	0.0100	0.9900	98.90
5.5	94,338,003	265,728	0.0028	0.9972	97.91
6.5	83,673,596	179,627	0.0021	0.9979	97.63
7.5	72,221,994	268,149	0.0037	0.9963	97.42
8.5	60,138,137	210,552	0.0035	0.9965	97.06
9.5	53,843,050	246,004	0.0046	0.9954	96.72
10.5	48,950,613	113,480	0.0023	0.9977	96.28
11.5	44,126,562	164,645	0.0037	0.9963	96.06
12.5	40,426,996	408,461	0.0101	0.9899	95.70
13.5	37,338,662	193,503	0.0052	0.9948	94.73
14.5	35,293,166	959,110	0.0272	0.9728	94.24
15.5	32,793,877	173,306	0.0053	0.9947	91.68
16.5	31,132,032	66,651	0.0021	0.9979	91.20
17.5	28,815,734	139,327	0.0048	0.9952	91.00
18.5	27,207,107	231,488	0.0085	0.9915	90.56
19.5	24,826,598	106,611	0.0043	0.9957	89.79
20.5	22,982,175	83,470	0.0036	0.9964	89.40
21.5	21,376,413	123,936	0.0058	0.9942	89.08
22.5	20,059,302	65,482	0.0033	0.9967	88.56
23.5	18,698,145	89,369	0.0048	0.9952	88.27
24.5	17,419,113	41,385	0.0024	0.9976	87.85
25.5	16,331,065	79,115	0.0048	0.9952	87.64
26.5	15,387,088	157,568	0.0102	0.9898	87.22
27.5	14,515,565	284,387	0.0196	0.9804	86.33
28.5	13,421,922	219,524	0.0164	0.9836	84.63
29.5	10,413,083	48,662	0.0047	0.9953	83.25
30.5	9,612,158	177,625	0.0185	0.9815	82.86
31.5	8,666,539	44,346	0.0051	0.9949	81.33
32.5	7,673,251	56,399	0.0074	0.9926	80.91
33.5	6,598,669	122,209	0.0185	0.9815	80.32
34.5	6,476,460	314,819	0.0486	0.9514	78.83
35.5	5,854,260	801,910	0.1370	0.8630	75.00
36.5	5,052,350	519,782	0.1029	0.8971	64.73
37.5	4,532,568	244,480	0.0539	0.9461	58.07
38.5	4,288,089	131,526	0.0307	0.9693	54.93

PLACEMENT BAND 1940-2014

EXPERIENCE BAND 1940-2014

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	4,156,563	98,636	0.0237	0.9763	53.25
40.5	4,057,926	333,162	0.0821	0.9179	51.99
41.5	3,724,764	173,726	0.0466	0.9534	47.72
42.5	3,551,038	177,296	0.0499	0.9501	45.49
43.5	3,373,742	381,155	0.1130	0.8870	43.22
44.5	2,992,587	168,069	0.0562	0.9438	38.34
45.5	2,824,517	1,494,823	0.5292	0.4708	36.18
46.5	1,329,694	53,834	0.0405	0.9595	17.03
47.5	1,275,860	15,121	0.0119	0.9881	16.35
48.5	1,260,739	1,224,850	0.9715	0.0285	16.15
49.5	35,889		0.0000	1.0000	0.46
50.5	35,889		0.0000	1.0000	0.46
51.5	35,889	24,891	0.6935	0.3065	0.46
52.5	10,998		0.0000	1.0000	0.14
53.5	10,998	10,998	1.0000		0.14
54.5					



PLACEMENT BAND 1960-2012

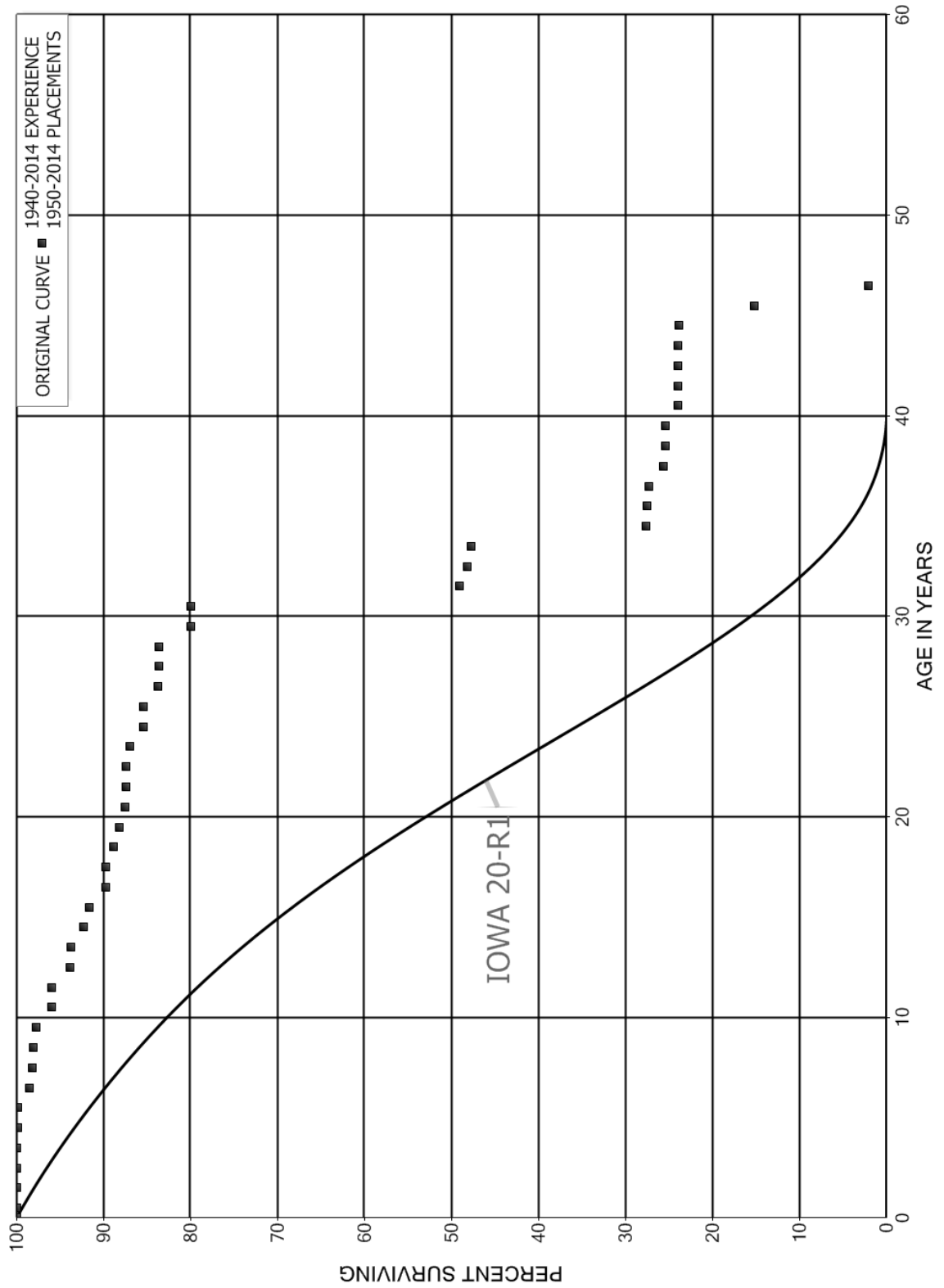
EXPERIENCE BAND 1940-2014

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	15,041,450		0.0000	1.0000	100.00
0.5	15,041,450		0.0000	1.0000	100.00
1.5	15,041,450		0.0000	1.0000	100.00
2.5	14,752,695	94	0.0000	1.0000	100.00
3.5	14,373,843	28	0.0000	1.0000	100.00
4.5	14,367,167	5,454,915	0.3797	0.6203	100.00
5.5	8,707,070	312	0.0000	1.0000	62.03
6.5	8,525,391		0.0000	1.0000	62.03
7.5	8,384,430		0.0000	1.0000	62.03
8.5	8,201,734	1,996	0.0002	0.9998	62.03
9.5	7,991,370		0.0000	1.0000	62.01
10.5	7,887,036		0.0000	1.0000	62.01
11.5	7,829,228	2	0.0000	1.0000	62.01
12.5	7,811,323		0.0000	1.0000	62.01
13.5	7,300,882	238	0.0000	1.0000	62.01
14.5	6,958,107		0.0000	1.0000	62.01
15.5	6,652,453	3,877	0.0006	0.9994	62.01
16.5	6,332,102	29	0.0000	1.0000	61.98
17.5	5,937,903		0.0000	1.0000	61.98
18.5	5,670,027		0.0000	1.0000	61.98
19.5	5,271,405	0	0.0000	1.0000	61.98
20.5	4,887,810		0.0000	1.0000	61.98
21.5	4,618,066	0	0.0000	1.0000	61.98
22.5	4,380,227		0.0000	1.0000	61.98
23.5	4,138,178		0.0000	1.0000	61.98
24.5	3,891,199		0.0000	1.0000	61.98
25.5	3,656,828	0	0.0000	1.0000	61.98
26.5	3,472,105		0.0000	1.0000	61.98
27.5	3,332,862		0.0000	1.0000	61.98
28.5	3,178,139		0.0000	1.0000	61.98
29.5	1,817,529		0.0000	1.0000	61.98
30.5	1,680,437	48,297	0.0287	0.9713	61.98
31.5	1,494,447		0.0000	1.0000	60.19
32.5	1,324,332	16	0.0000	1.0000	60.19
33.5	1,134,091		0.0000	1.0000	60.19
34.5	991,094		0.0000	1.0000	60.19
35.5	881,999		0.0000	1.0000	60.19
36.5	758,605		0.0000	1.0000	60.19
37.5	669,839		0.0000	1.0000	60.19
38.5	579,539		0.0000	1.0000	60.19

PLACEMENT BAND 1960-2012

EXPERIENCE BAND 1940-2014

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	505,998		0.0000	1.0000	60.19
40.5	456,656		0.0000	1.0000	60.19
41.5	425,951		0.0000	1.0000	60.19
42.5	397,148		0.0000	1.0000	60.19
43.5	375,204		0.0000	1.0000	60.19
44.5	354,800		0.0000	1.0000	60.19
45.5	333,280		0.0000	1.0000	60.19
46.5	312,151		0.0000	1.0000	60.19
47.5	292,192	9,814	0.0336	0.9664	60.19
48.5	264,611		0.0000	1.0000	58.17
49.5	241,414		0.0000	1.0000	58.17
50.5	227,272		0.0000	1.0000	58.17
51.5	209,906		0.0000	1.0000	58.17
52.5	195,533		0.0000	1.0000	58.17
53.5	184,837		0.0000	1.0000	58.17
54.5					58.17



PLACEMENT BAND 1950-2014

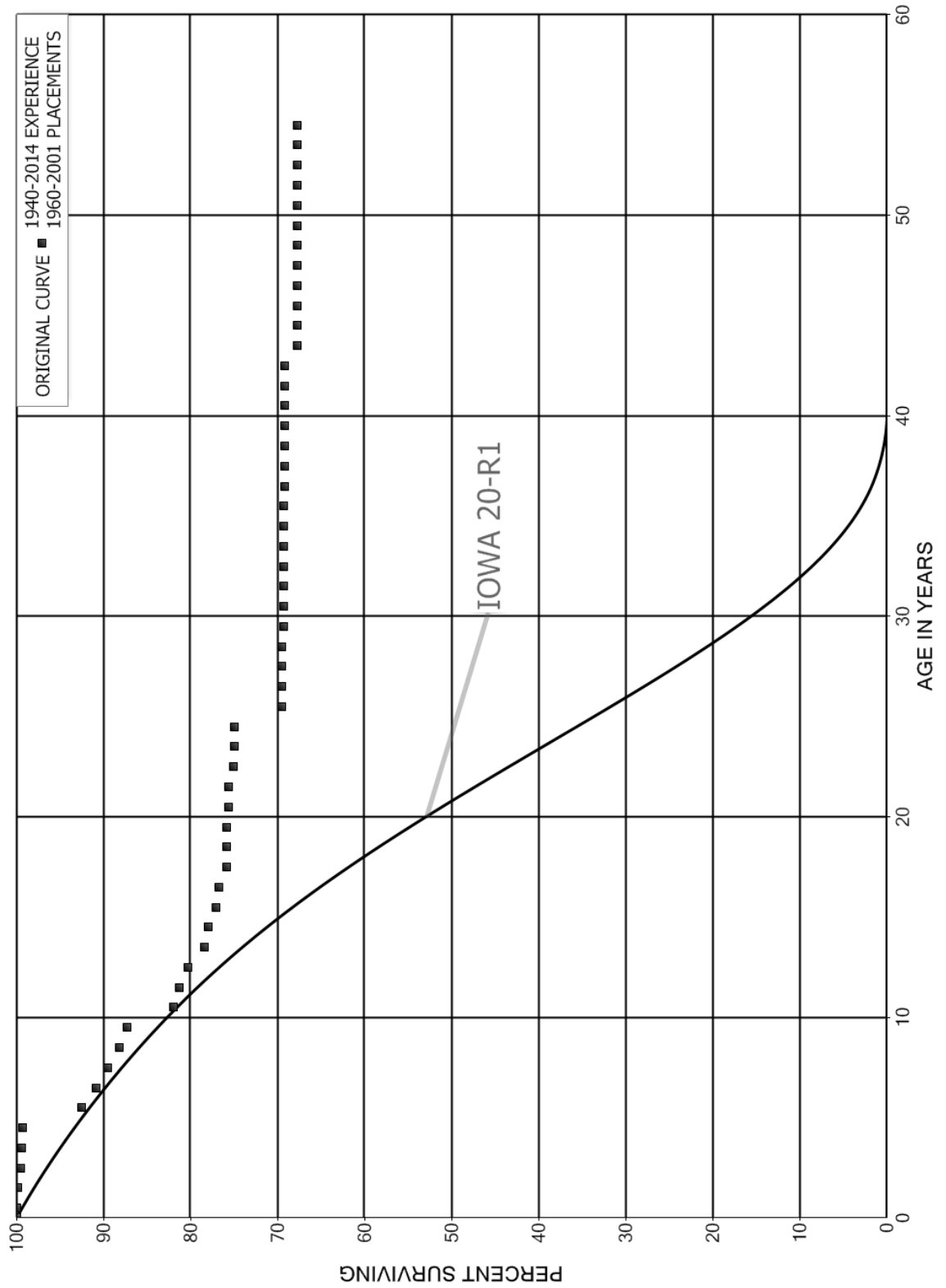
EXPERIENCE BAND 1940-2014

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	19,287,583	3,405	0.0002	0.9998	100.00
0.5	18,086,735	5,723	0.0003	0.9997	99.98
1.5	17,806,276	5,006	0.0003	0.9997	99.95
2.5	17,354,962	4,311	0.0002	0.9998	99.92
3.5	16,938,244	5,330	0.0003	0.9997	99.90
4.5	16,332,670	3,180	0.0002	0.9998	99.87
5.5	15,921,764	222,520	0.0140	0.9860	99.85
6.5	15,179,323	49,534	0.0033	0.9967	98.45
7.5	14,332,633	1,991	0.0001	0.9999	98.13
8.5	13,615,488	48,372	0.0036	0.9964	98.12
9.5	12,997,534	243,575	0.0187	0.9813	97.77
10.5	12,181,483	3,370	0.0003	0.9997	95.94
11.5	11,444,657	253,985	0.0222	0.9778	95.91
12.5	10,913,904	1,975	0.0002	0.9998	93.78
13.5	10,568,367	170,030	0.0161	0.9839	93.76
14.5	9,683,284	70,959	0.0073	0.9927	92.26
15.5	9,162,733	180,512	0.0197	0.9803	91.58
16.5	8,482,300	1,082	0.0001	0.9999	89.78
17.5	8,170,315	86,418	0.0106	0.9894	89.76
18.5	7,748,289	59,393	0.0077	0.9923	88.81
19.5	7,457,019	52,064	0.0070	0.9930	88.13
20.5	7,195,796	6,899	0.0010	0.9990	87.52
21.5	7,006,313	1,764	0.0003	0.9997	87.43
22.5	6,821,001	34,670	0.0051	0.9949	87.41
23.5	6,591,629	116,880	0.0177	0.9823	86.97
24.5	6,366,881	96	0.0000	1.0000	85.43
25.5	6,270,827	127,402	0.0203	0.9797	85.42
26.5	6,087,644	1,851	0.0003	0.9997	83.69
27.5	6,025,920	258	0.0000	1.0000	83.66
28.5	5,952,168	262,064	0.0440	0.9560	83.66
29.5	4,280,021		0.0000	1.0000	79.98
30.5	3,865,890	1,493,181	0.3862	0.6138	79.98
31.5	1,565,989	27,685	0.0177	0.9823	49.09
32.5	1,538,303	16,852	0.0110	0.9890	48.22
33.5	1,521,451	639,029	0.4200	0.5800	47.69
34.5	882,422	5,729	0.0065	0.9935	27.66
35.5	876,693	6,323	0.0072	0.9928	27.48
36.5	870,370	52,171	0.0599	0.9401	27.28
37.5	818,199	7,415	0.0091	0.9909	25.65
38.5	810,784		0.0000	1.0000	25.41

PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

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	810,784	48,015	0.0592	0.9408	25.41
40.5	762,770	254	0.0003	0.9997	23.91
41.5	762,516	102	0.0001	0.9999	23.90
42.5	762,414		0.0000	1.0000	23.90
43.5	762,414	3,539	0.0046	0.9954	23.90
44.5	758,875	273,643	0.3606	0.6394	23.79
45.5	485,231	418,066	0.8616	0.1384	15.21
46.5	67,165		0.0000	1.0000	2.11
47.5	67,165		0.0000	1.0000	2.11
48.5	67,165	34,165	0.5087	0.4913	2.11
49.5	33,001		0.0000	1.0000	1.03
50.5	33,001		0.0000	1.0000	1.03
51.5	33,001		0.0000	1.0000	1.03
52.5	33,001		0.0000	1.0000	1.03
53.5	33,001	33,001	1.0000		1.03
54.5					



PLACEMENT BAND 1960-2001

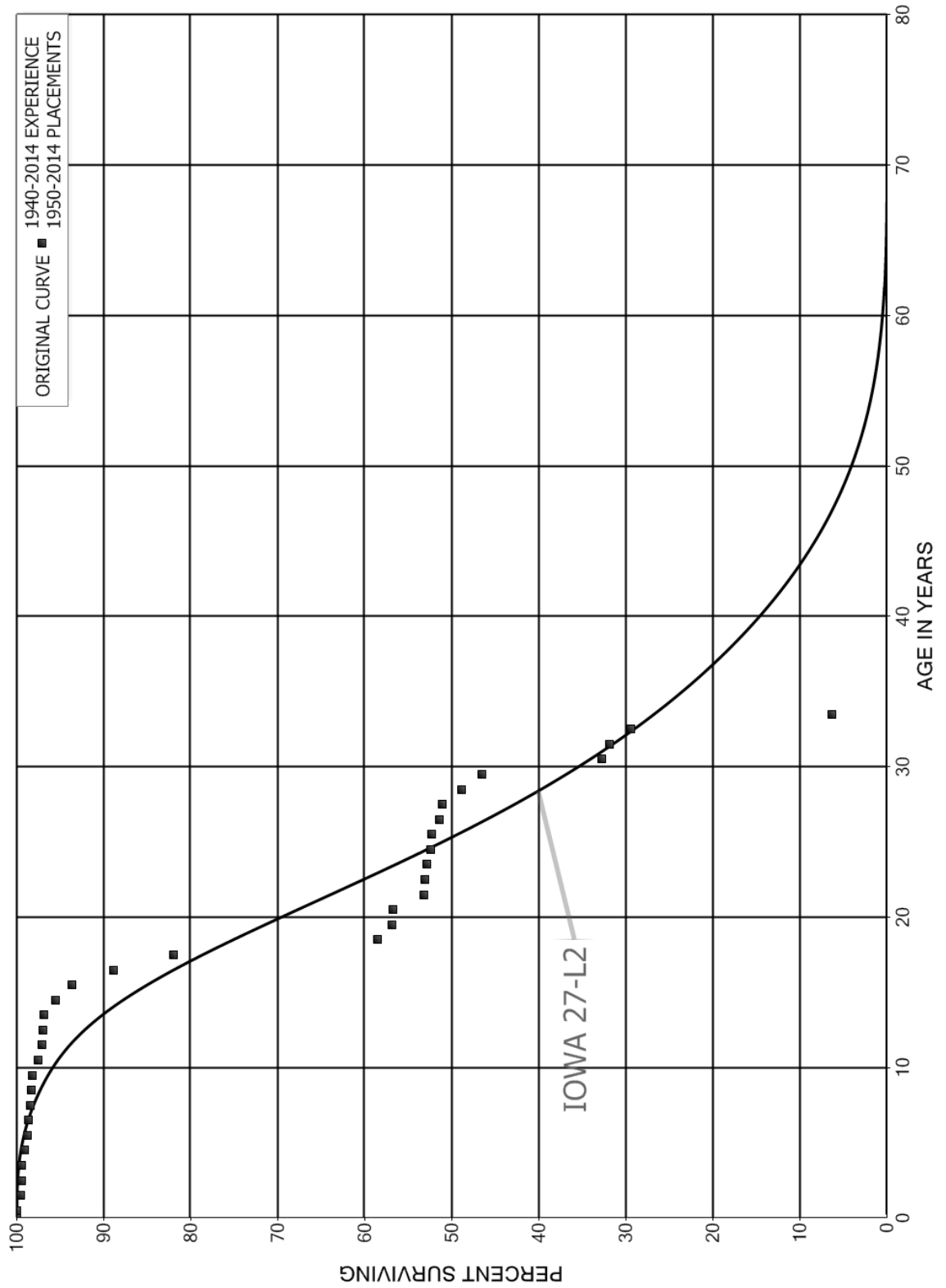
EXPERIENCE BAND 1940-2014

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	1,282,160	519	0.0004	0.9996	100.00
0.5	1,281,641	948	0.0007	0.9993	99.96
1.5	1,280,693	4,867	0.0038	0.9962	99.89
2.5	1,275,827	1,904	0.0015	0.9985	99.51
3.5	1,273,923	1,219	0.0010	0.9990	99.36
4.5	1,272,703	86,050	0.0676	0.9324	99.26
5.5	1,186,653	21,600	0.0182	0.9818	92.55
6.5	1,165,053	18,044	0.0155	0.9845	90.87
7.5	1,147,010	16,993	0.0148	0.9852	89.46
8.5	1,130,017	10,800	0.0096	0.9904	88.13
9.5	1,119,217	69,046	0.0617	0.9383	87.29
10.5	1,050,171	7,652	0.0073	0.9927	81.91
11.5	1,042,519	13,029	0.0125	0.9875	81.31
12.5	1,029,489	24,737	0.0240	0.9760	80.29
13.5	936,984	4,893	0.0052	0.9948	78.36
14.5	882,332	9,933	0.0113	0.9887	77.95
15.5	827,458	4,002	0.0048	0.9952	77.08
16.5	784,896	8,614	0.0110	0.9890	76.70
17.5	716,582	2	0.0000	1.0000	75.86
18.5	677,174	44	0.0001	0.9999	75.86
19.5	620,985	2,353	0.0038	0.9962	75.86
20.5	563,168		0.0000	1.0000	75.57
21.5	521,767	3,473	0.0067	0.9933	75.57
22.5	486,473	706	0.0015	0.9985	75.07
23.5	451,387	84	0.0002	0.9998	74.96
24.5	418,617	30,528	0.0729	0.9271	74.94
25.5	360,966		0.0000	1.0000	69.48
26.5	337,109		0.0000	1.0000	69.48
27.5	317,795		0.0000	1.0000	69.48
28.5	295,438	677	0.0023	0.9977	69.48
29.5	272,365		0.0000	1.0000	69.32
30.5	251,487		0.0000	1.0000	69.32
31.5	230,406		0.0000	1.0000	69.32
32.5	204,190	112	0.0005	0.9995	69.32
33.5	174,762		0.0000	1.0000	69.28
34.5	152,725		0.0000	1.0000	69.28
35.5	135,912	222	0.0016	0.9984	69.28
36.5	116,674		0.0000	1.0000	69.17
37.5	102,994		0.0000	1.0000	69.17
38.5	89,078		0.0000	1.0000	69.17

PLACEMENT BAND 1960-2001

EXPERIENCE BAND 1940-2014

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	77,745		0.0000	1.0000	69.17
40.5	70,141		0.0000	1.0000	69.17
41.5	65,409		0.0000	1.0000	69.17
42.5	60,970	1,278	0.0210	0.9790	69.17
43.5	56,310		0.0000	1.0000	67.72
44.5	53,166		0.0000	1.0000	67.72
45.5	49,849		0.0000	1.0000	67.72
46.5	46,593		0.0000	1.0000	67.72
47.5	43,517		0.0000	1.0000	67.72
48.5	40,779		0.0000	1.0000	67.72
49.5	37,204		0.0000	1.0000	67.72
50.5	35,025		0.0000	1.0000	67.72
51.5	32,349		0.0000	1.0000	67.72
52.5	30,134		0.0000	1.0000	67.72
53.5	28,485		0.0000	1.0000	67.72
54.5					67.72



PLACEMENT BAND 1950-2014

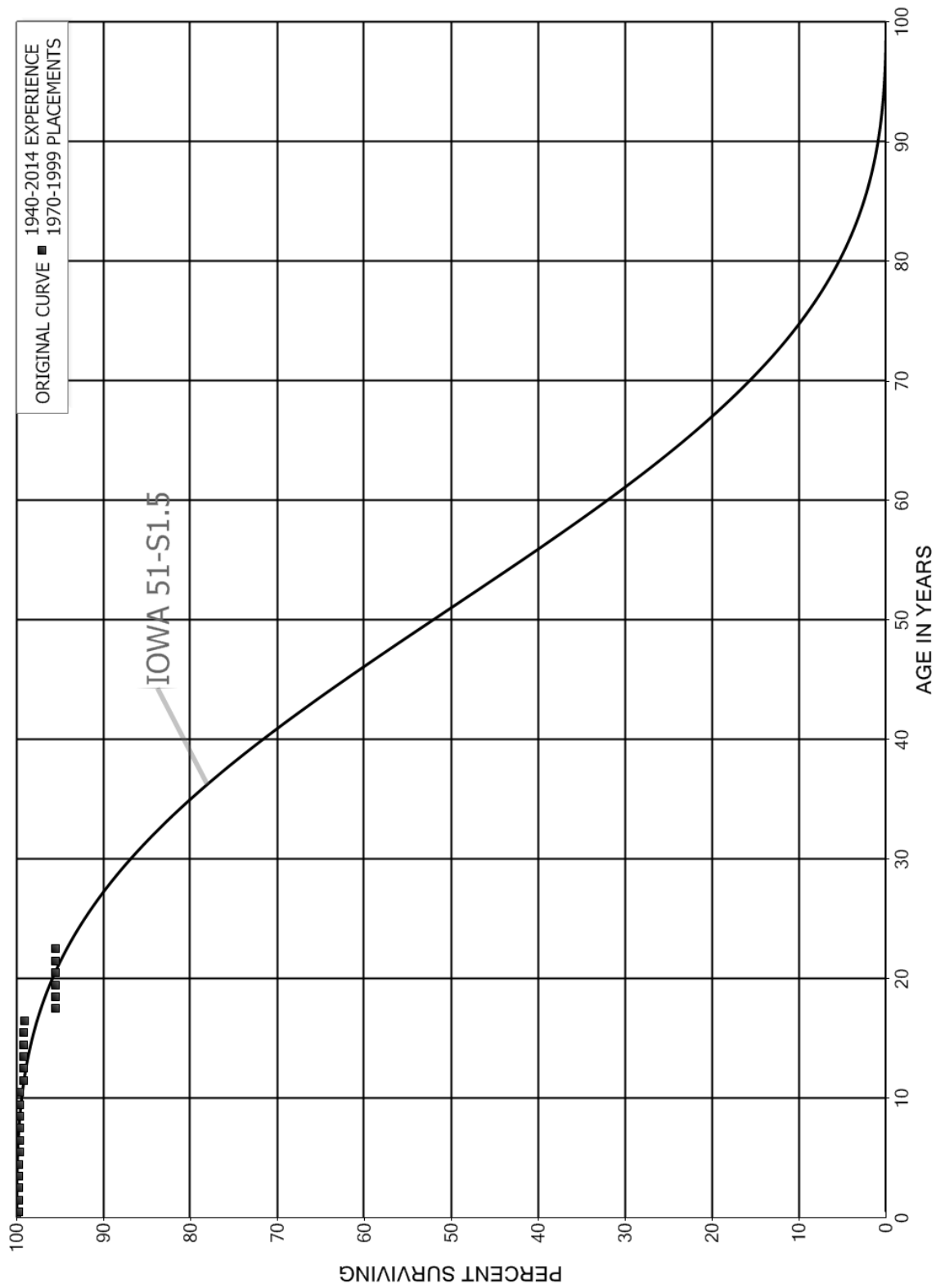
EXPERIENCE BAND 1940-2014

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	13,639,964	402	0.0000	1.0000	100.00
0.5	13,544,779	66,370	0.0049	0.9951	100.00
1.5	13,467,534	9,989	0.0007	0.9993	99.51
2.5	13,435,233	6,705	0.0005	0.9995	99.43
3.5	12,734,548	43,254	0.0034	0.9966	99.38
4.5	11,427,418	35,813	0.0031	0.9969	99.05
5.5	10,046,227	13,004	0.0013	0.9987	98.74
6.5	8,297,233	14,011	0.0017	0.9983	98.61
7.5	6,609,380	7,607	0.0012	0.9988	98.44
8.5	5,013,467	10,225	0.0020	0.9980	98.33
9.5	3,929,489	24,190	0.0062	0.9938	98.13
10.5	3,029,039	12,717	0.0042	0.9958	97.52
11.5	2,065,527	4,366	0.0021	0.9979	97.11
12.5	2,061,161	1,827	0.0009	0.9991	96.91
13.5	1,977,564	26,278	0.0133	0.9867	96.82
14.5	1,896,978	37,949	0.0200	0.9800	95.54
15.5	1,818,642	93,393	0.0514	0.9486	93.63
16.5	1,683,949	130,706	0.0776	0.9224	88.82
17.5	1,486,064	425,223	0.2861	0.7139	81.92
18.5	1,024,907	28,733	0.0280	0.9720	58.48
19.5	933,249	2,231	0.0024	0.9976	56.84
20.5	882,744	54,955	0.0623	0.9377	56.71
21.5	781,235	2,170	0.0028	0.9972	53.18
22.5	743,212	2,037	0.0027	0.9973	53.03
23.5	703,558	6,018	0.0086	0.9914	52.88
24.5	663,247	2,529	0.0038	0.9962	52.43
25.5	632,200	10,504	0.0166	0.9834	52.23
26.5	600,277	4,064	0.0068	0.9932	51.36
27.5	579,352	24,592	0.0424	0.9576	51.02
28.5	554,760	26,803	0.0483	0.9517	48.85
29.5	382,184	113,384	0.2967	0.7033	46.49
30.5	268,800	7,116	0.0265	0.9735	32.70
31.5	261,684	20,309	0.0776	0.9224	31.83
32.5	241,374	189,764	0.7862	0.2138	29.36
33.5	51,610		0.0000	1.0000	6.28
34.5	51,610		0.0000	1.0000	6.28
35.5	51,610		0.0000	1.0000	6.28
36.5	51,610		0.0000	1.0000	6.28
37.5	51,610		0.0000	1.0000	6.28
38.5	51,610	21	0.0004	0.9996	6.28

PLACEMENT BAND 1950-2014

EXPERIENCE BAND 1940-2014

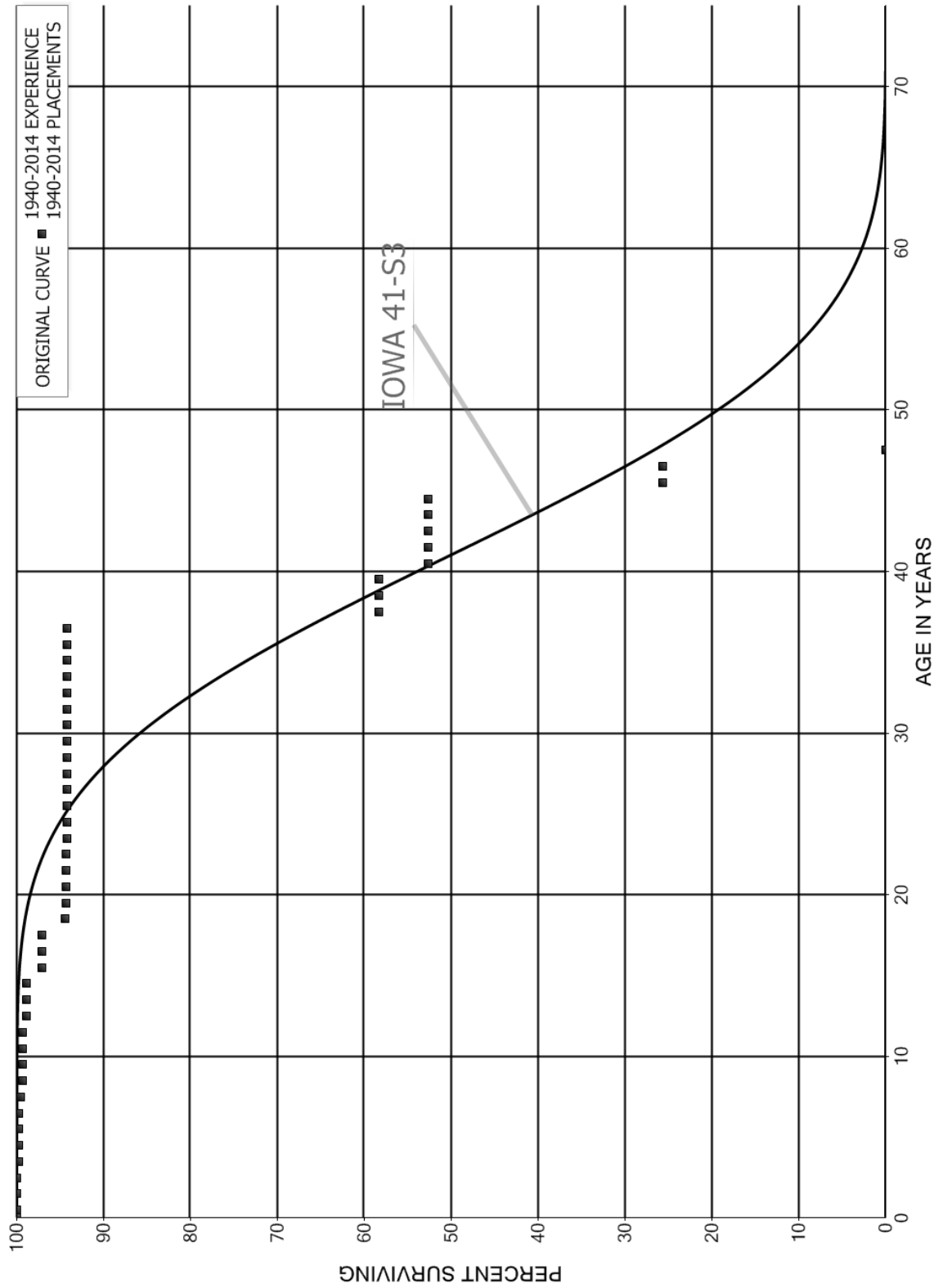
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
39.5	51,589		0.0000	1.0000	6.28
40.5	51,589	49,629	0.9620	0.0380	6.28
41.5	1,960	12	0.0063	0.9937	0.24
42.5	1,947		0.0000	1.0000	0.24
43.5	1,947	1,947	1.0000		0.24
44.5					



PLACEMENT BAND 1970-1999

EXPERIENCE BAND 1940-2014

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	353,427	923	0.0026	0.9974	100.00
0.5	352,504	6	0.0000	1.0000	99.74
1.5	352,499	0	0.0000	1.0000	99.74
2.5	352,499	106	0.0003	0.9997	99.74
3.5	352,392	2	0.0000	1.0000	99.71
4.5	352,390	192	0.0005	0.9995	99.71
5.5	352,198	9	0.0000	1.0000	99.65
6.5	352,189	203	0.0006	0.9994	99.65
7.5	351,986	1	0.0000	1.0000	99.59
8.5	351,985	0	0.0000	1.0000	99.59
9.5	351,985	21	0.0001	0.9999	99.59
10.5	351,964	1,342	0.0038	0.9962	99.59
11.5	350,622	13	0.0000	1.0000	99.21
12.5	350,608	4	0.0000	1.0000	99.20
13.5	350,605	13	0.0000	1.0000	99.20
14.5	350,592		0.0000	1.0000	99.20
15.5	350,592	460	0.0013	0.9987	99.20
16.5	350,131	12,428	0.0355	0.9645	99.07
17.5	337,703	1	0.0000	1.0000	95.55
18.5	337,702		0.0000	1.0000	95.55
19.5	337,702	338	0.0010	0.9990	95.55
20.5	337,364		0.0000	1.0000	95.46
21.5	337,364		0.0000	1.0000	95.46
22.5	0		0.0000	1.0000	95.46
23.5	0	0	0.5000	0.5000	95.46
24.5	0		0.0000	1.0000	47.73
25.5	0		0.0000	1.0000	47.73
26.5	0	0	1.0000		47.73
27.5					



PLACEMENT BAND 1940-2014

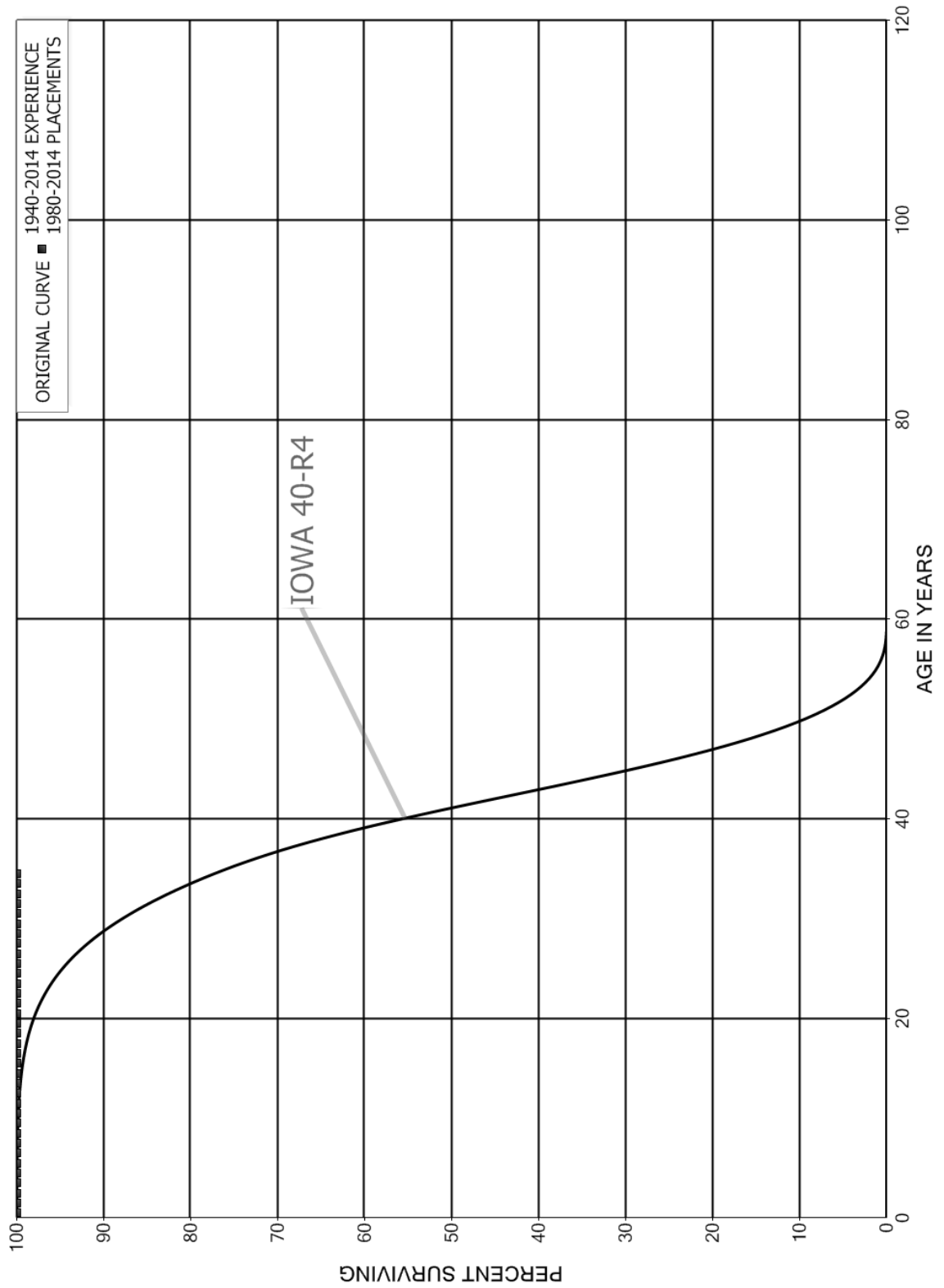
EXPERIENCE BAND 1940-2014

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	24,471,566	6,648	0.0003	0.9997	100.00
0.5	23,772,941		0.0000	1.0000	99.97
1.5	10,486,455	2,081	0.0002	0.9998	99.97
2.5	10,328,767	18,554	0.0018	0.9982	99.95
3.5	9,956,486	1,317	0.0001	0.9999	99.77
4.5	9,649,942		0.0000	1.0000	99.76
5.5	9,208,295	7,157	0.0008	0.9992	99.76
6.5	8,752,722	14,399	0.0016	0.9984	99.68
7.5	8,082,545	19,119	0.0024	0.9976	99.52
8.5	7,808,527	1,624	0.0002	0.9998	99.28
9.5	7,702,077		0.0000	1.0000	99.26
10.5	7,560,425	1,535	0.0002	0.9998	99.26
11.5	7,323,448	32,931	0.0045	0.9955	99.24
12.5	7,162,043		0.0000	1.0000	98.80
13.5	6,784,029		0.0000	1.0000	98.80
14.5	6,751,527	114,790	0.0170	0.9830	98.80
15.5	6,207,171		0.0000	1.0000	97.12
16.5	6,128,838		0.0000	1.0000	97.12
17.5	5,964,415	169,532	0.0284	0.9716	97.12
18.5	5,711,453	2,710	0.0005	0.9995	94.36
19.5	5,659,966		0.0000	1.0000	94.31
20.5	5,234,249		0.0000	1.0000	94.31
21.5	4,870,285		0.0000	1.0000	94.31
22.5	4,735,888	4,385	0.0009	0.9991	94.31
23.5	4,391,999		0.0000	1.0000	94.22
24.5	4,328,277	1,830	0.0004	0.9996	94.22
25.5	3,636,836		0.0000	1.0000	94.18
26.5	2,992,342		0.0000	1.0000	94.18
27.5	2,749,346		0.0000	1.0000	94.18
28.5	2,699,833		0.0000	1.0000	94.18
29.5	1,436,134		0.0000	1.0000	94.18
30.5	1,412,168		0.0000	1.0000	94.18
31.5	1,301,429	825	0.0006	0.9994	94.18
32.5	1,282,577		0.0000	1.0000	94.12
33.5	1,274,072		0.0000	1.0000	94.12
34.5	1,268,079		0.0000	1.0000	94.12
35.5	597,755		0.0000	1.0000	94.12
36.5	597,755	227,314	0.3803	0.6197	94.12
37.5	362,977		0.0000	1.0000	58.33
38.5	317,885		0.0000	1.0000	58.33

PLACEMENT BAND 1940-2014

EXPERIENCE BAND 1940-2014

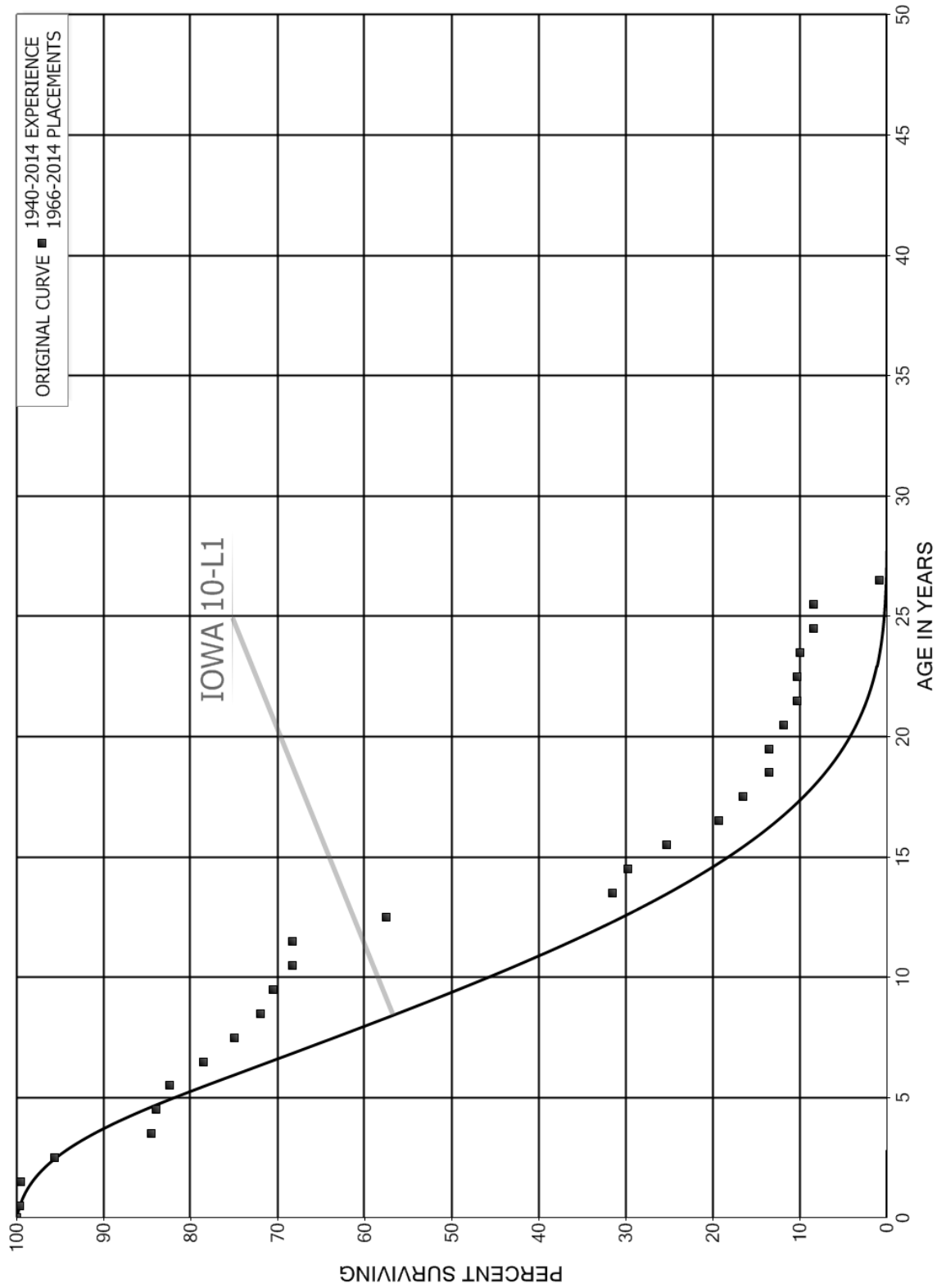
AGE AT BEGIN OF INTERVAL	EXPOSURES AT BEGINNING OF AGE INTERVAL	RETIREMENTS DURING AGE INTERVAL	RETMT RATIO	SURV RATIO	PCT SURV BEGIN OF INTERVAL
39.5	119,964	11,818	0.0985	0.9015	58.33
40.5	108,146		0.0000	1.0000	52.58
41.5	108,146		0.0000	1.0000	52.58
42.5	108,146		0.0000	1.0000	52.58
43.5	108,146		0.0000	1.0000	52.58
44.5	108,146	55,471	0.5129	0.4871	52.58
45.5	52,676		0.0000	1.0000	25.61
46.5	52,676	52,676	1.0000		25.61
47.5					



PLACEMENT BAND 1980-2014

EXPERIENCE BAND 1940-2014

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	16,067,148		0.0000	1.0000	100.00
0.5	15,653,189		0.0000	1.0000	100.00
1.5	14,987,510		0.0000	1.0000	100.00
2.5	13,679,226		0.0000	1.0000	100.00
3.5	13,042,880		0.0000	1.0000	100.00
4.5	12,781,853		0.0000	1.0000	100.00
5.5	12,046,893		0.0000	1.0000	100.00
6.5	11,663,526		0.0000	1.0000	100.00
7.5	11,120,498		0.0000	1.0000	100.00
8.5	10,534,999		0.0000	1.0000	100.00
9.5	10,356,688		0.0000	1.0000	100.00
10.5	10,350,256		0.0000	1.0000	100.00
11.5	5,495,407		0.0000	1.0000	100.00
12.5	2,581,853		0.0000	1.0000	100.00
13.5	2,581,853		0.0000	1.0000	100.00
14.5	2,501,322		0.0000	1.0000	100.00
15.5	2,362,019		0.0000	1.0000	100.00
16.5	2,362,019		0.0000	1.0000	100.00
17.5	2,206,422		0.0000	1.0000	100.00
18.5	2,090,160		0.0000	1.0000	100.00
19.5	2,052,688		0.0000	1.0000	100.00
20.5	1,983,680		0.0000	1.0000	100.00
21.5	1,964,477		0.0000	1.0000	100.00
22.5	1,936,434		0.0000	1.0000	100.00
23.5	1,922,806		0.0000	1.0000	100.00
24.5	1,890,074		0.0000	1.0000	100.00
25.5	1,890,074		0.0000	1.0000	100.00
26.5	1,706,465		0.0000	1.0000	100.00
27.5	1,693,574		0.0000	1.0000	100.00
28.5	1,685,380		0.0000	1.0000	100.00
29.5	1,684,781		0.0000	1.0000	100.00
30.5	1,673,051		0.0000	1.0000	100.00
31.5	1,659,668		0.0000	1.0000	100.00
32.5	1,643,713		0.0000	1.0000	100.00
33.5	1,630,325		0.0000	1.0000	100.00
34.5					100.00



PLACEMENT BAND 1966-2014

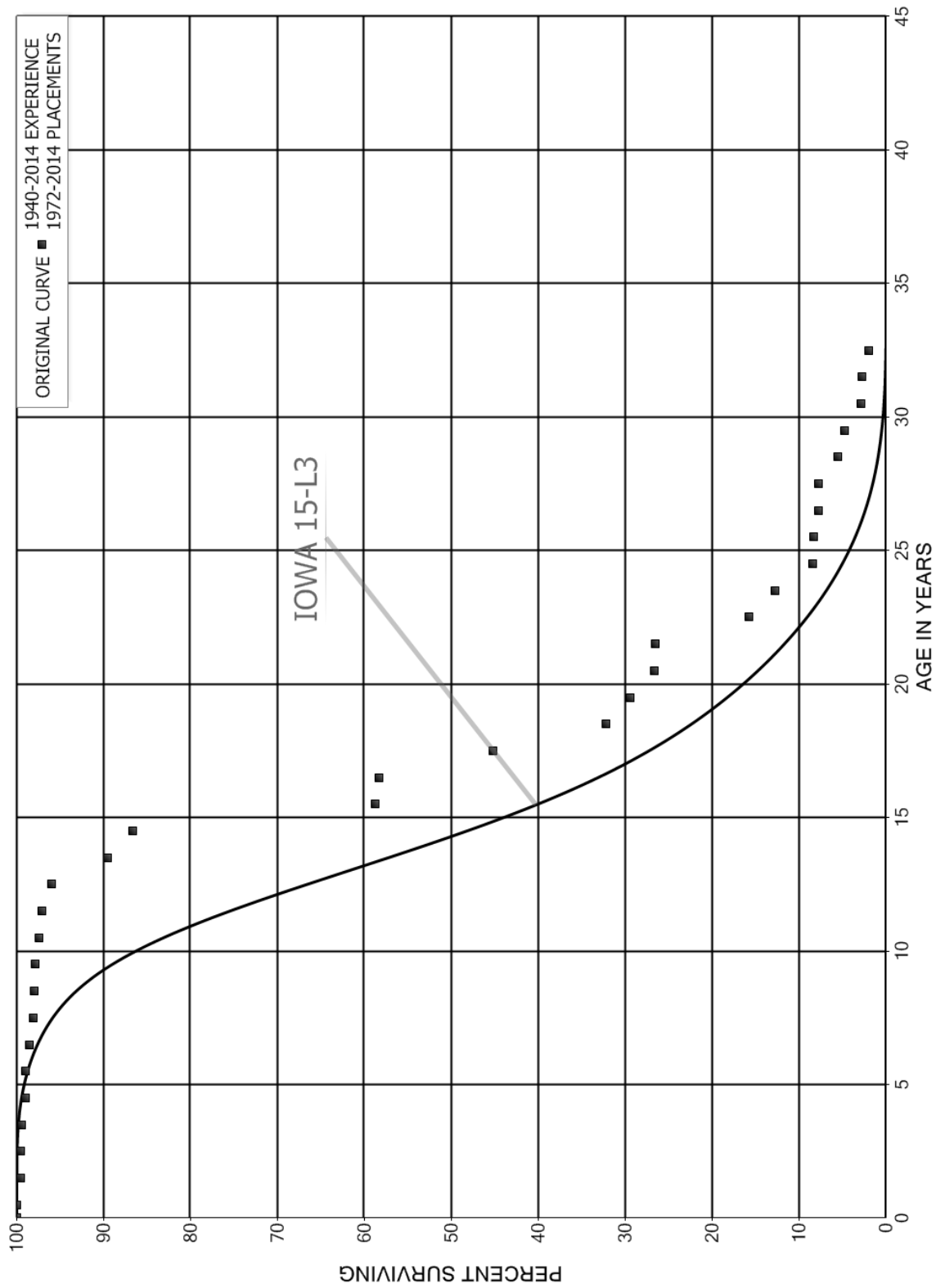
EXPERIENCE BAND 1940-2014

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	21,379,202	70,556	0.0033	0.9967	100.00
0.5	21,226,530	40,162	0.0019	0.9981	99.67
1.5	20,864,278	821,718	0.0394	0.9606	99.48
2.5	18,806,549	2,184,762	0.1162	0.8838	95.56
3.5	15,825,479	96,949	0.0061	0.9939	84.46
4.5	15,728,530	297,935	0.0189	0.9811	83.94
5.5	14,846,613	688,889	0.0464	0.9536	82.35
6.5	13,472,839	623,501	0.0463	0.9537	78.53
7.5	12,145,435	472,998	0.0389	0.9611	74.90
8.5	10,342,525	219,522	0.0212	0.9788	71.98
9.5	9,164,001	280,820	0.0306	0.9694	70.45
10.5	8,883,181	2,691	0.0003	0.9997	68.29
11.5	8,880,490	1,403,820	0.1581	0.8419	68.27
12.5	7,476,670	3,384,920	0.4527	0.5473	57.48
13.5	4,091,750	221,807	0.0542	0.9458	31.46
14.5	3,869,943	586,030	0.1514	0.8486	29.75
15.5	3,283,913	770,595	0.2347	0.7653	25.25
16.5	2,513,318	369,100	0.1469	0.8531	19.32
17.5	2,144,218	392,090	0.1829	0.8171	16.48
18.5	1,752,128		0.0000	1.0000	13.47
19.5	1,633,210	193,943	0.1187	0.8813	13.47
20.5	1,415,725	183,140	0.1294	0.8706	11.87
21.5	1,232,585		0.0000	1.0000	10.34
22.5	1,232,585	39,922	0.0324	0.9676	10.34
23.5	1,192,663	185,109	0.1552	0.8448	10.00
24.5	979,339		0.0000	1.0000	8.45
25.5	979,339	882,850	0.9015	0.0985	8.45
26.5	96,489	35,514	0.3681	0.6319	0.83
27.5	60,975		0.0000	1.0000	0.53
28.5	60,975		0.0000	1.0000	0.53
29.5	60,975		0.0000	1.0000	0.53
30.5	60,975		0.0000	1.0000	0.53
31.5	60,975	11,287	0.1851	0.8149	0.53
32.5	49,688		0.0000	1.0000	0.43
33.5	49,688	3,891	0.0783	0.9217	0.43
34.5	45,797		0.0000	1.0000	0.40
35.5	45,797		0.0000	1.0000	0.40
36.5	45,797		0.0000	1.0000	0.40
37.5	45,797		0.0000	1.0000	0.40
38.5	45,797	17,435	0.3807	0.6193	0.40

PLACEMENT BAND 1966-2014

EXPERIENCE BAND 1940-2014

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	28,362		0.0000	1.0000	0.24
40.5	28,362		0.0000	1.0000	0.24
41.5	28,362		0.0000	1.0000	0.24
42.5	28,362	28,362	1.0000		0.24
43.5					



PLACEMENT BAND 1972-2014

EXPERIENCE BAND 1940-2014

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	29,409,530		0.0000	1.0000	100.00
0.5	28,072,943	124,041	0.0044	0.9956	100.00
1.5	25,633,662	1,230	0.0000	1.0000	99.56
2.5	23,717,663	41,862	0.0018	0.9982	99.55
3.5	23,675,801	111,697	0.0047	0.9953	99.38
4.5	23,564,105		0.0000	1.0000	98.91
5.5	21,883,352	90,644	0.0041	0.9959	98.91
6.5	21,043,790	98,690	0.0047	0.9953	98.50
7.5	17,879,645	8,446	0.0005	0.9995	98.04
8.5	16,510,234	24,435	0.0015	0.9985	97.99
9.5	15,924,710	78,276	0.0049	0.9951	97.85
10.5	15,762,070	44,024	0.0028	0.9972	97.36
11.5	15,567,165	181,599	0.0117	0.9883	97.09
12.5	15,073,965	1,006,840	0.0668	0.9332	95.96
13.5	14,067,125	459,221	0.0326	0.9674	89.55
14.5	13,566,528	4,368,040	0.3220	0.6780	86.63
15.5	9,150,992	63,267	0.0069	0.9931	58.74
16.5	9,087,725	2,056,740	0.2263	0.7737	58.33
17.5	7,030,985	2,009,716	0.2858	0.7142	45.13
18.5	4,947,744	435,935	0.0881	0.9119	32.23
19.5	4,258,237	397,650	0.0934	0.9066	29.39
20.5	3,684,346	19,620	0.0053	0.9947	26.64
21.5	3,615,339	1,475,764	0.4082	0.5918	26.50
22.5	2,133,414	402,900	0.1889	0.8111	15.68
23.5	1,722,363	579,467	0.3364	0.6636	12.72
24.5	1,142,896	14,980	0.0131	0.9869	8.44
25.5	1,084,544	85,744	0.0791	0.9209	8.33
26.5	998,800		0.0000	1.0000	7.67
27.5	982,956	273,824	0.2786	0.7214	7.67
28.5	709,132	102,374	0.1444	0.8556	5.54
29.5	588,978	235,223	0.3994	0.6006	4.74
30.5	338,090	8,215	0.0243	0.9757	2.84
31.5	303,392	91,541	0.3017	0.6983	2.78
32.5	201,151	67,041	0.3333	0.6667	1.94
33.5	134,110		0.0000	1.0000	1.29
34.5	55,440		0.0000	1.0000	1.29
35.5	43,735		0.0000	1.0000	1.29
36.5	43,735		0.0000	1.0000	1.29
37.5	43,735	43,735	1.0000		1.29
38.5					

PART VI. NET SALVAGE STATISTICS

2007	4,734	4,734-
2008	2,893	2,893-
2009		
2010		
2011		
2012		
2013		
2014		
TOTAL	7,627	7,627-

THREE-YEAR MOVING AVERAGES

07-09	2,542	2,542-
08-10	964	964-
09-11		
10-12		
11-13		
12-14		

FIVE-YEAR AVERAGE

10-14

1995	14,776		0	0		0
1996						
1997						
1998						
1999						
2000		10			10-	
2001						
2002						
2003						
2004	40,943	409	1	0	409-	1-
2005	51,854	455	1	0	455-	1-
2006	3,832	45	1	0	45-	1-
2007	10,530	73	1	0	73-	1-
2008		372			372-	
2009		34,323			34,323-	
2010	1,634	11,001	673	0	11,001-	673-
2011		38,355			38,355-	
2012	13,159	74,904	569	0	74,904-	569-
2013						
2014	12,872	349,560		0	349,560-	
TOTAL	149,599	509,509	341	0	509,509-	341-

THREE-YEAR MOVING AVERAGES

95-97	4,925		0	0		0
96-98						
97-99						
98-00		3			3-	
99-01		3			3-	
00-02		3			3-	
01-03						
02-04	13,648	136	1	0	136-	1-
03-05	30,932	288	1	0	288-	1-
04-06	32,210	303	1	0	303-	1-
05-07	22,072	191	1	0	191-	1-
06-08	4,787	164	3	0	164-	3-
07-09	3,510	11,589	330	0	11,589-	330-
08-10	545	15,232		0	15,232-	
09-11	545	27,893		0	27,893-	
10-12	4,931	41,420	840	0	41,420-	840-

THREE-YEAR MOVING AVERAGES

11-13	4,386	37,753	861	0	37,753-	861-
12-14	8,677	141,488		0	141,488-	

FIVE-YEAR AVERAGE

10-14	5,533	94,764		0	94,764-	
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2003						
2004	68,452	685	1	0	685-	1-
2005	369,177	655	0	0	655-	0
2006	3,015	806	27	0	806-	27-
2007	76,239	1,474	2	0	1,474-	2-
2008	4,551	47	1	0	47-	1-
2009	19,693	213,012		0	213,012-	
2010	9,503	35,678	375	0	35,678-	375-
2011		48,265			48,265-	
2012	73,047	85,181	117	0	85,181-	117-
2013		11,455			11,455-	
2014	30,533	22,140	73	0	22,140-	73-
TOTAL	654,210	419,399	64	0	419,399-	64-

THREE-YEAR MOVING AVERAGES

03-05	145,876	446	0	0	446-	0
04-06	146,881	715	0	0	715-	0
05-07	149,477	978	1	0	978-	1-
06-08	27,935	776	3	0	776-	3-
07-09	33,494	71,511	214	0	71,511-	214-
08-10	11,249	82,913	737	0	82,913-	737-
09-11	9,732	98,985		0	98,985-	
10-12	27,517	56,375	205	0	56,375-	205-
11-13	24,349	48,300	198	0	48,300-	198-
12-14	34,527	39,592	115	0	39,592-	115-

FIVE-YEAR AVERAGE

10-14	22,617	40,544	179	0	40,544-	179-
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1995		149			149-	
1996						
1997						
1998						
1999		433		0	433-	
2000	33,568	563	2	0	563-	2-
2001		17			17-	
2002						
2003	362,133	5	0	0	5-	0
2004	170,821	4,290	3	0	4,290-	3-
2005		3,442			3,442-	
2006	1,083	138	13	0	138-	13-
2007	367,027	3,509	1	0	3,509-	1-
2008	181,067	4,722	3	0	4,722-	3-
2009	368,480	491,636	133	0	491,636-	133-
2010	261,664	572,346	219	0	572,346-	219-
2011		458,607			458,607-	
2012	2,376	48,160		0	48,160-	
2013		3,593			3,593-	
2014	1,528		0	0		0
TOTAL	1,749,747	1,591,611	91	0	1,591,611-	91-

THREE-YEAR MOVING AVERAGES

95-97		50			50-	
96-98						
97-99		144			144-	
98-00	11,189	332	3	0	332-	3-
99-01	11,189	338	3	0	338-	3-
00-02	11,189	193	2	0	193-	2-
01-03	120,711	7	0	0	7-	0
02-04	177,651	1,432	1	0	1,432-	1-
03-05	177,651	2,579	1	0	2,579-	1-
04-06	57,301	2,623	5	0	2,623-	5-
05-07	122,703	2,363	2	0	2,363-	2-
06-08	183,059	2,790	2	0	2,790-	2-
07-09	305,525	166,623	55	0	166,623-	55-
08-10	270,404	356,235	132	0	356,235-	132-
09-11	210,048	507,530	242	0	507,530-	242-
10-12	88,013	359,704	409	0	359,704-	409-

THREE-YEAR MOVING AVERAGES

11-13	792	170,120	0	170,120-
12-14	1,301	17,251	0	17,251-

FIVE-YEAR AVERAGE

10-14	53,114	216,541	408	0	216,541-	408-
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1999		440			440-	
2000		653			653-	
2001						
2002		473			473-	
2003	188,915	2	0	0	2-	0
2004	69,020	690	1	0	690-	1-
2005	70,164	2,527	4	0	2,527-	4-
2006	37,818	247	1	0	247-	1-
2007	132,922	1,073	1	0	1,073-	1-
2008	93,009	1,160	1	0	1,160-	1-
2009	194,348	209,855	108	0	209,855-	108-
2010	378,810	236,934	63	0	236,934-	63-
2011	592,930	236,004	40	0	236,004-	40-
2012	446,687	175,354	39	0	175,354-	39-
2013	685,532	36,883	5	0	36,883-	5-
2014	49,980	67,019	134	0	67,019-	134-
TOTAL	2,940,138	969,314	33	0	969,314-	33-

THREE-YEAR MOVING AVERAGES

99-01		364			364-	
00-02		375			375-	
01-03	62,972	158	0	0	158-	0
02-04	85,979	388	0	0	388-	0
03-05	109,366	1,073	1	0	1,073-	1-
04-06	59,001	1,155	2	0	1,155-	2-
05-07	80,302	1,283	2	0	1,283-	2-
06-08	87,917	827	1	0	827-	1-
07-09	140,093	70,696	50	0	70,696-	50-
08-10	222,056	149,316	67	0	149,316-	67-
09-11	388,696	227,597	59	0	227,597-	59-
10-12	472,809	216,097	46	0	216,097-	46-
11-13	575,050	149,413	26	0	149,413-	26-
12-14	394,067	93,085	24	0	93,085-	24-

FIVE-YEAR AVERAGE

10-14	430,788	150,439	35	0	150,439-	35-
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2000	57,465	598	1	0	598-	1-
2001						
2002						
2003						
2004						
2005	76,417	84	0	0	84-	0
2006						
2007	30,528	227	1	0	227-	1-
2008	30,120	137	0	0	137-	0
2009	90,985		0	0		0
2010	7,386	13,556	184	0	13,556-	184-
2011						
2012	380,467	61,811	16	0	61,811-	16-
2013		1,830			1,830-	
2014	24,016	18,186	76	0	18,186-	76-
TOTAL	697,384	96,428	14	0	96,428-	14-

THREE-YEAR MOVING AVERAGES

00-02	19,155	199	1	0	199-	1-
01-03						
02-04						
03-05	25,472	28	0	0	28-	0
04-06	25,472	28	0	0	28-	0
05-07	35,648	104	0	0	104-	0
06-08	20,216	121	1	0	121-	1-
07-09	50,544	121	0	0	121-	0
08-10	42,830	4,564	11	0	4,564-	11-
09-11	32,790	4,519	14	0	4,519-	14-
10-12	129,284	25,122	19	0	25,122-	19-
11-13	126,822	21,214	17	0	21,214-	17-
12-14	134,828	27,275	20	0	27,275-	20-

FIVE-YEAR AVERAGE

10-14	82,374	19,076	23	0	19,076-	23-
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2003	202,938	2	0	0	2-	0
2004	24,931	258	1	0	258-	1-
2005						
2006						
2007						
2008						
2009						
2010						
2011						
2012						
2013						
2014						
TOTAL	227,869	260	0	0	260-	0

THREE-YEAR MOVING AVERAGES

03-05	75,956	87	0	0	87-	0
04-06	8,310	86	1	0	86-	1-
05-07						
06-08						
07-09						
08-10						
09-11						
10-12						
11-13						
12-14						

FIVE-YEAR AVERAGE

10-14

1996	7,794		0	0		0
1997						
1998		1,886			1,886-	
1999	50,703	68	0	0	68-	0
2000		382			382-	
2001		173			173-	
2002						
2003						
2004		901			901-	
2005		795			795-	
2006	496,251	2,350	0	0	2,350-	0
2007	75,512	3,370	4	0	3,370-	4-
2008	49,236	5,005	10	0	5,005-	10-
2009	21,849	242,754		0	242,754-	
2010	76,624	535,418	699	0	535,418-	699-
2011	2,067,624	317,257	15	0	317,257-	15-
2012	67,971	210,447	310	0	210,447-	310-
2013	35,196	192,463	547	0	192,463-	547-
2014	671,807	450,636	67	0	450,636-	67-
TOTAL	3,620,567	1,963,904	54	0	1,963,904-	54-

THREE-YEAR MOVING AVERAGES

96-98	2,598	629	24	0	629-	24-
97-99	16,901	651	4	0	651-	4-
98-00	16,901	779	5	0	779-	5-
99-01	16,901	208	1	0	208-	1-
00-02		185			185-	
01-03		58			58-	
02-04		300			300-	
03-05		565			565-	
04-06	165,417	1,349	1	0	1,349-	1-
05-07	190,587	2,172	1	0	2,172-	1-
06-08	207,000	3,575	2	0	3,575-	2-
07-09	48,866	83,710	171	0	83,710-	171-
08-10	49,236	261,059	530	0	261,059-	530-
09-11	722,032	365,143	51	0	365,143-	51-
10-12	737,406	354,374	48	0	354,374-	48-

THREE-YEAR MOVING AVERAGES

11-13	723,597	240,055	33	0	240,055-	33-
12-14	258,325	284,515	110	0	284,515-	110-

FIVE-YEAR AVERAGE

10-14	583,844	341,244	58	0	341,244-	58-
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1995	99,949	974	1	0	974-	1-
1996	213,287	2,079	1	0	2,079-	1-
1997		883-			883	
1998						
1999	6,579	3,462	53	0	3,462-	53-
2000	100,351	1,251	1	0	1,251-	1-
2001	2,512	25	1	0	25-	1-
2002		454			454-	
2003	1,091,033	20	0	0	20-	0
2004	223,141	15,852	7	0	15,852-	7-
2005	64,253	3,428-	5-	0	3,428	5
2006	49,637	3,571	7	0	3,571-	7-
2007	2,154	2,282	106	0	2,282-	106-
2008	15,154	2,508	17	0	2,508-	17-
2009	24,891	330,850		0	330,850-	
2010	3,733,262	1,293,489	35	0	1,293,489-	35-
2011	79,952	939,959		0	939,959-	
2012	90,239	280,618	311	0	280,618-	311-
2013	5,646	71,710		0	71,710-	
2014	184,887	1,679,731	909	142,550	77	1,537,180- 831-
TOTAL	5,986,926	4,624,523	77	142,550	2	4,481,973- 75-

THREE-YEAR MOVING AVERAGES

95-97	104,412	723	1	0	723-	1-
96-98	71,096	399	1	0	399-	1-
97-99	2,193	860	39	0	860-	39-
98-00	35,643	1,571	4	0	1,571-	4-
99-01	36,480	1,579	4	0	1,579-	4-
00-02	34,288	577	2	0	577-	2-
01-03	364,515	166	0	0	166-	0
02-04	438,058	5,442	1	0	5,442-	1-
03-05	459,475	4,148	1	0	4,148-	1-
04-06	112,343	5,332	5	0	5,332-	5-
05-07	38,681	808	2	0	808-	2-
06-08	22,315	2,787	12	0	2,787-	12-
07-09	14,066	111,880	795	0	111,880-	795-
08-10	1,257,769	542,282	43	0	542,282-	43-
09-11	1,279,368	854,766	67	0	854,766-	67-
10-12	1,301,151	838,022	64	0	838,022-	64-

THREE-YEAR MOVING AVERAGES

11-13	58,612	430,762	735		0	430,762-	735-
12-14	93,591	677,353	724	47,517	51	629,836-	673-

FIVE-YEAR AVERAGE

10-14	818,797	853,101	104	28,510	3	824,591-	101-
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1995	13,192	125	1	0	125-	1-
1996	393,558	3,731	1	0	3,731-	1-
1997	124,398-	122-	0	0	122	0
1998			0	0		0
1999		3,619			3,619-	
2000	103,152	1,250	1	0	1,250-	1-
2001	6,887	69	1	0	69-	1-
2002						
2003	855,508	9	0	0	9-	0
2004	211,195	4,055	2	0	4,055-	2-
2005		4,976			4,976-	
2006		3,571			3,571-	
2007		2,069			2,069-	
2008		2,508			2,508-	
2009		419,432			419,432-	
2010	3,618,338	1,290,786	36	0	1,290,786-	36-
2011	79,952	924,568		0	924,568-	
2012	104,778	1,251,596		0	1,251,596-	
2013	6,992	36,924	528	0	36,924-	528-
2014	233,833	1,399,905	599	16,034	7	1,383,871- 592-
TOTAL	5,502,988	5,349,069	97	16,034	0	5,333,035- 97-

THREE-YEAR MOVING AVERAGES

95-97	94,118	1,245	1	0	1,245-	1-
96-98	89,720	1,203	1	0	1,203-	1-
97-99	41,466-	1,166	3-	0	1,166-	3
98-00	34,384	1,623	5	0	1,623-	5-
99-01	36,680	1,646	4	0	1,646-	4-
00-02	36,680	440	1	0	440-	1-
01-03	287,465	26	0	0	26-	0
02-04	355,568	1,355	0	0	1,355-	0
03-05	355,568	3,013	1	0	3,013-	1-
04-06	70,398	4,201	6	0	4,201-	6-
05-07		3,538			3,538-	
06-08		2,716			2,716-	
07-09		141,336			141,336-	
08-10	1,206,113	570,909	47	0	570,909-	47-
09-11	1,232,763	878,262	71	0	878,262-	71-
10-12	1,267,689	1,155,650	91	0	1,155,650-	91-

THREE-YEAR MOVING AVERAGES

11-13	63,907	737,696			0	737,696-
12-14	115,201	896,142	778	5,345	5	890,797- 773-

FIVE-YEAR AVERAGE

10-14	808,778	980,756	121	3,207	0	977,549- 121-
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1995		3,074		0	3,074-	
1996	330,483	3,403	1	0	3,403-	1-
1997			0	0		0
1998	146,294		0	0		0
1999			0	0		0
2000	15,208	115	1	0	115-	1-
2001	17,841	307	2	0	307-	2-
2002		83			83-	
2003	383,051	4	0	0	4-	0
2004	161,630	1,877	1	0	1,877-	1-
2005		328			328-	
2006	780,412	768	0	0	768-	0
2007	233,118	2,769	1	0	2,769-	1-
2008	73,108	1,302	2	0	1,302-	2-
2009	2,018,319	77,851	4	0	77,851-	4-
2010	445,859	976,059	219	0	976,059-	219-
2011	1,632,523	288,635	18	0	288,635-	18-
2012	104,276	160,924	154	0	160,924-	154-
2013	230,930	131,391	57	0	131,391-	57-
2014	518,455	1,132,395	218	2,358	1,130,037-	218-
TOTAL	7,091,507	2,781,287	39	2,358	0	2,778,929- 39-

THREE-YEAR MOVING AVERAGES

95-97	110,161	2,159	2	0	2,159-	2-
96-98	158,926	1,134	1	0	1,134-	1-
97-99	48,765		0	0		0
98-00	53,834	38	0	0	38-	0
99-01	11,016	141	1	0	141-	1-
00-02	11,016	169	2	0	169-	2-
01-03	133,631	132	0	0	132-	0
02-04	181,560	655	0	0	655-	0
03-05	181,560	737	0	0	737-	0
04-06	314,014	991	0	0	991-	0
05-07	337,844	1,288	0	0	1,288-	0
06-08	362,213	1,613	0	0	1,613-	0
07-09	774,849	27,307	4	0	27,307-	4-
08-10	845,762	351,738	42	0	351,738-	42-
09-11	1,365,567	447,515	33	0	447,515-	33-
10-12	727,552	475,206	65	0	475,206-	65-

THREE-YEAR MOVING AVERAGES

11-13	655,909	193,650	30		0	193,650-	30-
12-14	284,553	474,903	167	786	0	474,117-	167-

FIVE-YEAR AVERAGE

10-14	586,408	537,881	92	472	0	537,409-	92-
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1995	358,733	4,178	1	0	4,178-	1-	
1996	249,180	83	0	0	83-	0	
1997	361,979	865	0	0	865-	0	
1998	261,380	1,154	0	0	1,154-	0	
1999	102,575	2,893	3	0	2,893-	3-	
2000	105,334	3,773	4	0	3,773-	4-	
2001	87,504	3,368	4	0	3,368-	4-	
2002		5,836			5,836-		
2003		2			2-		
2004	152,450	4,070	3	0	4,070-	3-	
2005	124,134	12	0	0	12-	0	
2006	249,103	4	0	0	4-	0	
2007	285,089	70-	0	0	70	0	
2008	354,093	56-	0	0	56	0	
2009	433,826	899,583	207	0	899,583-	207-	
2010	397,516	826,460	208	0	826,460-	208-	
2011	182,667	563,990	309	0	563,990-	309-	
2012	461,965	427,020	92	0	427,020-	92-	
2013	495,508	342,056	69	0	342,056-	69-	
2014	786,935	900,638	114	853	899,785-	114-	
TOTAL	5,449,971	3,985,858	73	853	0	3,985,005-	73-

THREE-YEAR MOVING AVERAGES

95-97	323,297	1,709	1	0	1,709-	1-
96-98	290,846	701	0	0	701-	0
97-99	241,978	1,637	1	0	1,637-	1-
98-00	156,430	2,607	2	0	2,607-	2-
99-01	98,471	3,345	3	0	3,345-	3-
00-02	64,279	4,326	7	0	4,326-	7-
01-03	29,168	3,068	11	0	3,068-	11-
02-04	50,817	3,302	6	0	3,302-	6-
03-05	92,194	1,361	1	0	1,361-	1-
04-06	175,229	1,362	1	0	1,362-	1-
05-07	219,442	18-	0	0	18	0
06-08	296,095	40-	0	0	40	0
07-09	357,669	299,819	84	0	299,819-	84-
08-10	395,145	575,329	146	0	575,329-	146-
09-11	338,003	763,344	226	0	763,344-	226-
10-12	347,383	605,823	174	0	605,823-	174-

THREE-YEAR MOVING AVERAGES

11-13	380,047	444,355	117		0	444,355-	117-
12-14	581,470	556,571	96	284	0	556,287-	96-

FIVE-YEAR AVERAGE

10-14	464,918	612,033	132	171	0	611,862-	132-
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1995	825,623	1,670	0	0	1,670-	0
1996	193,306	3,212-	2-	0	3,212	2
1997	336,433	5,100	2	0	5,100-	2-
1998	216,234	1,261	1	0	1,261-	1-
1999		2,090			2,090-	
2000	93,238	3,744	4	0	3,744-	4-
2001	44,968	3,034	7	0	3,034-	7-
2002		368-			368	
2003	75,543	1	0	0	1-	0
2004	113,231	5,802	5	0	5,802-	5-
2005	273,643	296-	0	0	296	0
2006	417,711	1,269-	0	0	1,269	0
2007	428,815	274-	0	0	274	0
2008	587,763		0	0		0
2009	708,815	1,393,766	197	0	1,393,766-	197-
2010	769,802	1,318,948	171	0	1,318,948-	171-
2011	300,103	903,468	301	0	903,468-	301-
2012	376,145	688,743	183	0	688,743-	183-
2013	386,350	398,316	103	0	398,316-	103-
2014	1,033,015	1,428,938	138	1,375	0	1,427,563- 138-
TOTAL	7,180,739	6,149,460	86	1,375	0	6,148,085- 86-

THREE-YEAR MOVING AVERAGES

95-97	451,787	1,186	0	0	1,186-	0
96-98	248,658	1,050	0	0	1,050-	0
97-99	184,222	2,817	2	0	2,817-	2-
98-00	103,157	2,365	2	0	2,365-	2-
99-01	46,069	2,956	6	0	2,956-	6-
00-02	46,069	2,136	5	0	2,136-	5-
01-03	40,170	889	2	0	889-	2-
02-04	62,925	1,812	3	0	1,812-	3-
03-05	154,139	1,836	1	0	1,836-	1-
04-06	268,195	1,412	1	0	1,412-	1-
05-07	373,390	613-	0	0	613	0
06-08	478,097	514-	0	0	514	0
07-09	575,131	464,497	81	0	464,497-	81-
08-10	688,793	904,238	131	0	904,238-	131-
09-11	592,907	1,205,394	203	0	1,205,394-	203-
10-12	482,017	970,386	201	0	970,386-	201-

THREE-YEAR MOVING AVERAGES

11-13	354,199	663,509	187		0	663,509-	187-
12-14	598,503	838,666	140	458	0	838,207-	140-

FIVE-YEAR AVERAGE

10-14	573,083	947,683	165	275	0	947,407-	165-
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1995	5,468	492	9	0	492-	9-	
1996		85-			85		
1997	146,975		0	0		0	
1998							
1999	127,125	2,340	2	0	2,340-	2-	
2000		308			308-		
2001	227,756	2,407	1	0	2,407-	1-	
2002		2,017			2,017-		
2003	234,683	3	0	0	3-	0	
2004	481,295	7,569	2	0	7,569-	2-	
2005	577,784	277	0	0	277-	0	
2006	942,950	1,308	0	0	1,308-	0	
2007	1,026,299	3,020	0	0	3,020-	0	
2008	1,461,654	2,048	0	0	2,048-	0	
2009	1,632,016	737,628	45	0	737,628-	45-	
2010	1,384,063	712,410	51	0	712,410-	51-	
2011	781,632	538,093	69	0	538,093-	69-	
2012	964,590	478,654	50	0	478,654-	50-	
2013	925,054	279,130	30	0	279,130-	30-	
2014	1,983,414	807,074	41	523	0	806,551-	41-
TOTAL	12,902,758	3,574,690	28	523	0	3,574,167-	28-

THREE-YEAR MOVING AVERAGES

95-97	50,815	136	0	0	136-	0
96-98	48,992	28-	0	0	28	0
97-99	91,367	780	1	0	780-	1-
98-00	42,375	883	2	0	883-	2-
99-01	118,294	1,685	1	0	1,685-	1-
00-02	75,919	1,577	2	0	1,577-	2-
01-03	154,146	1,476	1	0	1,476-	1-
02-04	238,659	3,196	1	0	3,196-	1-
03-05	431,254	2,616	1	0	2,616-	1-
04-06	667,343	3,051	0	0	3,051-	0
05-07	849,011	1,535	0	0	1,535-	0
06-08	1,143,634	2,125	0	0	2,125-	0
07-09	1,373,323	247,565	18	0	247,565-	18-
08-10	1,492,578	484,028	32	0	484,028-	32-
09-11	1,265,904	662,710	52	0	662,710-	52-
10-12	1,043,429	576,385	55	0	576,385-	55-

THREE-YEAR MOVING AVERAGES

11-13	890,426	431,959	49		0	431,959-	49-
12-14	1,291,020	521,619	40	174	0	521,445-	40-

FIVE-YEAR AVERAGE

10-14	1,207,751	563,072	47	105	0	562,968-	47-
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2003	2,804,975	29	0	0	29-	0
2004	59	105-	178-	0	105	178
2005	1,399	1,234-	88-	0	1,234	88
2006	1,455	769	53	0	769-	53-
2007	3,548	610-	17-	0	610	17
2008	3,831-	1,635-	43	0	1,635	43-
2009	4,100	295,044-		0	295,044	
2010	1,638	5,657-	345-	0	5,657	345
2011	2,596	84,216-		0	84,216	
2012	2,066	152,264-		0	152,264	
2013	2,218	37,829-		0	37,829	
2014	1,538,159	81,153-	5-	0	81,153	5
TOTAL	4,358,382	658,948-	15-	0	658,948	15

THREE-YEAR MOVING AVERAGES

03-05	935,478	436-	0	0	436	0
04-06	971	190-	20-	0	190	20
05-07	2,134	358-	17-	0	358	17
06-08	391	492-	126-	0	492	126
07-09	1,273	99,096-		0	99,096	
08-10	636	100,779-		0	100,779	
09-11	2,778	128,305-		0	128,305	
10-12	2,100	80,712-		0	80,712	
11-13	2,293	91,436-		0	91,436	
12-14	514,147	90,415-	18-	0	90,415	18

FIVE-YEAR AVERAGE

10-14	309,335	72,224-	23-	0	72,224	23
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1995		157			157-	
1996						
1997						
1998						
1999	1,622	27	2	0	27-	2-
2000	417,141	113	0	0	113-	0
2001						
2002						
2003	8,100		0	0		0
2004	26,253	660	3	0	660-	3-
2005	23,390	2	0	0	2-	0
2006	49,475		0	0		0
2007	52,676	1-	0	0	1	0
2008	46,051	1	0	0	1-	0
2009	52,739	124,577	236	0	124,577-	236-
2010	47,370	118,203	250	0	118,203-	250-
2011	23,470	80,753	344	0	80,753-	344-
2012	57,331		0	0		0
2013	59,168		0	0		0
2014	92,239		0	0		0
TOTAL	957,023	324,492	34	0	324,492-	34-

THREE-YEAR MOVING AVERAGES

95-97		52			52-	
96-98						
97-99	541	9	2	0	9-	2-
98-00	139,588	47	0	0	47-	0
99-01	139,588	47	0	0	47-	0
00-02	139,047	38	0	0	38-	0
01-03	2,700		0	0		0
02-04	11,451	220	2	0	220-	2-
03-05	19,247	221	1	0	221-	1-
04-06	33,039	220	1	0	220-	1-
05-07	41,847		0	0		0
06-08	49,400		0	0		0
07-09	50,488	41,525	82	0	41,525-	82-
08-10	48,720	80,927	166	0	80,927-	166-
09-11	41,193	107,844	262	0	107,844-	262-
10-12	42,724	66,319	155	0	66,319-	155-

THREE-YEAR MOVING AVERAGES

11-13	46,656	26,918	58	0	26,918-	58-
12-14	69,579		0	0		0

FIVE-YEAR AVERAGE

10-14	55,916	39,791	71	0	39,791-	71-
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2002	132,286	127-	0	0	127	0
2003	572,749	6	0	0	6-	0
2004	20,325	204	1	0	204-	1-
2005	18,600	4	0	0	4-	0
2006	11,835	489	4	0	489-	4-
2007		2,547			2,547-	
2008		723			723-	
2009		525			525-	
2010						
2011						
2012						
2013						
2014						
TOTAL	755,795	4,371	1	0	4,371-	1-

THREE-YEAR MOVING AVERAGES

02-04	241,787	27	0	0	27-	0
03-05	203,891	71	0	0	71-	0
04-06	16,920	232	1	0	232-	1-
05-07	10,145	1,013	10	0	1,013-	10-
06-08	3,945	1,253	32	0	1,253-	32-
07-09		1,265			1,265-	
08-10		416			416-	
09-11		175			175-	
10-12						
11-13						
12-14						

FIVE-YEAR AVERAGE

10-14

1995	79,994	1,883	2	0	1,883-	2-
1996	110,671	2,531	2	0	2,531-	2-
1997	106,652	2,201	2	0	2,201-	2-
1998	135,667	26,938	20	0	26,938-	20-
1999	42,272	1,221	3	0	1,221-	3-
2000	136,464-	3,575	3-	0	3,575-	3
2001	16,516	749	5	0	749-	5-
2002	204,972	2,158	1	0	2,158-	1-
2003	946,226		0	0		0
2004		30			30-	
2005						
2006	404,006	600-	0	0	600	0
2007	649,230	427-	0	0	427	0
2008	1,485,654-	3,506-	0	0	3,506	0
2009	1,352,845		0	0		0
2010	6,099		0	0		0
2011	37,116		0	0		0
2012						
2013						
2014	187,838		0	0		0
TOTAL	2,657,986	36,753	1	0	36,753-	1-

THREE-YEAR MOVING AVERAGES

95-97	99,106	2,205	2	0	2,205-	2-
96-98	117,663	10,557	9	0	10,557-	9-
97-99	94,864	10,120	11	0	10,120-	11-
98-00	13,825	10,578	77	0	10,578-	77-
99-01	25,892-	1,848	7-	0	1,848-	7
00-02	28,342	2,161	8	0	2,161-	8-
01-03	389,238	969	0	0	969-	0
02-04	383,733	729	0	0	729-	0
03-05	315,409	10	0	0	10-	0
04-06	134,669	190-	0	0	190	0
05-07	351,079	342-	0	0	342	0
06-08	144,139-	1,511-	1	0	1,511	1-
07-09	172,140	1,311-	1-	0	1,311	1
08-10	42,237-	1,169-	3	0	1,169	3-
09-11	465,353		0	0		0
10-12	14,405		0	0		0

THREE-YEAR MOVING AVERAGES

11-13	12,372	0	0	0
12-14	62,613	0	0	0

FIVE-YEAR AVERAGE

10-14	46,211	0	0	0
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2010	249,544	0	0	0
2011	41,862	0	0	0
2012	409,701	0	0	0
2013	443,467	0	0	0
2014	1,219,183	0	0	0
TOTAL	2,363,757	0	0	0

THREE-YEAR MOVING AVERAGES

10-12	233,702	0	0	0
11-13	298,343	0	0	0
12-14	690,784	0	0	0

FIVE-YEAR AVERAGE

10-14	472,751	0	0	0
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2010	473,310	9,685	2	102,761	22	93,076	20
2011	185,109	3,392	2	6,207	3	2,815	2
2012	371,136	5,682	2	86,477	23	80,795	22
2013	15,652	3,613	23	67,004	428	63,392	405
2014	862,544	13,658	2	329,182	38	315,523	37
TOTAL	1,907,751	36,031	2	591,631	31	555,600	29

THREE-YEAR MOVING AVERAGES

10-12	343,185	6,253	2	65,148	19	58,895	17
11-13	190,632	4,229	2	53,230	28	49,000	26
12-14	416,444	7,651	2	160,888	39	153,236	37

FIVE-YEAR AVERAGE

10-14	381,550	7,206	2	118,326	31	111,120	29
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1995	60,914-		0		0		0
1996	99,252		0		0		0
1997	58,157-		0		0		0
1998	1,052,266		0		0		0
1999	765,028-	73	0		0	73-	0
2000	673,866-	14	0		0	14-	0
2001							
2002							
2003							
2004							
2005							
2006	129,725	53	0		0	53-	0
2007		74				74-	
2008		461				461-	
2009	54,750	16,118	29		0	16,118-	29-
2010		29,139				29,139-	
2011		16,171				16,171-	
2012							
2013		3,924				3,924-	
2014		30,856				30,856-	
TOTAL	221,970-	96,883	44-		0	96,883-	44

THREE-YEAR MOVING AVERAGES

95-97	6,606-		0		0		0
96-98	364,454		0		0		0
97-99	76,360	24	0		0	24-	0
98-00	128,876-	29	0		0	29-	0
99-01	479,631-	29	0		0	29-	0
00-02	224,622-	5	0		0	5-	0
01-03							
02-04							
03-05							
04-06	43,242	17	0		0	17-	0
05-07	43,242	42	0		0	42-	0
06-08	43,242	196	0		0	196-	0
07-09	18,250	5,551	30		0	5,551-	30-
08-10	18,250	15,239	84		0	15,239-	84-
09-11	18,250	20,476	112		0	20,476-	112-
10-12		15,104				15,104-	

THREE-YEAR MOVING AVERAGES

11-13	6,698	6,698-
12-14	11,593	11,593-

FIVE-YEAR AVERAGE

10-14	16,018	16,018-
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DEPRECIATION CALCULATIONS

SURVIVOR CURVE.. IOWA 75-R4
 NET SALVAGE PERCENT.. 0

1980	83,965.00	37,885	161,189-	245,154	41.16	5,956
1983	14,974.00	6,193	26,349-	41,323	43.98	940
2005	20,957.55	2,649	11,271-	32,229	65.52	492
2007	726,878.34	72,593	308,860-	1,035,738	67.51	15,342
2008	114,583.26	9,915	42,185-	156,768	68.51	2,288
	961,358.15	129,235	549,854-	1,511,212		25,018

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 60.4 2.60

SURVIVOR CURVE.. IOWA 68-S2.5
NET SALVAGE PERCENT.. -5

1982	164,532.98	79,317	127,553	45,207	36.78	1,229
1984	3,658.00	1,666	2,679	1,162	38.50	30
1985	28,887.75	12,766	20,529	9,803	39.38	249
1986	56,563.00	24,219	38,948	20,443	40.27	508
1987	15,641.14	6,480	10,421	6,002	41.17	146
1988	20,857.00	8,351	13,430	8,470	42.07	201
1989	29,039.00	11,214	18,034	12,457	42.99	290
1990	106,678.46	39,666	63,788	48,224	43.92	1,098
1991	811,084.00	289,932	466,251	385,387	44.85	8,593
1992	267,598.00	91,731	147,516	133,462	45.80	2,914
1993	1,160,244.00	380,705	612,226	606,030	46.75	12,963
1994	1,403,771.00	440,021	707,615	766,345	47.70	16,066
1995	2,185,168.00	652,214	1,048,850	1,245,576	48.67	25,592
1996	156,174.00	44,300	71,241	92,742	49.63	1,869
1997	94,696.00	25,428	40,892	58,539	50.61	1,157
1998	455,428.07	115,471	185,693	292,506	51.58	5,671
1999	70,304.00	16,761	26,954	46,865	52.56	892
2000	464,971.00	103,747	166,839	321,381	53.55	6,002
2001	1,021,391.00	212,283	341,380	731,081	54.54	13,404
2002	377,623.44	72,711	116,929	279,576	55.53	5,035
2003	576,192.10	102,136	164,249	440,753	56.52	7,798
2004	209,949.46	34,006	54,686	165,761	57.51	2,882
2005	401,350.75	58,813	94,580	326,838	58.51	5,586
2006	217,430.19	28,538	45,893	182,409	59.50	3,066
2007	621,007.69	71,915	115,649	536,409	60.50	8,866
2008	771,956.58	77,481	124,600	685,954	61.50	11,154
2009	295,448.33	25,091	40,350	269,871	62.50	4,318
2010	595,952.42	41,412	66,597	559,153	63.50	8,806
2011	184,169.62	9,953	16,006	177,372	64.50	2,750
2012	1,025,557.38	39,584	63,656	1,013,179	65.50	15,468
2013	176,153.41	4,080	6,561	178,400	66.50	2,683
2014	901,620.00	6,958	11,190	935,511	67.50	13,859
	14,871,097.77	3,128,950	5,031,785	10,582,868		191,145

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 55.4 1.29

SURVIVOR CURVE.. IOWA 70-S2.5
NET SALVAGE PERCENT.. -15

1982	9,450,975.78	4,862,948	3,593,256	7,275,366	38.68	188,091
1987	87,783.00	38,779	28,654	72,296	43.11	1,677
1989	65,068.00	26,778	19,786	55,042	44.95	1,225
1991	15,350.00	5,845	4,319	13,334	46.82	285
1993	753,420.88	263,275	194,535	671,899	48.73	13,788
1994	507,161.00	169,220	125,038	458,197	49.69	9,221
1996	18,978.00	5,731	4,235	17,590	51.62	341
1997	31,458.00	8,992	6,644	29,533	52.60	561
1998	697,578.41	188,176	139,044	663,171	53.58	12,377
2000	381,328.00	90,587	66,935	371,592	55.54	6,691
2001	4,626.00	1,024	757	4,563	56.53	81
2003	847,766.00	159,889	118,143	856,788	58.52	14,641
2004	1,104,371.66	190,326	140,633	1,129,394	59.51	18,978
2005	243,422.90	37,951	28,042	251,894	60.51	4,163
2006	2,897,371.90	404,602	298,962	3,033,016	61.50	49,317
2007	2,188,732.51	269,676	199,265	2,317,777	62.50	37,084
2008	3,486,392.04	372,308	275,100	3,734,251	63.50	58,807
2009	1,548,559.95	139,921	103,389	1,677,455	64.50	26,007
2010	2,209,837.24	163,381	120,723	2,420,590	65.50	36,956
2011	705,347.99	40,558	29,969	781,181	66.50	11,747
2012	2,080,696.83	85,447	63,137	2,329,664	67.50	34,514
2013	232,034.36	5,718	4,225	262,615	68.50	3,834
2014	2,164,343.07	17,771	13,131	2,475,864	69.50	35,624
	31,722,603.52	7,548,903	5,577,922	30,903,072		566,010

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 54.6 1.78

SURVIVOR CURVE.. IOWA 70-R2.5
NET SALVAGE PERCENT.. -20

1960	10,021.32	7,684	5,798	6,228	25.27	246
1963	661,927.48	485,436	366,270	428,043	27.22	15,725
1964	834,199.00	602,335	454,473	546,566	27.88	19,604
1965	266.36	189	143	177	28.56	6
1969	296.00	196	148	207	31.35	7
1971	320.00	204	154	230	32.79	7
1977	5,452.00	3,057	2,307	4,235	37.29	114
1982	6,298,880.75	3,106,608	2,343,992	5,214,665	41.23	126,477
1984	76,397.00	35,558	26,829	64,847	42.85	1,513
1985	24,262.00	10,951	8,263	20,851	43.67	477
1986	141,673.00	61,956	46,747	123,261	44.49	2,771
1987	23,239.00	9,832	7,418	20,469	45.32	452
1988	20,333.00	8,310	6,270	18,130	46.16	393
1989	124,840.00	49,222	37,139	112,669	47.00	2,397
1990	70,198.00	26,655	20,112	64,126	47.85	1,340
1991	264,678.00	96,647	72,922	244,692	48.70	5,024
1992	76,763.00	26,898	20,295	71,821	49.56	1,449
1993	74,999.00	25,174	18,994	71,005	50.42	1,408
1994	202,347.00	64,902	48,970	193,846	51.29	3,779
1995	263,503.00	80,588	60,805	255,399	52.16	4,896
1996	609,784.00	177,293	133,771	597,970	53.04	11,274
1997	242,471.00	66,797	50,400	240,565	53.93	4,461
1998	563,945.00	146,851	110,802	565,932	54.81	10,325
1999	175,583.00	43,044	32,477	178,223	55.70	3,200
2000	8,983,992.00	2,063,767	1,557,150	9,223,640	56.60	162,962
2001	1,677,510.00	359,464	271,222	1,741,790	57.50	30,292
2002	167,941.99	33,367	25,176	176,354	58.41	3,019
2003	111,541.33	20,440	15,422	118,428	59.31	1,997
2004	13,810,092.50	2,312,970	1,745,178	14,826,933	60.23	246,172
2005	226,645.86	34,424	25,974	246,001	61.14	4,024
2006	10,137,657.60	1,379,897	1,041,157	11,124,032	62.06	179,246
2007	6,923,415.74	833,219	628,679	7,679,420	62.98	121,934
2008	55,618.46	5,807	4,381	62,361	63.91	976
2009	8,256,043.52	730,264	550,997	9,356,255	64.84	144,298
2010	12,327,471.75	893,939	674,493	14,118,473	65.77	214,664
2011	20,664,520.99	1,165,479	879,375	23,918,050	66.71	358,538

SURVIVOR CURVE.. IOWA 70-R2.5
 NET SALVAGE PERCENT.. -20

2012	1,386,828.00	56,100	42,329	1,621,865	67.64	23,978
2013	226,553.72	5,516	4,162	267,702	68.58	3,903
2014	1,117,010.02	8,994	6,786	1,333,626	69.53	19,181
	96,839,221.39	15,040,034	11,347,980	104,859,086		1,732,529

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 60.5 1.79

SURVIVOR CURVE.. IOWA 50-R1.5
NET SALVAGE PERCENT.. -20

1960	2,432,027.73	2,097,186	2,459,628	458,805	14.07	32,609
1963	36,009.00	29,919	35,090	8,121	15.38	528
1964	4,376.00	3,588	4,208	1,043	15.84	66
1966	934.00	744	873	248	16.79	15
1968	3,150.00	2,436	2,857	923	17.78	52
1969	4,532.00	3,449	4,045	1,393	18.29	76
1971	166,041.00	122,140	143,249	56,000	19.35	2,894
1973	3,044.00	2,160	2,533	1,120	20.44	55
1974	6,163.00	4,289	5,030	2,366	21.00	113
1975	242.00	165	194	96	21.58	4
1976	10,090.00	6,742	7,907	4,201	22.16	190
1977	4,199.00	2,746	3,221	1,818	22.75	80
1978	12,510.00	8,001	9,384	5,628	23.35	241
1979	2,324.00	1,452	1,703	1,086	23.96	45
1984	41,292.00	22,654	26,569	22,981	27.14	847
1986	96,990.47	50,117	58,778	57,611	28.47	2,024
1988	3,190.00	1,544	1,811	2,017	29.83	68
1989	54,978.00	25,703	30,145	35,829	30.52	1,174
1990	34,251.00	15,438	18,106	22,995	31.22	737
1991	134,455.00	58,343	68,426	92,920	31.92	2,911
1992	47,926.00	19,979	23,432	34,079	32.63	1,044
1993	75,949.00	30,349	35,594	55,545	33.35	1,666
1994	233.00	89	104	176	34.07	5
1996	200,512.00	69,634	81,668	158,946	35.53	4,474
1997	30,813.00	10,153	11,908	25,068	36.27	691
1998	345,695.00	107,691	126,302	288,532	37.02	7,794
1999	36,767.00	10,792	12,657	31,463	37.77	833
2000	1,276,738.17	351,767	412,560	1,119,526	38.52	29,063
2001	3,961,946.16	1,019,330	1,195,494	3,558,841	39.28	90,602
2002	467,778.08	111,705	131,010	430,324	40.05	10,745
2003	196,323.46	43,254	50,729	184,859	40.82	4,529
2004	5,259,126.66	1,061,502	1,244,954	5,065,998	41.59	121,808
2005	104,954.72	19,219	22,540	103,406	42.37	2,441
2006	2,100,809.02	345,373	405,061	2,115,910	43.15	49,036
2007	2,772,544.74	403,239	472,928	2,854,126	43.94	64,955
2008	527,543.72	66,724	78,255	554,797	44.73	12,403
2009	4,883,068.59	523,856	614,391	5,245,291	45.53	115,205
2010	5,819,300.59	512,564	601,147	6,382,014	46.33	137,751
2011	6,648,755.68	456,371	535,242	7,443,265	47.14	157,897

SURVIVOR CURVE.. IOWA 50-R1.5
 NET SALVAGE PERCENT.. -20

2012	3,473,708.77	170,906	200,443	3,968,008	47.95	82,753
2013	541,805.27	15,994	18,758	631,408	48.77	12,947
2014	889,608.10	8,754	10,267	1,057,263	49.59	21,320

	42,712,704.93	7,818,061	9,169,201	42,086,045		974,691
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COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 43.2 2.28

SURVIVOR CURVE.. IOWA 51-R4
NET SALVAGE PERCENT.. -10

1960	296,699.41	287,910	326,369			
1966	3,794.00	3,459	3,971	202	8.73	23
1974	920.00	737	846	166	13.87	12
1975	1,560.00	1,225	1,406	310	14.59	21
1976	13,034.00	10,031	11,517	2,820	15.32	184
1977	21,030.00	15,848	18,195	4,938	16.06	307
1978	20,835.00	15,360	17,635	5,284	16.82	314
1979	5.00	4	5			
1982	325,311.97	217,443	249,649	108,194	20.01	5,407
1984	61,166.00	38,668	44,395	22,888	21.69	1,055
1985	83,345.00	51,142	58,717	32,962	22.55	1,462
1986	313,637.48	186,504	214,128	130,873	23.43	5,586
1987	189,964.27	109,355	125,552	83,409	24.31	3,431
1988	160,759.00	89,424	102,669	74,166	25.21	2,942
1989	158,020.00	84,832	97,397	76,425	26.11	2,927
1990	402,925.00	208,312	239,166	204,052	27.03	7,549
1991	179,533.00	89,256	102,476	95,010	27.95	3,399
1992	75,471.00	35,991	41,322	41,696	28.89	1,443
1993	210,112.20	95,939	110,149	120,974	29.83	4,055
1994	234,783.00	102,393	117,559	140,702	30.78	4,571
1995	260,393.00	108,171	124,193	162,239	31.74	5,111
1996	496,063.00	195,797	224,797	320,872	32.70	9,813
1997	582,990.00	218,038	250,332	390,957	33.66	11,615
1998	328,140.00	115,787	132,937	228,017	34.64	6,582
1999	553,189.00	183,623	210,820	397,688	35.61	11,168
2000	595,694.00	185,145	212,568	442,695	36.59	12,099
2001	710,087.00	205,686	236,151	544,945	37.57	14,505
2002	495,110.01	132,844	152,520	392,101	38.56	10,169
2003	18,238,607.57	4,504,225	5,171,364	14,891,104	39.55	376,513
2004	10,403,339.19	2,347,097	2,694,735	8,748,938	40.54	215,810
2005	922,110.20	188,349	216,246	798,075	41.53	19,217
2006	777,610.65	142,223	163,288	692,084	42.52	16,277
2007	684,155.32	110,380	126,729	625,842	43.52	14,381
2008	373,290.15	52,251	59,990	350,629	44.51	7,878
2009	2,308,438.00	273,354	313,842	2,225,440	45.51	48,900
2010	755,928.57	73,207	84,050	747,471	46.51	16,071
2011	259,214.50	19,569	22,467	262,669	47.50	5,530

SURVIVOR CURVE.. IOWA 51-R4
 NET SALVAGE PERCENT.. -10

2012	1,503,860.41	81,091	93,102	1,561,144	48.50	32,189
2013	126,103.57	4,080	4,684	134,030	49.50	2,708
2014	1,230,984.12	13,270	15,236	1,338,847	50.50	26,512
	44,358,213.59	10,798,020	12,393,174	36,400,861		907,736

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 40.1 2.05

SURVIVOR CURVE.. IOWA 75-S4
 NET SALVAGE PERCENT.. 0

1982	589,100.00	255,198	204,088	385,012	42.51	9,057
1984	24,405.00	9,925	7,937	16,468	44.50	370
1988	12,362.00	4,368	3,493	8,869	48.50	183
1989	33,467.00	11,379	9,100	24,367	49.50	492
1990	124,442.00	40,651	32,510	91,932	50.50	1,820
1991	10,933.00	3,426	2,740	8,193	51.50	159
1992	100,650.00	30,195	24,148	76,502	52.50	1,457
1999	103,274.00	21,344	17,069	86,205	59.50	1,449
2001	44,436.00	7,998	6,396	38,040	61.50	619
2003	2,238.48	343	274	1,964	63.50	31
2004	918.03	129	103	815	64.50	13
2006	6,819.52	773	618	6,202	66.50	93
2008	234,389.25	20,315	16,247	218,142	68.50	3,185
	1,287,434.28	406,044	324,723	962,711		18,928

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 50.9 1.47

SURVIVOR CURVE.. IOWA 75-R4
NET SALVAGE PERCENT.. 0

1957	71,278.06	50,484	64,341	6,937	21.88	317
1958	34,551.79	24,135	30,759	3,793	22.61	168
1959	2,763.34	1,903	2,425	338	23.36	14
1960	582.44	395	503	79	24.11	3
1961	2,850.33	1,905	2,428	422	24.88	17
1962	20,156.50	13,263	16,903	3,254	25.65	127
1963	31,260.31	20,240	25,795	5,465	26.44	207
1964	16,993.61	10,824	13,795	3,199	27.23	117
1965	19,273.35	12,068	15,380	3,893	28.04	139
1966	3,950.77	2,431	3,098	853	28.85	30
1967	2,359.50	1,426	1,817	542	29.68	18
1968	595.99	354	451	145	30.51	5
1969	1,196.56	696	887	310	31.35	10
1970	869.76	496	632	238	32.21	7
1971	1,642.63	918	1,170	473	33.07	14
1972	479.26	262	334	145	33.94	4
1973	832.69	446	568	265	34.81	8
1974	4,497.72	2,357	3,004	1,494	35.70	42
1975	8,196.07	4,197	5,349	2,847	36.59	78
1976	85,868.53	42,945	54,732	31,137	37.49	831
1977	10,063.09	4,911	6,259	3,804	38.40	99
1978	10,831.78	5,153	6,567	4,265	39.32	108
1979	26,493.79	12,279	15,649	10,845	40.24	270
1980	51,385.22	23,185	29,549	21,836	41.16	531
1981	19,722.84	8,652	11,027	8,696	42.10	207
1982	41,635.32	17,742	22,612	19,023	43.04	442
1983	50,103.21	20,723	26,411	23,692	43.98	539
1984	137,982.87	55,321	70,505	67,478	44.93	1,502
1985	104,391.94	40,532	51,657	52,735	45.88	1,149
1986	130,939.68	49,164	62,658	68,282	46.84	1,458
1987	80,226.62	29,096	37,082	43,145	47.80	903
1988	96,448.17	33,731	42,989	53,459	48.77	1,096
1989	49,216.47	16,583	21,135	28,081	49.73	565
1990	58,928.31	19,085	24,323	34,605	50.71	682
1991	65,498.62	20,365	25,955	39,544	51.68	765
1992	50,101.05	14,924	19,020	31,081	52.66	590
1993	61,506.44	17,517	22,325	39,181	53.64	730
1994	309,831.48	84,191	107,300	202,531	54.62	3,708
1995	50,913.71	13,170	16,785	34,129	55.60	614
1996	316,525.13	77,697	99,023	217,502	56.59	3,843
1997	74,245.06	17,245	21,978	52,267	57.58	908
1998	212,930.29	46,647	59,451	153,479	58.57	2,620

SURVIVOR CURVE.. IOWA 75-R4
 NET SALVAGE PERCENT.. 0

1999	78,129.38	16,084	20,499	57,630	59.56	968
2000	225,136.61	43,377	55,283	169,854	60.55	2,805
2001	120,078.37	21,550	27,465	92,613	61.54	1,505
2003	289,525.31	44,277	56,430	233,095	63.53	3,669
2004	169,460.57	23,679	30,178	139,283	64.52	2,159
2005	1,089,610.87	137,727	175,531	914,080	65.52	13,951
2006	71,615.33	8,098	10,321	61,294	66.52	921
2007	1,483,559.61	148,163	188,831	1,294,729	67.51	19,178
2008	1,114,560.16	96,443	122,915	991,645	68.51	14,474
2009	450,433.59	32,972	42,022	408,412	69.51	5,876
2010	437,550.01	26,196	33,386	404,164	70.51	5,732
2011	86,283.89	4,027	5,132	81,152	71.50	1,135
2012	44,631.51	1,488	1,897	42,735	72.50	589
2013	12,577.56	252	321	12,257	73.50	167
2014	53,530.73	357	455	53,076	74.50	712
	8,046,803.80	1,424,348	1,815,297	6,231,507		99,326

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 62.7 1.23

SURVIVOR CURVE.. IOWA 50-R4
NET SALVAGE PERCENT.. -25

1960	56,830.00	63,209	67,231	3,806	5.51	691
1961	142.00	157	167	10	5.87	2
1964	12.00	13	14	1	7.09	
1965	6,772.00	7,187	7,644	821	7.55	109
1966	391,315.07	410,392	436,506	52,638	8.05	6,539
1967	25,270.00	26,167	27,832	3,756	8.58	438
1968	47.00	48	51	8	9.14	1
1969	458,346.17	461,325	490,680	82,253	9.74	8,445
1970	9,963.00	9,873	10,501	1,953	10.36	189
1971	16,270.00	15,863	16,872	3,466	11.00	315
1972	383,550.00	367,537	390,924	88,514	11.67	7,585
1973	6,389.53	6,014	6,397	1,590	12.35	129
1974	2,803.00	2,590	2,755	749	13.04	57
1975	85,421.00	77,434	82,361	24,415	13.74	1,777
1976	12,139.00	10,786	11,472	3,702	14.46	256
1977	1,486,527.00	1,293,278	1,375,571	482,588	15.20	31,749
1978	1,413,697.27	1,203,410	1,279,984	487,138	15.95	30,542
1979	1,579,780.00	1,314,772	1,398,433	576,292	16.71	34,488
1980	168,265.00	136,757	145,459	64,872	17.49	3,709
1981	15,936.00	12,633	13,437	6,483	18.29	354
1982	2,719,436.00	2,100,764	2,234,438	1,164,857	19.10	60,987
1983	82,076.00	61,721	65,648	36,947	19.92	1,855
1984	817,024.00	597,245	635,248	386,032	20.76	18,595
1985	3,896,531.85	2,765,563	2,941,539	1,929,126	21.61	89,270
1986	500,402.95	344,277	366,184	259,320	22.48	11,536
1987	2,576,226.99	1,715,767	1,824,943	1,395,341	23.36	59,732
1988	46,051.00	29,645	31,531	26,033	24.25	1,074
1989	234,355.00	145,593	154,857	138,087	25.15	5,491
1990	222,574.00	133,211	141,687	136,530	26.06	5,239
1991	796,892.00	458,611	487,793	508,322	26.98	18,841
1992	569,210.00	314,346	334,348	377,164	27.91	13,514
1993	1,694,981.00	896,221	953,249	1,165,477	28.85	40,398
1994	687,569.00	347,394	369,499	489,962	29.79	16,447
1995	1,416,953.00	681,909	725,300	1,045,891	30.75	34,013
1996	3,706,520.00	1,694,806	1,802,649	2,830,501	31.71	89,262
1997	457,406.00	198,171	210,781	360,976	32.67	11,049
1998	809,687.00	331,162	352,234	659,875	33.64	19,616
1999	350,200.00	134,652	143,220	294,530	34.62	8,508
2000	612,408.00	220,467	234,496	531,014	35.60	14,916
2001	1,480,363.00	496,662	528,265	1,322,189	36.58	36,145
2002	43,751.97	13,607	14,473	40,217	37.56	1,071
2003	32,849,968.37	9,403,303	10,001,647	31,060,813	38.55	805,728

SURVIVOR CURVE.. IOWA 50-R4
NET SALVAGE PERCENT.. -25

2004	9,732,940.93	2,545,164	2,707,116	9,459,060	39.54	239,228
2005	50,098,878.52	11,860,909	12,615,633	50,007,965	40.53	1,233,851
2006	19,011,886.45	4,030,520	4,286,987	19,477,871	41.52	469,120
2007	9,572,790.31	1,790,112	1,904,019	10,061,969	42.52	236,641
2008	2,220,920.31	360,344	383,273	2,392,877	43.51	54,996
2009	2,849,461.85	391,089	415,974	3,145,853	44.51	70,677
2010	10,145,633.44	1,138,847	1,211,313	11,470,729	45.51	252,049
2011	41,333,490.62	3,616,680	3,846,814	47,820,049	46.50	1,028,388
2012	6,303,160.17	393,948	419,016	7,459,934	47.50	157,051
2013	1,666,020.09	62,476	66,451	2,016,074	48.50	41,569
2014	9,825,290.09	122,816	130,631	12,150,982	49.50	245,474
	225,450,534.95	54,817,447	58,305,547	223,507,622		5,519,706

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 40.5 2.45

SURVIVOR CURVE.. IOWA 50-R1.5
NET SALVAGE PERCENT.. -25

1957	405,274.21	376,500	361,565	145,028	12.84	11,295
1958	202,308.91	185,922	178,547	74,339	13.24	5,615
1959	98,041.50	89,095	85,561	36,991	13.65	2,710
1960	11,147.41	10,013	9,616	4,318	14.07	307
1961	4,704.40	4,176	4,010	1,870	14.49	129
1962	216,684.52	189,978	182,442	88,414	14.93	5,922
1963	322,157.80	278,828	267,767	134,930	15.38	8,773
1964	171,492.24	146,454	140,644	73,721	15.84	4,654
1965	53,410.48	44,985	43,200	23,563	16.31	1,445
1966	34,862.30	28,944	27,796	15,782	16.79	940
1967	21,935.03	17,943	17,231	10,188	17.28	590
1968	3,689.05	2,972	2,854	1,757	17.78	99
1969	5,820.97	4,615	4,432	2,844	18.29	155
1970	3,031.16	2,364	2,270	1,519	18.81	81
1971	3,752.55	2,875	2,761	1,930	19.35	100
1972	3,819.70	2,875	2,761	2,014	19.89	101
1973	6,245.18	4,615	4,432	3,374	20.44	165
1974	31,396.03	22,762	21,859	17,386	21.00	828
1975	93,790.68	66,638	63,995	53,243	21.58	2,467
1976	1,001,005.66	696,700	669,062	582,195	22.16	26,272
1977	70,189.20	47,816	45,919	41,818	22.75	1,838
1978	119,267.74	79,462	76,310	72,775	23.35	3,117
1979	99,138.90	64,539	61,979	61,945	23.96	2,585
1980	597,293.80	379,580	364,522	382,095	24.58	15,545
1981	175,319.22	108,654	104,344	114,805	25.21	4,554
1982	423,491.13	255,789	245,642	283,722	25.84	10,980
1983	587,422.98	345,258	331,562	402,717	26.49	15,203
1984	1,462,583.93	835,867	802,709	1,025,521	27.14	37,786
1985	1,027,142.16	570,064	547,450	736,478	27.80	26,492
1986	1,434,195.42	771,956	741,333	1,051,411	28.47	36,930
1987	531,355.32	277,102	266,110	398,084	29.14	13,661
1988	784,872.42	395,772	380,072	601,019	29.83	20,148
1989	330,215.38	160,815	154,436	258,333	30.52	8,464
1990	525,581.21	246,760	236,971	420,006	31.22	13,453
1991	478,989.45	216,503	207,914	390,823	31.92	12,244
1992	402,943.80	174,978	168,037	335,643	32.63	10,286
1993	464,748.92	193,452	185,778	395,158	33.35	11,849
1994	3,563,311.72	1,419,089	1,362,795	3,091,345	34.07	90,735
1995	566,373.73	215,222	206,684	501,283	34.80	14,405
1996	3,635,343.63	1,315,086	1,262,917	3,281,263	35.53	92,352
1997	839,923.95	288,304	276,867	773,038	36.27	21,313
1998	2,398,940.79	778,456	747,575	2,251,101	37.02	60,808

SURVIVOR CURVE.. IOWA 50-R1.5
NET SALVAGE PERCENT.. -25

1999	858,545.98	262,500	252,087	821,095	37.77	21,739
2000	2,600,895.23	746,457	716,845	2,534,274	38.52	65,791
2001	1,442,100.62	386,483	371,151	1,431,475	39.28	36,443
2002	470,190.03	116,960	112,320	475,418	40.05	11,871
2003	8,463,226.89	1,942,311	1,865,261	8,713,773	40.82	213,468
2004	7,039,370.85	1,480,028	1,421,316	7,377,898	41.59	177,396
2005	5,677,730.83	1,083,027	1,040,064	6,057,100	42.37	142,957
2006	2,760,083.55	472,664	453,914	2,996,190	43.15	69,437
2007	8,127,196.82	1,231,270	1,182,426	8,976,570	43.94	204,292
2008	3,070,855.07	404,585	388,535	3,450,034	44.73	77,130
2009	4,498,334.78	502,689	482,748	5,140,170	45.53	112,896
2010	20,375,227.14	1,869,427	1,795,269	23,673,765	46.33	510,981
2011	2,845,486.69	203,452	195,381	3,361,477	47.14	71,308
2012	2,234,254.45	114,506	109,964	2,682,854	47.95	55,951
2013	579,886.16	17,831	17,124	707,734	48.77	14,512
2014	8,846,829.33	90,680	87,082	10,971,455	49.59	221,243
	103,103,429.00	22,244,648	21,362,218	107,517,068		2,604,811

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 41.3 2.53

SURVIVOR CURVE.. IOWA 53-R1.5
NET SALVAGE PERCENT.. -25

1957	479,808.14	429,788	316,718	283,042	15.02	18,844
1958	208,239.51	184,420	135,902	124,397	15.45	8,052
1959	102,700.47	89,887	66,239	62,137	15.89	3,910
1960	11,474.18	9,921	7,311	7,032	16.34	430
1961	18,875.56	16,115	11,875	11,719	16.80	698
1962	220,706.36	185,986	137,056	138,827	17.27	8,039
1963	341,889.12	284,234	209,457	217,904	17.75	12,276
1964	192,186.62	157,557	116,107	124,126	18.24	6,805
1965	56,244.09	45,447	33,491	36,814	18.74	1,964
1966	35,884.28	28,563	21,049	23,806	19.25	1,237
1967	22,578.07	17,695	13,040	15,183	19.77	768
1968	3,797.18	2,928	2,158	2,588	20.30	127
1969	5,991.61	4,545	3,349	4,141	20.84	199
1970	3,120.03	2,327	1,715	2,185	21.38	102
1971	3,862.56	2,830	2,085	2,743	21.94	125
1972	3,931.67	2,827	2,083	2,832	22.51	126
1973	6,428.26	4,536	3,343	4,692	23.08	203
1974	32,316.39	22,355	16,474	23,921	23.67	1,011
1975	97,389.12	66,013	48,646	73,090	24.26	3,013
1976	1,035,518.33	687,002	506,264	788,134	24.87	31,690
1977	72,246.78	46,893	34,556	55,752	25.48	2,188
1978	122,764.02	77,886	57,396	96,059	26.10	3,680
1979	278,741.15	172,767	127,315	221,111	26.72	8,275
1980	614,803.16	371,779	273,971	494,533	27.36	18,075
1981	180,458.61	106,403	78,410	147,163	28.00	5,256
1982	448,615.87	257,534	189,781	370,989	28.66	12,944
1983	612,004.90	341,797	251,876	513,130	29.32	17,501
1984	1,507,461.32	818,438	603,122	1,281,205	29.98	42,735
1985	1,180,418.35	621,948	458,325	1,017,198	30.66	33,177
1986	1,476,238.18	754,136	555,736	1,289,562	31.34	41,147
1987	574,757.75	284,397	209,577	508,870	32.02	15,892
1988	807,880.59	386,409	284,752	725,099	32.72	22,161
1989	339,895.51	156,959	115,666	309,203	33.42	9,252
1990	540,988.38	240,767	177,426	498,809	34.13	14,615
1991	501,900.33	214,964	158,411	468,964	34.84	13,461
1992	430,050.66	176,891	130,354	407,209	35.56	11,451
1993	509,928.32	201,084	148,182	489,228	36.28	13,485
1994	3,689,202.45	1,391,290	1,025,267	3,586,236	37.01	96,899
1995	614,385.26	220,979	162,843	605,139	37.75	16,030
1996	3,780,728.16	1,293,812	953,433	3,772,477	38.49	98,012
1997	873,000.04	283,518	208,930	882,320	39.23	22,491
1998	2,553,010.07	783,966	577,719	2,613,544	39.98	65,371

SURVIVOR CURVE.. IOWA 53-R1.5
NET SALVAGE PERCENT.. -25

1999	953,346.35	275,887	203,306	988,377	40.73	24,267
2000	2,668,590.17	724,422	533,840	2,801,898	41.49	67,532
2001	1,471,678.62	372,776	274,705	1,564,893	42.26	37,030
2002	459,522.30	108,051	79,625	494,778	43.03	11,498
2003	8,468,839.19	1,837,526	1,354,106	9,231,943	43.80	210,775
2004	7,274,464.92	1,446,345	1,065,837	8,027,244	44.57	180,104
2005	4,214,035.08	759,316	559,553	4,707,991	45.36	103,792
2006	2,553,606.24	413,142	304,452	2,887,556	46.14	62,582
2007	5,568,549.12	797,207	587,476	6,373,210	46.93	135,802
2008	3,067,051.68	381,196	280,910	3,552,905	47.73	74,438
2009	4,734,616.55	499,147	367,830	5,550,441	48.53	114,371
2010	20,375,342.07	1,763,741	1,299,733	24,169,445	49.33	489,954
2011	2,798,083.59	188,731	139,079	3,358,525	50.14	66,983
2012	2,235,444.73	108,084	79,649	2,714,657	50.95	53,281
2013	979,476.92	28,417	20,941	1,203,405	51.77	23,245
2014	7,609,667.41	73,624	54,255	9,457,829	52.59	179,841
	100,024,736.35	21,227,205	15,642,707	109,388,213		2,519,212

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 43.4 2.52

SURVIVOR CURVE.. IOWA 40-R3
NET SALVAGE PERCENT.. 0

1957	4,051.98	3,802	2,707	1,345	2.47	545
1958	1,964.19	1,830	1,303	661	2.73	242
1959	540.81	500	356	185	2.99	62
1960	74.44	68	48	26	3.25	8
1961	162.04	148	105	57	3.50	16
1962	1,145.84	1,038	739	407	3.76	108
1963	1,777.07	1,598	1,138	639	4.03	159
1964	966.04	862	614	352	4.30	82
1965	1,095.64	970	691	405	4.58	88
1966	227.59	200	142	86	4.87	18
1967	134.14	117	83	51	5.18	10
1968	33.89	29	21	13	5.50	2
1969	68.02	58	41	27	5.83	5
1970	49.43	42	30	19	6.19	3
1971	93.39	78	56	37	6.57	6
1972	27.25	23	16	11	6.97	2
1973	47.34	39	28	19	7.39	3
1974	255.71	206	147	109	7.84	14
1975	465.91	369	263	203	8.31	24
1976	4,881.41	3,807	2,710	2,171	8.80	247
1977	572.07	439	313	259	9.32	28
1978	615.76	464	330	286	9.86	29
1979	1,506.11	1,114	793	713	10.42	68
1980	2,921.12	2,117	1,507	1,414	11.01	128
1981	1,121.19	795	566	555	11.62	48
1982	2,366.86	1,642	1,169	1,198	12.25	98
1983	2,993.83	2,029	1,444	1,550	12.89	120
1984	7,843.97	5,185	3,691	4,153	13.56	306
1985	5,934.42	3,820	2,719	3,215	14.25	226
1986	7,443.59	4,662	3,319	4,125	14.95	276
1987	4,585.54	2,789	1,985	2,601	15.67	166
1988	5,482.85	3,235	2,303	3,180	16.40	194
1989	2,797.83	1,598	1,138	1,660	17.15	97
1990	3,349.93	1,850	1,317	2,033	17.91	114
1991	3,723.43	1,984	1,412	2,311	18.69	124
1992	2,249.64	1,154	821	1,429	19.48	73
1993	3,496.50	1,723	1,227	2,270	20.29	112
1994	17,613.14	8,322	5,924	11,689	21.10	554
1995	2,894.32	1,308	931	1,963	21.93	90
1996	18,011.74	7,754	5,520	12,492	22.78	548
1997	4,220.63	1,727	1,229	2,992	23.63	127
1998	12,086.53	4,687	3,337	8,750	24.49	357

SURVIVOR CURVE.. IOWA 40-R3
 NET SALVAGE PERCENT.. 0

1999	4,505.92	1,648	1,173	3,333	25.37	131
2000	12,734.01	4,374	3,114	9,620	26.26	366
2001	6,467.55	2,078	1,479	4,989	27.15	184
2003	203,814.63	56,151	39,972	163,843	28.98	5,654
2004	400,777.56	101,196	72,039	328,739	29.90	10,995
2005	57,486.72	13,179	9,382	48,105	30.83	1,560
2009	303,250.00	40,636	28,927	274,323	34.64	7,919
	1,120,929.52	295,444	210,319	910,611		32,336

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 28.2 2.88

SURVIVOR CURVE.. IOWA 75-R4
NET SALVAGE PERCENT.. 0

1960	8,862.06	6,013	8,862			
1961	512.83	343	513			
1962	689.10	453	689			
1963	832.63	539	833			
1964	678.06	432	678			
1965	1,973.13	1,235	1,973			
1966	942.31	580	942			
1967	956.96	578	957			
1968	1,013.01	601	1,004	9	30.51	
1969	1,031.77	600	1,002	30	31.35	1
1970	978.30	558	932	46	32.21	1
1971	1,052.12	588	982	70	33.07	2
1972	1,380.94	756	1,263	118	33.94	3
1973	1,472.18	789	1,318	154	34.81	4
1974	2,365.72	1,240	2,071	295	35.70	8
1975	3,525.93	1,806	3,017	509	36.59	14
1976	4,329.44	2,165	3,617	712	37.49	19
1977	4,255.93	2,077	3,470	786	38.40	20
1978	5,916.12	2,814	4,701	1,215	39.32	31
1979	5,230.62	2,424	4,049	1,182	40.24	29
1980	6,856.02	3,093	5,167	1,689	41.16	41
1981	9,120.39	4,001	6,684	2,436	42.10	58
1982	8,156.20	3,476	5,807	2,349	43.04	55
1983	6,558.69	2,713	4,532	2,027	43.98	46
1984	6,495.14	2,604	4,350	2,145	44.93	48
1985	6,967.88	2,705	4,519	2,449	45.88	53
1986	6,955.58	2,612	4,363	2,593	46.84	55
1987	6,008.60	2,179	3,640	2,369	47.80	50
1988	7,422.32	2,596	4,337	3,085	48.77	63
1989	8,438.39	2,843	4,749	3,689	49.73	74
1990	10,168.89	3,293	5,501	4,668	50.71	92
1991	10,696.00	3,326	5,556	5,140	51.68	99
1992	9,900.16	2,949	4,926	4,974	52.66	94
1993	12,880.28	3,668	6,128	6,752	53.64	126
1994	17,255.09	4,689	7,833	9,422	54.62	173
1995	17,467.66	4,518	7,548	9,920	55.60	178
1996	12,259.58	3,009	5,027	7,233	56.59	128
1997	18,573.59	4,314	7,207	11,367	57.58	197
1998	11,996.28	2,628	4,390	7,606	58.57	130
1999	13,981.55	2,878	4,808	9,174	59.56	154
2000	15,480.63	2,983	4,983	10,498	60.55	173
2001	15,930.29	2,859	4,776	11,154	61.54	181

SURVIVOR CURVE.. IOWA 75-R4
 NET SALVAGE PERCENT.. 0

2003	1,042,250.77	159,391	266,271	775,980	63.53	12,214
2004	811,493.91	113,390	189,424	622,070	64.52	9,642
2005	363,509.94	45,948	76,759	286,751	65.52	4,377
2006	995,363.15	112,546	188,014	807,349	66.52	12,137
2007	1,702,630.22	170,042	284,064	1,418,566	67.51	21,013
2008	508,195.45	43,974	73,461	434,734	68.51	6,346
2009	2,113,133.73	154,681	258,402	1,854,732	69.51	26,683
2010	1,486,282.22	88,984	148,652	1,337,630	70.51	18,971
2011	53,244.96	2,485	4,151	49,094	71.50	687
2012	194,831.63	6,494	10,849	183,983	72.50	2,538
2013	110,696.29	2,214	3,699	106,997	73.50	1,456
2014	786,370.65	5,245	8,762	777,609	74.50	10,438

10,455,571.29	1,001,921	1,672,212	8,783,359	128,902
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COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 68.1 1.23

SURVIVOR CURVE.. IOWA 50-R3
NET SALVAGE PERCENT.. -25

1960	65,387.00	68,395	62,278	19,456	8.16	2,384
1961	642.00	665	606	196	8.56	23
1962	27,163.43	27,863	25,371	8,583	8.97	957
1963	467.00	474	432	152	9.40	16
1964	11,474.00	11,517	10,487	3,856	9.85	391
1965	29,533.31	29,297	26,677	10,240	10.32	992
1966	64,829.45	63,517	57,836	23,201	10.81	2,146
1967	1,424.00	1,377	1,254	526	11.32	46
1968	26,104.96	24,898	22,671	9,960	11.85	841
1969	61,439.95	57,769	52,602	24,198	12.39	1,953
1970	58,037.68	53,743	48,936	23,611	12.96	1,822
1971	49,858.15	45,446	41,381	20,942	13.54	1,547
1972	21,961.00	19,688	17,927	9,524	14.14	674
1973	8,441.00	7,439	6,774	3,777	14.75	256
1974	248,528.60	215,039	195,806	114,855	15.39	7,463
1975	226,292.75	192,179	174,990	107,876	16.03	6,730
1976	336,995.42	280,549	255,457	165,787	16.70	9,927
1977	549,293.49	447,949	407,884	278,733	17.38	16,038
1978	767,944.64	613,012	558,184	401,747	18.07	22,233
1979	93,323.78	72,863	66,346	50,309	18.77	2,680
1980	2,360,939.50	1,800,807	1,639,742	1,311,432	19.49	67,287
1981	653,690.14	486,672	443,144	373,969	20.22	18,495
1982	2,883,125.39	2,092,428	1,905,280	1,698,627	20.97	81,003
1983	2,636,375.69	1,863,918	1,697,208	1,598,262	21.72	73,585
1984	539,283.13	370,892	337,719	336,385	22.49	14,957
1985	1,220,191.26	815,698	742,741	782,498	23.26	33,641
1986	2,254,774.51	1,462,785	1,331,952	1,486,516	24.05	61,809
1987	1,820,362.89	1,144,553	1,042,183	1,233,271	24.85	49,629
1988	961,190.24	584,884	532,572	668,916	25.66	26,068
1989	1,809,821.88	1,064,175	968,994	1,293,283	26.48	48,840
1990	2,428,455.00	1,377,541	1,254,333	1,781,236	27.31	65,223
1991	3,493,229.69	1,908,177	1,737,508	2,629,029	28.15	93,394
1992	718,679.00	377,306	343,559	554,790	29.00	19,131
1993	1,633,414.00	822,424	748,866	1,292,902	29.86	43,299
1994	3,134,232.00	1,509,916	1,374,868	2,542,922	30.73	82,750
1995	4,340,947.69	1,996,836	1,818,238	3,607,947	31.60	114,176
1996	4,213,216.34	1,844,335	1,679,376	3,587,144	32.49	110,408
1997	2,177,476.00	904,741	823,820	1,898,025	33.38	56,861
1998	1,979,023.32	777,756	708,193	1,765,586	34.28	51,505
1999	3,023,650.78	1,119,507	1,019,378	2,760,185	35.19	78,437
2000	1,236,140.00	429,250	390,858	1,154,317	36.11	31,967
2001	2,437,994.00	790,520	719,815	2,327,678	37.03	62,859

SURVIVOR CURVE.. IOWA 50-R3
NET SALVAGE PERCENT.. -25

2002	833,762.01	250,962	228,516	813,687	37.96	21,435
2003	3,683,024.98	1,022,960	931,466	3,672,315	38.89	94,428
2004	856,454.29	217,539	198,082	872,486	39.84	21,900
2005	7,159,948.66	1,650,368	1,502,758	7,447,178	40.78	182,618
2006	16,793,692.30	3,467,897	3,157,726	17,834,389	41.74	427,273
2007	21,500,739.58	3,929,260	3,577,824	23,298,100	42.69	545,751
2008	34,389,609.31	5,450,753	4,963,234	38,023,778	43.66	870,907
2009	31,306,921.52	4,210,781	3,834,166	35,299,486	44.62	791,114
2010	20,288,424.97	2,236,799	2,036,738	23,323,793	45.59	511,599
2011	18,343,374.97	1,572,944	1,432,259	21,496,960	46.57	461,605
2012	4,436,486.63	272,844	248,441	5,297,167	47.54	111,425
2013	2,530,999.58	93,647	85,271	3,078,478	48.52	63,448
2014	14,478,416.87	177,361	161,498	17,936,523	49.51	362,281
	227,207,209.73	52,332,915	47,652,225	236,356,787		5,830,227

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 40.5 2.57

SURVIVOR CURVE.. IOWA 50-R2.5
NET SALVAGE PERCENT.. -30

1960	998,121.61	1,036,489	963,570	333,988	10.06	33,200
1961	91,932.06	94,534	87,883	31,629	10.45	3,027
1962	125,481.37	127,727	118,741	44,385	10.85	4,091
1963	153,885.36	154,919	144,020	56,031	11.28	4,967
1964	120,547.50	119,979	111,538	45,174	11.72	3,854
1965	208,404.19	204,928	190,511	80,414	12.18	6,602
1966	163,203.86	158,445	147,298	64,867	12.66	5,124
1967	185,881.29	178,093	165,564	76,082	13.15	5,786
1968	184,380.56	174,210	161,954	77,741	13.66	5,691
1969	188,700.17	175,691	163,331	81,979	14.19	5,777
1970	172,711.52	158,380	147,238	77,287	14.73	5,247
1971	198,850.20	179,454	166,829	91,676	15.29	5,996
1972	253,509.47	224,959	209,133	120,429	15.87	7,588
1973	285,459.43	248,932	231,419	139,678	16.46	8,486
1974	440,562.64	377,201	350,664	222,067	17.07	13,009
1975	662,557.91	556,588	517,431	343,894	17.69	19,440
1976	820,114.58	675,512	627,989	438,160	18.32	23,917
1977	787,494.42	635,335	590,638	433,105	18.97	22,831
1978	1,145,577.62	904,571	840,933	648,318	19.63	33,027
1979	1,015,398.36	784,091	728,929	591,089	20.30	29,118
1981	1,785,398.81	1,314,625	1,222,139	1,098,879	21.68	50,686
1982	1,611,815.58	1,157,058	1,075,657	1,019,703	22.39	45,543
1983	1,291,938.95	903,246	839,701	839,820	23.11	36,340
1984	1,278,155.16	869,350	808,190	853,412	23.84	35,797
1985	5,814,946.36	3,843,214	3,572,839	3,986,591	24.58	162,188
1986	1,376,917.88	883,183	821,050	968,943	25.33	38,253
1987	1,203,303.02	748,045	695,419	868,875	26.09	33,303
1988	1,491,031.26	897,064	833,954	1,104,387	26.86	41,116
1989	1,776,283.60	1,033,122	960,440	1,348,729	27.63	48,814
1990	2,068,961.94	1,160,853	1,079,185	1,610,466	28.42	56,667
1991	2,187,809.94	1,182,030	1,098,873	1,745,280	29.22	59,729
1992	2,048,988.77	1,064,409	989,526	1,674,159	30.02	55,768
1993	2,682,371.53	1,336,250	1,242,243	2,244,840	30.84	72,790
1994	3,417,933.32	1,629,807	1,515,148	2,928,165	31.66	92,488
1995	3,568,964.28	1,624,807	1,510,500	3,129,154	32.49	96,311
1996	2,449,312.69	1,061,581	986,897	2,197,209	33.33	65,923
1997	3,705,230.34	1,524,035	1,416,817	3,399,982	34.18	99,473
1998	2,577,781.64	1,003,324	932,739	2,418,377	35.03	69,037
1999	2,777,255.63	1,018,864	947,185	2,663,247	35.89	74,206
2000	3,096,407.53	1,065,907	990,919	3,034,411	36.76	82,547
2001	4,389,481.27	1,410,604	1,311,366	4,394,960	37.64	116,763
2002	3,034,884.78	905,852	842,124	3,103,226	38.52	80,561

SURVIVOR CURVE.. IOWA 50-R2.5
 NET SALVAGE PERCENT.. -30

2003	5,958,430.40	1,640,594	1,525,176	6,220,784	39.41	157,848
2004	5,541,484.89	1,397,562	1,299,242	5,904,688	40.30	146,518
2005	8,130,320.22	1,860,217	1,729,348	8,840,068	41.20	214,565
2006	11,722,162.77	2,404,684	2,235,511	13,003,301	42.11	308,794
2007	10,027,623.99	1,819,813	1,691,787	11,344,124	43.02	263,694
2008	12,539,462.84	1,978,978	1,839,754	14,461,548	43.93	329,195
2009	11,061,513.77	1,478,261	1,374,263	13,005,705	44.86	289,918
2010	11,230,245.74	1,232,183	1,145,497	13,453,822	45.78	293,880
2011	8,428,324.12	720,959	670,239	10,286,582	46.71	220,222
2012	10,568,268.97	645,721	600,294	13,138,456	47.65	275,728
2013	5,705,268.28	209,155	194,440	7,222,409	48.59	148,640
2014	12,560,622.65	153,491	142,693	16,186,116	49.53	326,794

177,311,677.04 50,348,886 46,806,768 183,698,412 4,736,877

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 38.8 2.67

SURVIVOR CURVE.. IOWA 49-R3
NET SALVAGE PERCENT.. -30

1960	2,709,473.15	2,976,708	2,438,195	1,084,120	7.59	142,835
1961	174,834.11	190,317	155,887	71,397	7.97	8,958
1962	241,338.84	260,213	213,138	100,602	8.36	12,034
1963	292,889.17	312,608	256,054	124,702	8.77	14,219
1964	235,638.99	248,814	203,801	102,530	9.20	11,145
1965	397,296.11	414,768	339,733	176,752	9.65	18,316
1966	303,547.79	313,113	256,468	138,144	10.12	13,651
1967	341,350.27	347,669	284,773	158,982	10.61	14,984
1968	355,341.21	357,110	292,506	169,438	11.12	15,237
1969	361,708.09	358,421	293,579	176,642	11.65	15,162
1970	334,019.39	326,112	267,115	167,110	12.20	13,698
1971	372,371.35	358,023	293,253	190,830	12.76	14,955
1972	477,734.11	451,848	370,105	250,949	13.35	18,798
1973	523,396.75	486,708	398,658	281,758	13.95	20,198
1974	834,438.16	762,213	624,322	460,448	14.57	31,602
1975	1,236,913.89	1,109,190	908,527	699,461	15.20	46,017
1976	1,531,814.70	1,347,214	1,103,491	887,868	15.85	56,017
1977	1,493,886.45	1,287,309	1,054,423	887,629	16.52	53,731
1978	2,106,219.78	1,776,963	1,455,494	1,282,592	17.20	74,569
1979	1,863,484.98	1,537,556	1,259,398	1,163,132	17.90	64,979
1981	3,249,137.73	2,557,601	2,094,908	2,128,971	19.33	110,138
1982	2,896,261.72	2,223,729	1,821,436	1,943,704	20.06	96,895
1983	2,347,730.15	1,755,874	1,438,221	1,613,828	20.81	77,551
1984	2,326,146.60	1,692,830	1,386,582	1,637,409	21.57	75,911
1985	6,186,923.56	4,376,036	3,584,371	4,458,630	22.34	199,581
1986	2,496,028.41	1,713,793	1,403,752	1,841,085	23.12	79,632
1987	2,181,922.90	1,451,834	1,189,184	1,647,316	23.92	68,868
1988	2,714,867.84	1,748,817	1,432,440	2,096,888	24.72	84,826
1989	3,160,130.45	1,967,731	1,611,751	2,496,419	25.53	97,784
1990	3,844,736.15	2,309,348	1,891,566	3,106,591	26.36	117,852
1991	3,924,040.67	2,270,568	1,859,802	3,241,451	27.19	119,215
1992	3,631,574.72	2,019,475	1,654,134	3,066,913	28.04	109,376
1993	4,739,491.91	2,528,675	2,071,215	4,090,124	28.89	141,576
1994	5,879,027.45	3,000,920	2,458,026	5,184,710	29.76	174,217
1995	6,356,509.14	3,097,972	2,537,521	5,725,941	30.63	186,939
1996	4,423,875.10	2,052,775	1,681,409	4,069,629	31.51	129,154
1997	6,668,018.92	2,936,689	2,405,415	6,263,010	32.40	193,303
1998	4,449,274.75	1,853,270	1,517,997	4,266,060	33.30	128,110
1999	4,937,337.14	1,938,655	1,587,935	4,830,603	34.20	141,246
2000	5,556,291.96	2,046,110	1,675,950	5,547,230	35.12	157,951
2001	7,867,318.26	2,705,075	2,215,703	8,011,811	36.04	222,303
2002	4,811,743.84	1,535,731	1,257,903	4,997,364	36.97	135,173

SURVIVOR CURVE.. IOWA 49-R3
NET SALVAGE PERCENT.. -30

2003	9,007,915.58	2,652,732	2,172,829	9,537,461	37.90	251,648
2004	8,101,442.49	2,183,784	1,788,718	8,743,157	38.84	225,107
2005	11,794,424.05	2,881,944	2,360,574	12,972,177	39.79	326,016
2006	18,614,057.11	4,079,103	3,341,156	20,857,118	40.74	511,957
2007	17,216,884.19	3,334,463	2,731,229	19,650,720	41.70	471,240
2008	19,670,215.77	3,308,668	2,710,100	22,861,181	42.66	535,893
2009	16,940,813.68	2,418,132	1,980,670	20,042,388	43.62	459,477
2010	17,095,503.17	2,000,174	1,638,325	20,585,829	44.59	461,669
2011	14,298,711.54	1,301,183	1,065,787	17,522,538	45.57	384,519
2012	14,767,728.97	959,902	786,247	18,411,801	46.55	395,527
2013	9,009,566.08	351,373	287,806	11,424,630	47.53	240,367
2014	19,531,870.15	253,914	207,979	25,183,452	48.51	519,139

286,885,219.44 90,731,757 74,317,561 298,633,224 8,291,265

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 36.0 2.89

SURVIVOR CURVE.. IOWA 45-R4
NET SALVAGE PERCENT.. -15

1979	307,380.77	256,003	204,628	148,860	12.41	11,995
1981	1,018,183.24	810,270	647,665	523,246	13.86	37,752
1982	948,942.64	736,737	588,889	502,395	14.62	34,364
1983	767,992.99	581,140	464,517	418,675	15.39	27,204
1984	752,263.40	554,047	442,861	422,242	16.18	26,097
1985	2,789,314.64	1,997,346	1,596,519	1,611,193	16.98	94,888
1986	809,256.02	562,314	449,469	481,175	17.81	27,017
1987	713,954.72	480,953	384,435	436,613	18.64	23,423
1988	864,862.61	563,824	450,676	543,916	19.49	27,907
1989	1,046,663.52	659,078	526,814	676,849	20.36	33,244
1990	1,189,662.19	722,363	577,399	790,713	21.24	37,228
1991	1,295,674.70	756,933	605,032	884,994	22.14	39,973
1992	1,193,175.05	669,610	535,233	836,918	23.04	36,325
1993	1,522,291.41	818,527	654,265	1,096,370	23.96	45,758
1994	1,737,811.62	893,102	713,874	1,284,609	24.89	51,611
1995	2,149,021.88	1,053,350	841,964	1,629,411	25.82	63,107
1996	1,469,299.59	684,512	547,144	1,142,551	26.77	42,680
1997	2,249,647.54	993,444	794,080	1,793,015	27.72	64,683
1998	1,488,538.40	620,825	496,238	1,215,581	28.68	42,384
1999	1,540,178.53	604,176	482,930	1,288,275	29.65	43,449
2000	1,851,993.71	680,597	544,015	1,585,778	30.62	51,789
2001	2,679,873.64	918,393	734,090	2,347,765	31.59	74,320
2002	3,534,920.40	1,121,984	896,824	3,168,334	32.58	97,248
2003	4,710,570.65	1,377,149	1,100,783	4,316,373	33.56	128,617
2004	4,646,433.02	1,240,844	991,832	4,351,566	34.55	125,950
2005	6,084,534.57	1,470,954	1,175,763	5,821,452	35.54	163,800
2006	11,815,707.45	2,557,545	2,044,297	11,543,767	36.53	316,008
2007	11,271,974.84	2,154,672	1,722,273	11,240,498	37.52	299,587
2008	10,398,679.84	1,724,652	1,378,549	10,579,933	38.51	274,732
2009	9,166,038.72	1,285,995	1,027,922	9,513,023	39.51	240,775
2010	8,926,581.85	1,024,298	818,742	9,446,827	40.51	233,197
2011	7,447,654.82	666,170	532,483	8,032,320	41.50	193,550
2012	6,701,011.24	428,154	342,232	7,363,931	42.50	173,269
2013	4,513,716.05	173,008	138,289	5,052,484	43.50	116,149
2014	12,852,991.84	164,216	131,261	14,649,680	44.50	329,206
132,456,798.10		32,007,185	25,583,987	126,741,331		3,629,286

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 34.9 2.74

SURVIVOR CURVE.. IOWA 75-R4
NET SALVAGE PERCENT.. 0

1960	184,837.08	125,418	184,837			
1961	10,696.17	7,148	10,696			
1962	14,372.55	9,457	14,373			
1963	17,366.13	11,244	17,366			
1964	14,142.19	9,008	14,142			
1965	23,196.44	14,524	23,196			
1966	17,767.49	10,933	17,767			
1967	19,959.39	12,061	19,959			
1968	21,128.77	12,534	21,129			
1969	21,519.60	12,524	21,520			
1970	20,404.53	11,641	20,405			
1971	21,944.07	12,268	21,944			
1972	28,802.58	15,769	28,803			
1973	30,705.30	16,454	30,705			
1974	49,342.16	25,855	49,342			
1975	73,540.83	37,662	73,541			
1976	90,299.70	45,162	90,300			
1977	88,766.42	43,318	88,766			
1978	123,393.52	58,702	123,394			
1979	109,095.19	50,562	109,095			
1980	142,996.75	64,520	142,997			
1981	190,225.29	83,446	190,225			
1982	170,114.73	72,491	170,115			
1983	137,693.18	56,950	137,693			
1984	137,091.67	54,964	137,092			
1985	1,360,610.28	528,284	1,353,614	6,996	45.88	152
1986	154,723.04	58,094	148,853	5,870	46.84	125
1987	139,243.02	50,499	129,393	9,850	47.80	206
1988	184,723.14	64,603	165,531	19,192	48.77	394
1989	234,370.58	78,966	202,333	32,038	49.73	644
1990	246,978.64	79,989	204,955	42,024	50.71	829
1991	242,049.47	75,260	192,837	49,212	51.68	952
1992	237,839.34	70,845	181,525	56,314	52.66	1,069
1993	269,743.23	76,823	196,842	72,901	53.64	1,359
1994	383,595.55	104,234	267,077	116,519	54.62	2,133
1995	398,622.09	103,112	264,202	134,420	55.60	2,418
1996	267,875.31	65,755	168,483	99,392	56.59	1,756
1997	394,170.57	91,554	234,588	159,583	57.58	2,772
1998	316,473.98	69,330	177,643	138,831	58.57	2,370
1999	305,653.95	62,925	161,232	144,422	59.56	2,425
2000	342,536.90	65,997	169,103	173,434	60.55	2,864
2001	510,441.16	91,609	234,728	275,713	61.54	4,480

SURVIVOR CURVE.. IOWA 75-R4
 NET SALVAGE PERCENT.. 0

2002	17,902.39	2,977	7,628	10,274	62.53	164
2003	57,808.58	8,841	22,653	35,156	63.53	553
2004	104,333.96	14,579	37,356	66,978	64.52	1,038
2005	208,367.82	26,338	67,485	140,883	65.52	2,150
2006	182,695.99	20,657	52,929	129,767	66.52	1,951
2007	140,960.30	14,078	36,072	104,888	67.51	1,554
2008	181,367.53	15,694	40,213	141,155	68.51	2,060
2009	205,182.31	15,019	38,483	166,699	69.51	2,398
2010	6,647.25	398	1,020	5,627	70.51	80
2011	378,758.20	17,677	45,293	333,465	71.50	4,664
2012	287,754.86	9,591	24,575	263,180	72.50	3,630
	9,520,831.17	2,758,343	6,586,048	2,934,783		47,190

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 62.2 0.50

INTERIM SURVIVOR CURVE.. IOWA 20-R1
 PROBABLE RETIREMENT YEAR.. 12-2015
 NET SALVAGE PERCENT.. 0

1983	806,720.47	770,846	349,531	457,189	0.88	457,189
1984	414,130.42	395,201	179,199	234,931	0.90	234,931
1985	1,410,083.99	1,344,515	609,654	800,430	0.91	800,430
1986	73,493.79	70,010	31,745	41,749	0.92	41,749
1987	59,872.48	56,975	25,835	34,037	0.93	34,037
1988	55,781.66	53,051	24,055	31,727	0.93	31,727
1989	95,957.15	91,144	41,328	54,629	0.94	54,629
1990	107,867.93	102,311	46,392	61,476	0.95	61,476
1991	194,702.70	184,489	83,654	111,049	0.95	111,049
1992	183,548.06	173,714	78,769	104,779	0.95	104,779
1993	182,582.89	172,462	78,201	104,382	0.96	104,382
1994	209,158.44	197,255	89,443	119,715	0.96	119,715
1995	231,877.90	218,139	98,913	132,965	0.97	132,965
1996	335,607.72	315,069	142,864	192,744	0.97	192,744
1997	310,902.94	291,167	132,026	178,877	0.97	178,877
1998	499,920.70	466,886	211,704	288,217	0.97	288,217
1999	449,592.22	418,233	189,643	259,949	0.98	259,949
2000	715,051.93	662,682	300,485	414,567	0.98	414,567
2001	343,561.90	317,008	143,743	199,819	0.98	199,819
2002	276,768.04	254,090	115,214	161,554	0.98	161,554
2003	733,455.80	669,278	303,476	429,980	0.98	429,980
2004	572,476.40	518,085	234,919	337,557	0.99	337,557
2005	569,581.46	510,966	231,691	337,890	0.99	337,890
2006	715,153.83	634,606	287,755	427,399	0.99	427,399
2007	797,155.55	697,758	316,390	480,766	0.99	480,766
2008	519,921.20	447,221	202,787	317,134	0.99	317,134
2009	407,725.83	342,514	155,309	252,417	0.99	252,417
2010	600,244.03	487,698	221,141	379,103	0.99	379,103
2011	412,406.44	318,765	144,540	267,866	0.99	267,866
2012	446,308.31	316,736	143,620	302,688	0.99	302,688
2013	274,735.75	164,171	74,441	200,295	0.99	200,295
2014	1,203,444.17	403,840	183,117	1,020,327	0.99	1,020,327

14,209,792.10 12,066,885 5,471,584 8,738,208 8,738,207

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 1.0 61.49

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

2014	8,137,057.23	203,426	8,137,057	19.50	417,285
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	8,137,057.23	203,426	8,137,057		417,285
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	COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 19.5				5.13
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SURVIVOR CURVE.. IOWA 20-R1
NET SALVAGE PERCENT.. 0

1960	28,485.17	28,485	28,485
1961	1,648.38	1,648	1,648
1962	2,214.95	2,215	2,215
1963	2,676.30	2,676	2,676
1964	2,179.46	2,179	2,179
1965	3,574.80	3,575	3,575
1966	2,738.13	2,738	2,738
1967	3,075.94	3,076	3,076
1968	3,256.14	3,256	3,256
1969	3,316.39	3,316	3,316
1970	3,144.54	3,145	3,145
1971	3,381.79	3,382	3,382
1972	4,438.76	4,439	4,439
1973	4,731.98	4,732	4,732
1974	7,604.10	7,604	7,604
1975	11,333.36	11,203	11,333
1976	13,916.05	13,526	13,916
1977	13,679.76	13,064	13,680
1978	19,016.12	17,856	19,016
1979	16,812.63	15,535	16,813
1980	22,037.17	20,032	22,037
1981	29,315.57	26,208	29,316
1982	26,216.31	23,031	26,216
1983	21,081.57	18,183	21,082
1984	20,877.21	17,662	20,877
1985	22,396.78	18,567	22,397
1986	22,357.19	18,143	22,357
1987	19,313.38	15,316	19,313
1988	23,857.41	18,466	23,857
1989	27,123.37	20,465	27,123
1990	32,685.71	23,991	32,686
1991	34,379.96	24,513	34,380
1992	31,822.00	21,989	31,822
1993	41,400.92	27,677	41,401
1994	55,462.75	35,773	55,463
1995	56,146.06	34,839	56,146
1996	39,405.77	23,466	39,406
1997	59,700.84	34,000	59,701
1998	38,559.48	20,919	38,559

SURVIVOR CURVE.. IOWA 20-R1
 NET SALVAGE PERCENT.. 0

1999	44,940.77	23,122	44,941
2000	49,759.21	24,183	49,759
2001	67,768.14	30,936	67,769
	937,832.32	669,131	937,832

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

SURVIVOR CURVE.. IOWA 27-L2
NET SALVAGE PERCENT.. -10

1985	145,773.01	101,495	66,690	93,660	9.91	9,451
1987	16,861.27	11,410	7,497	11,050	10.39	1,064
1988	21,419.57	14,285	9,386	14,176	10.63	1,334
1989	28,518.11	18,741	12,314	19,056	10.87	1,753
1990	34,293.16	22,186	14,578	23,144	11.12	2,081
1991	37,617.33	23,954	15,740	25,639	11.37	2,255
1992	35,852.43	22,436	14,742	24,696	11.64	2,122
1993	46,554.14	28,583	18,781	32,429	11.93	2,718
1994	48,273.37	29,048	19,087	34,014	12.23	2,781
1995	62,925.43	37,018	24,324	44,894	12.56	3,574
1996	35,933.26	20,598	13,534	25,993	12.93	2,010
1997	67,179.39	37,442	24,602	49,295	13.32	3,701
1998	41,300.39	22,278	14,638	30,792	13.76	2,238
1999	40,387.16	20,979	13,785	30,641	14.25	2,150
2000	54,307.69	27,037	17,765	41,973	14.78	2,840
2001	81,769.85	38,744	25,458	64,489	15.37	4,196
2003	950,794.28	398,206	261,652	784,222	16.72	46,903
2004	876,259.69	340,213	223,546	740,340	17.47	42,378
2005	1,073,752.91	382,331	251,221	929,907	18.26	50,926
2006	1,588,306.12	512,488	336,745	1,410,392	19.08	73,920
2007	1,673,842.55	482,125	316,794	1,524,433	19.93	76,489
2008	1,735,989.58	438,499	288,128	1,621,461	20.80	77,955
2009	1,345,378.07	291,055	191,246	1,288,670	21.69	59,413
2010	1,263,876.88	226,043	148,528	1,241,737	22.61	54,920
2011	693,980.36	97,262	63,908	699,470	23.56	29,689
2012	22,311.16	2,254	1,481	23,061	24.52	940
2013	10,874.94	660	434	11,528	25.51	452
2014	94,783.12	1,931	1,269	102,992	26.50	3,886
	12,129,115.22	3,649,301	2,397,873	10,944,154		564,139

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 19.4 4.65

SURVIVOR CURVE.. IOWA 51-S1.5
 NET SALVAGE PERCENT.. 0

1992	337,364.00	134,946	279,280	58,084	30.60	1,898
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	337,364.00	134,946	279,280	58,084		1,898
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COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 30.6 0.56

SURVIVOR CURVE.. IOWA 41-S3
NET SALVAGE PERCENT.. 0

1975	197,921.00	155,922	99,831	98,090	8.70	11,275
1976	45,092.00	35,062	22,449	22,643	9.12	2,483
1977	7,464.00	5,724	3,665	3,799	9.56	397
1979	670,324.00	498,493	319,166	351,158	10.51	33,412
1980	5,993.00	4,384	2,807	3,186	11.01	289
1981	8,505.00	6,109	3,911	4,594	11.55	398
1982	18,027.00	12,702	8,133	9,894	12.11	817
1983	110,739.00	76,464	48,957	61,782	12.69	4,869
1984	23,966.00	16,192	10,367	13,599	13.30	1,022
1985	1,263,699.11	834,041	534,005	729,694	13.94	52,345
1986	49,513.00	31,870	20,405	29,108	14.61	1,992
1987	242,995.75	152,317	97,523	145,473	15.30	9,508
1988	644,493.92	392,510	251,309	393,185	16.03	24,528
1989	689,611.00	407,374	260,826	428,785	16.78	25,553
1990	63,722.00	36,431	23,325	40,397	17.56	2,301
1991	339,505.00	187,475	120,033	219,472	18.36	11,954
1992	134,397.00	71,492	45,774	88,623	19.19	4,618
1993	9,207,830.35	4,705,017	3,012,444	6,195,386	20.05	308,997
1994	425,717.00	208,499	133,494	292,223	20.92	13,969
1995	48,776.00	22,817	14,609	34,167	21.82	1,566
1996	83,430.00	37,157	23,790	59,640	22.74	2,623
1997	164,423.00	69,459	44,472	119,951	23.68	5,065
1998	78,333.00	31,295	20,037	58,296	24.62	2,368
1999	429,566.00	161,452	103,372	326,194	25.59	12,747
2000	32,502.00	11,447	7,329	25,173	26.56	948
2001	378,014.00	124,098	79,455	298,559	27.54	10,841
2002	128,474.49	39,106	25,038	103,436	28.52	3,627
2003	235,441.60	65,980	42,245	193,197	29.51	6,547
2004	141,651.72	36,242	23,204	118,448	30.51	3,882
2005	104,826.39	24,289	15,551	89,275	31.50	2,834
2006	254,898.59	52,846	33,835	221,064	32.50	6,802
2007	655,778.50	119,962	76,807	578,972	33.50	17,283
2008	448,415.41	71,092	45,518	402,897	34.50	11,678
2009	441,646.91	59,247	37,934	403,713	35.50	11,372
2010	305,227.37	33,502	21,450	283,777	36.50	7,775
2011	353,726.09	30,198	19,335	334,391	37.50	8,917

SURVIVOR CURVE.. IOWA 41-S3
 NET SALVAGE PERCENT.. 0

2012	155,606.88	9,489	6,075	149,532	38.50	3,884
2013	4,442,620.63	162,555	104,078	4,338,543	39.50	109,837
2014	691,975.78	8,442	5,405	686,571	40.50	16,952
	23,724,849.49	9,008,753	5,767,963	17,956,886		758,275

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 23.7 3.20

SURVIVOR CURVE.. IOWA 40-R4
NET SALVAGE PERCENT.. 0

1980	1,630,325.00	1,263,502	1,534,836	95,489	9.00	10,610
1981	13,388.00	10,151	12,331	1,057	9.67	109
1982	15,955.00	11,823	14,362	1,593	10.36	154
1983	13,383.00	9,679	11,758	1,625	11.07	147
1984	11,730.00	8,273	10,050	1,680	11.79	142
1985	599.00	411	499	100	12.53	8
1986	8,194.00	5,472	6,647	1,547	13.29	116
1987	12,891.00	8,357	10,152	2,739	14.07	195
1988	183,609.00	115,352	140,124	43,485	14.87	2,924
1990	32,732.00	19,214	23,340	9,392	16.52	569
1991	13,628.00	7,707	9,362	4,266	17.38	245
1992	28,043.00	15,255	18,531	9,512	18.24	521
1993	19,203.00	10,019	12,171	7,032	19.13	368
1994	69,008.00	34,452	41,850	27,158	20.03	1,356
1995	37,472.00	17,855	21,689	15,783	20.94	754
1996	116,262.00	52,725	64,048	52,214	21.86	2,389
1997	155,597.00	66,907	81,275	74,322	22.80	3,260
1999	139,303.00	53,318	64,768	74,535	24.69	3,019
2000	80,531.00	28,890	35,094	45,437	25.65	1,771
2002	2,913,554.21	903,202	1,097,163	1,816,391	27.60	65,811
2003	4,823,124.18	1,378,208	1,674,175	3,148,949	28.57	110,219
2004	6,431.92	1,679	2,040	4,392	29.56	149
2005	178,311.07	42,171	51,227	127,084	30.54	4,161
2006	585,498.10	123,979	150,603	434,895	31.53	13,793
2007	543,028.60	101,546	123,353	419,676	32.52	12,905
2008	383,366.66	62,105	75,442	307,925	33.52	9,186
2009	734,960.51	100,873	122,535	612,426	34.51	17,746
2010	261,026.71	29,300	35,592	225,435	35.51	6,348
2011	636,345.64	55,521	67,444	568,902	36.51	15,582
2012	1,308,284.26	81,768	99,327	1,208,957	37.50	32,239
2013	665,679.56	24,963	30,324	635,356	38.50	16,503
2014	413,958.50	5,174	6,285	407,674	39.50	10,321
	16,035,422.92	4,649,851	5,648,397	10,387,026		343,620

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 30.2 2.14

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

1985	54,039.39	54,039	54,039			
1998	2,561,379.01	2,561,379	2,561,379			
1999	284,447.00	284,447	284,447			
2000	128,875.00	124,580	128,875			
2001	144,211.00	129,790	144,211			
2002	202,331.03	168,609	202,331			
2003	451,130.69	345,868	450,529	602	3.50	172
2004	601,075.73	420,753	548,075	53,001	4.50	11,778
2005	314,887.27	199,428	259,776	55,111	5.50	10,020
2006	242,960.20	137,678	179,340	63,620	6.50	9,788
2007	248,080.29	124,040	161,575	86,505	7.50	11,534
2008	236,641.24	102,544	133,574	103,067	8.50	12,126
2009	5,119.92	1,877	2,445	2,675	9.50	282
2010	254,717.42	76,415	99,539	155,178	10.50	14,779
2011	172,864.70	40,335	52,541	120,324	11.50	10,463
2012	112,903.31	18,818	24,512	88,391	12.50	7,071
2013	107,166.27	10,717	13,960	93,206	13.50	6,904
2014	160,507.84	5,350	6,969	153,539	14.50	10,589
	6,283,337.31	4,806,667	5,308,117	975,220		105,506

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 9.2 1.68

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

1994	218,967.68	218,968	218,968			
1995	298,595.51	298,596	298,596			
1996	196,187.00	196,187	196,187			
1997	81,457.00	81,457	81,457			
1998	3,839,752.35	3,839,752	3,839,752			
1999	536,059.00	536,059	536,059			
2000	650,730.42	650,730	650,730			
2001	356,419.00	356,419	356,419			
2002	783,237.04	783,237	783,237			
2003	1,036,127.87	1,036,128	1,036,128			
2004	797,732.99	797,733	797,733			
2005	1,583,329.12	1,583,329	1,583,329			
2006	2,044,106.59	2,044,107	2,044,107			
2007	427,889.76	427,890	427,890			
2008	2,470,888.35	2,470,888	2,470,888			
2009	1,148,550.06	1,148,550	1,148,550			
2010	1,658,996.28	1,493,097	954,161	704,835	0.50	704,835
2011	1,833,555.51	1,283,489	820,211	1,013,345	1.50	675,563
2012	1,003,907.39	501,954	320,773	683,134	2.50	273,254
2013	1,299,170.33	389,751	249,069	1,050,101	3.50	300,029
2014	2,197,691.53	219,769	140,443	2,057,249	4.50	457,166
	24,463,350.78	20,358,090	18,954,687	5,508,664		2,410,847

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 2.3 9.85

SURVIVOR CURVE.. 8-SQUARE
NET SALVAGE PERCENT.. 0

1994	56,834.00	56,834	56,834			
1995	240,563.00	240,563	240,563			
1996	363,228.00	363,228	363,228			
1997	352,819.00	352,819	352,819			
1998	4,496,541.00	4,496,541	4,496,541			
1999	416,862.00	416,862	416,862			
2000	3,583,706.00	3,583,706	3,583,706			
2001	1,756,611.00	1,756,611	1,756,611			
2002	8,629,000.18	8,629,000	8,629,000			
2003	1,109,406.59	1,109,407	1,109,407			
2004	284,942.95	284,943	284,943			
2005	1,318,828.56	1,318,829	1,318,829			
2006	3,561,084.10	3,561,084	3,561,084			
2007	2,279,850.19	2,137,360	2,267,159	12,691	0.50	12,691
2008	6,648,890.53	5,402,224	5,730,295	918,596	1.50	612,397
2009	4,688,518.64	3,223,357	3,419,108	1,269,411	2.50	507,764
2010	4,441,171.09	2,498,159	2,649,869	1,791,302	3.50	511,801
2011	4,407,259.70	1,928,176	2,045,272	2,361,988	4.50	524,886
2012	4,749,776.85	1,484,305	1,574,445	3,175,332	5.50	577,333
2013	4,187,674.17	785,189	832,872	3,354,802	6.50	516,123
2014	4,577,960.47	286,123	303,499	4,274,461	7.50	569,928
	62,151,528.02	43,915,320	44,992,946	17,158,582		3,832,923
COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 4.5 6.17						

SURVIVOR CURVE.. IOWA 10-L1
NET SALVAGE PERCENT.. +25

1990	28,215.00	18,431	21,161			
1994	23,542.00	14,037	17,568	88	2.05	43
1995	118,918.00	69,121	86,510	2,678	2.25	1,190
2005	959,001.58	371,134	464,499	254,752	4.84	52,635
2006	1,329,912.14	481,761	602,956	394,478	5.17	76,301
2007	703,902.66	236,511	296,009	231,918	5.52	42,014
2008	684,885.63	211,116	264,226	249,438	5.89	42,349
2009	583,982.24	162,493	203,371	234,616	6.29	37,300
2010	320,732.14	78,660	98,448	142,101	6.73	21,115
2011	2,288,344.23	470,255	588,556	1,127,702	7.26	155,331
2012	1,309,341.29	206,221	258,099	723,907	7.90	91,634
2013	322,089.82	32,128	40,210	201,357	8.67	23,225
2014	82,116.18	2,833	3,546	58,041	9.54	6,084
	8,754,982.91	2,354,701	2,945,159	3,621,078		549,221

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 6.6 6.27

SURVIVOR CURVE.. IOWA 15-L3
NET SALVAGE PERCENT.. +25

1979	11,705.00	8,720	6,967	1,812	0.10	1,812
1980	78,670.00	57,862	46,228	12,774	0.29	12,774
1982	10,700.00	7,677	6,133	1,892	0.65	1,892
1983	26,483.00	18,750	14,980	4,882	0.84	4,882
1984	15,665.00	10,942	8,742	3,007	1.03	2,919
1985	17,780.00	12,242	9,781	3,554	1.23	2,889
1987	15,844.00	10,576	8,449	3,434	1.65	2,081
1989	43,372.00	27,997	22,368	10,161	2.09	4,862
1991	8,151.00	5,066	4,047	2,066	2.57	804
1992	6,161.00	3,752	2,998	1,623	2.82	576
1993	49,387.00	29,459	23,536	13,504	3.07	4,399
1994	176,241.00	102,837	82,160	50,021	3.33	15,021
1995	253,572.00	144,663	115,576	74,603	3.59	20,781
1996	73,525.00	41,064	32,807	22,337	3.83	5,832
1999	47,496.00	25,125	20,073	15,549	4.42	3,518
2000	41,376.00	21,536	17,206	13,826	4.59	3,012
2002	311,600.78	155,177	123,976	109,725	5.04	21,771
2003	150,881.66	72,574	57,982	55,179	5.38	10,256
2004	84,363.75	38,639	30,870	32,403	5.84	5,548
2005	561,088.18	240,707	192,308	228,508	6.42	35,593
2006	1,360,964.62	536,901	428,947	591,776	7.11	83,232
2007	3,065,455.42	1,089,769	870,649	1,428,443	7.89	181,045
2008	748,918.60	234,410	187,277	374,412	8.74	42,839
2009	1,718,537.80	461,427	368,648	920,255	9.63	95,561
2010	477,831.70	106,079	84,750	273,624	10.56	25,911
2011	1,107,876.17	192,770	154,010	676,897	11.52	58,758
2012	612,001.57	76,502	61,120	397,881	12.50	31,830
2013	2,768,407.37	207,631	165,883	1,910,423	13.50	141,513
2014	1,365,141.45	34,125	27,263	996,593	14.50	68,731
15,209,197.07		3,974,979	3,175,734	8,231,164	890,642	

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 9.2 5.86

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

1982	41,453.82	41,454	41,454			
1983	65,245.00	65,245	65,245			
1984	115,409.00	115,409	115,409			
1985	473,348.43	473,348	473,348			
1986	198,825.00	198,825	198,825			
1987	120,168.00	120,168	120,168			
1988	175,882.00	175,882	175,882			
1989	404,733.00	404,733	404,733			
1990	206,564.00	206,564	206,564			
1991	223,808.00	223,808	223,808			
1992	160,370.00	160,370	160,370			
1993	288,316.00	288,316	288,316			
1995	215,015.00	215,015	215,015			
1996	88,890.00	88,890	88,890			
1997	461,604.00	461,604	461,604			
1998	498,925.00	498,925	498,925			
1999	545,506.00	545,506	545,506			
2000	351,604.00	339,885	351,604			
2001	664,907.00	598,416	664,907			
2002	449,257.79	374,380	449,258			
2003	514,101.97	394,147	514,102			
2004	518,418.44	362,893	479,295	39,123	4.50	8,694
2005	758,607.61	480,449	634,558	124,050	5.50	22,555
2006	859,648.67	487,137	643,391	216,258	6.50	33,270
2007	936,499.18	468,250	618,446	318,053	7.50	42,407
2008	587,124.42	254,419	336,027	251,097	8.50	29,541
2009	657,856.91	241,216	318,589	339,268	9.50	35,712
2010	495,084.56	148,525	196,166	298,919	10.50	28,468
2011	491,900.92	114,775	151,590	340,311	11.50	29,592
2012	530,907.08	88,486	116,869	414,038	12.50	33,123
2013	459,332.99	45,933	60,666	398,667	13.50	29,531
2014	497,378.07	16,578	21,896	475,482	14.50	32,792
13,056,691.86		8,699,551	9,841,426	3,215,266		325,685

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 9.9 2.49

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

1977	15,726.00	15,726	15,726			
1978	42,197.00	42,197	42,197			
1979	48,433.00	48,433	48,433			
1980	66,469.00	66,469	66,469			
1982	39,708.00	39,708	39,708			
1983	97,820.00	97,820	97,820			
1984	166,808.00	166,808	166,808			
1985	52,071.00	52,071	52,071			
1986	33,009.00	33,009	33,009			
1987	28,033.00	28,033	28,033			
1988	168,129.52	168,130	168,130			
1989	3,077.00	3,077	3,077			
1990	115,099.00	115,099	115,099			
1991	135,481.00	135,481	135,481			
1992	221,699.00	221,699	221,699			
1993	61,008.00	61,008	61,008			
1994	105,674.00	105,674	105,674			
1995	193,317.00	193,317	193,317			
1996	916,634.00	916,634	916,634			
1997	591,987.00	591,987	591,987			
1998	264,756.00	264,756	264,756			
1999	569,024.00	569,024	569,024			
2000	114,826.00	110,999	114,409	417	0.50	417
2001	212,907.00	191,616	197,502	15,405	1.50	10,270
2002	29,998.55	24,999	25,767	4,232	2.50	1,693
2003	2,752,554.17	2,110,301	2,175,125	577,429	3.50	164,980
2004	315,586.15	220,910	227,696	87,890	4.50	19,531
2005	5,360,030.39	3,394,668	3,498,945	1,861,085	5.50	338,379
2006	1,710,297.18	969,174	998,945	711,352	6.50	109,439
2007	5,528,980.52	2,764,490	2,849,410	2,679,571	7.50	357,276
2008	1,653,946.22	716,705	738,721	915,225	8.50	107,674
2009	1,083,117.36	397,147	409,346	673,771	9.50	70,923
2010	539,966.15	161,990	166,966	373,000	10.50	35,524
2011	693,797.25	161,884	166,857	526,940	11.50	45,821
2012	1,540,415.66	256,741	264,627	1,275,789	12.50	102,063
2013	434,404.28	43,440	44,774	389,630	13.50	28,861
2014	2,586,774.94	86,217	88,866	2,497,909	14.50	172,270
28,493,761.34		15,547,441	15,904,116	12,589,645		1,565,121

COMPOSITE REMAINING LIFE AND ANNUAL ACCRUAL RATE, PERCENT .. 8.0 5.49

APPENDIX A

ESTIMATION OF SURIVOR CURVES

ESTIMATION OF SURVIVOR CURVES

Average Service Life

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. A discussion of the general concept of survivor curves is presented. Also, the Iowa type survivor curves are reviewed.

SURVIVOR CURVES

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.

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

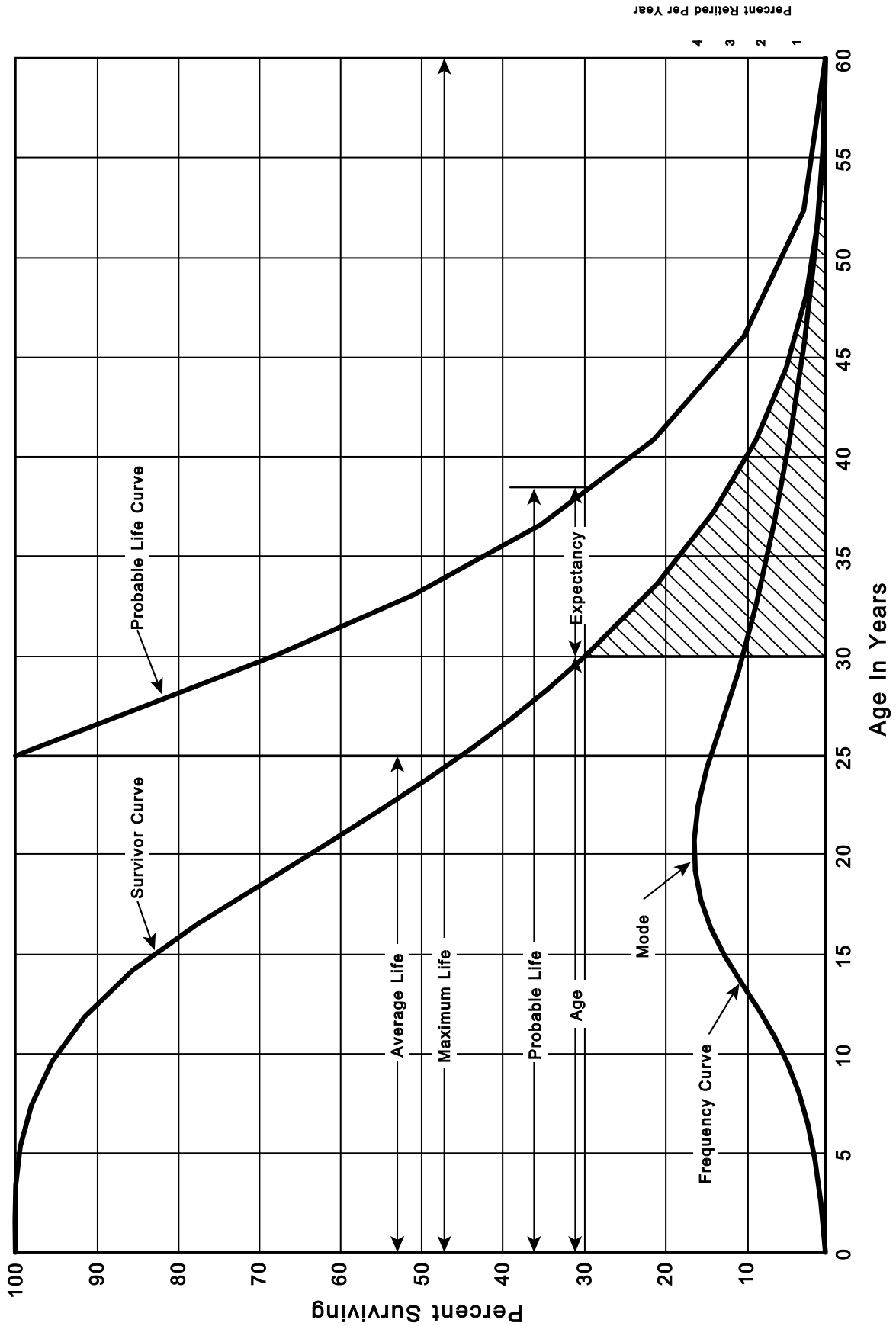


Figure 1. A Typical Survivor Curve and Derived Curves

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 125.¹ These curve types have also been presented in subsequent Experiment Station bulletins and in the text, "Engineering Valuation and Depreciation."² In 1957, Frank V. B. Couch, Jr., an Iowa State College graduate student, submitted a thesis³ presenting his development of the fourth family consisting of the four O type survivor curves.

¹ Winfrey, Robley. Statistical Analyses of Industrial Property Retirements. Iowa State College, Engineering Experiment Station, Bulletin 125. 1935.

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

³ Couch, Frank V. B., Jr. "Classification of Type O Retirement Characteristics of Industrial Property." Unpublished M.S. thesis (Engineering Valuation). Library, Iowa State College, Ames, Iowa. 1957.

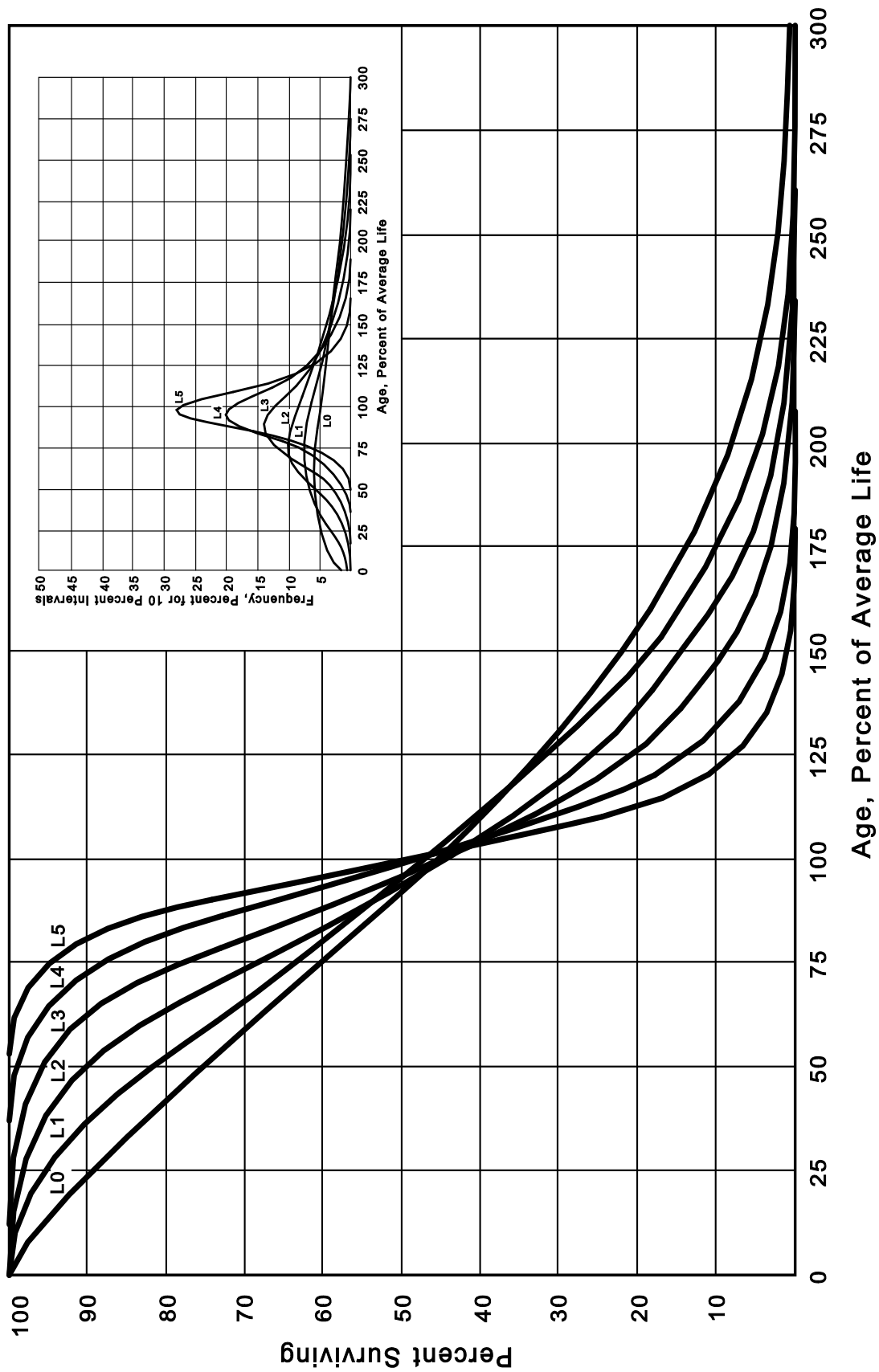


Figure 2. Left Modal or "L" Iowa Type Survivor Curves

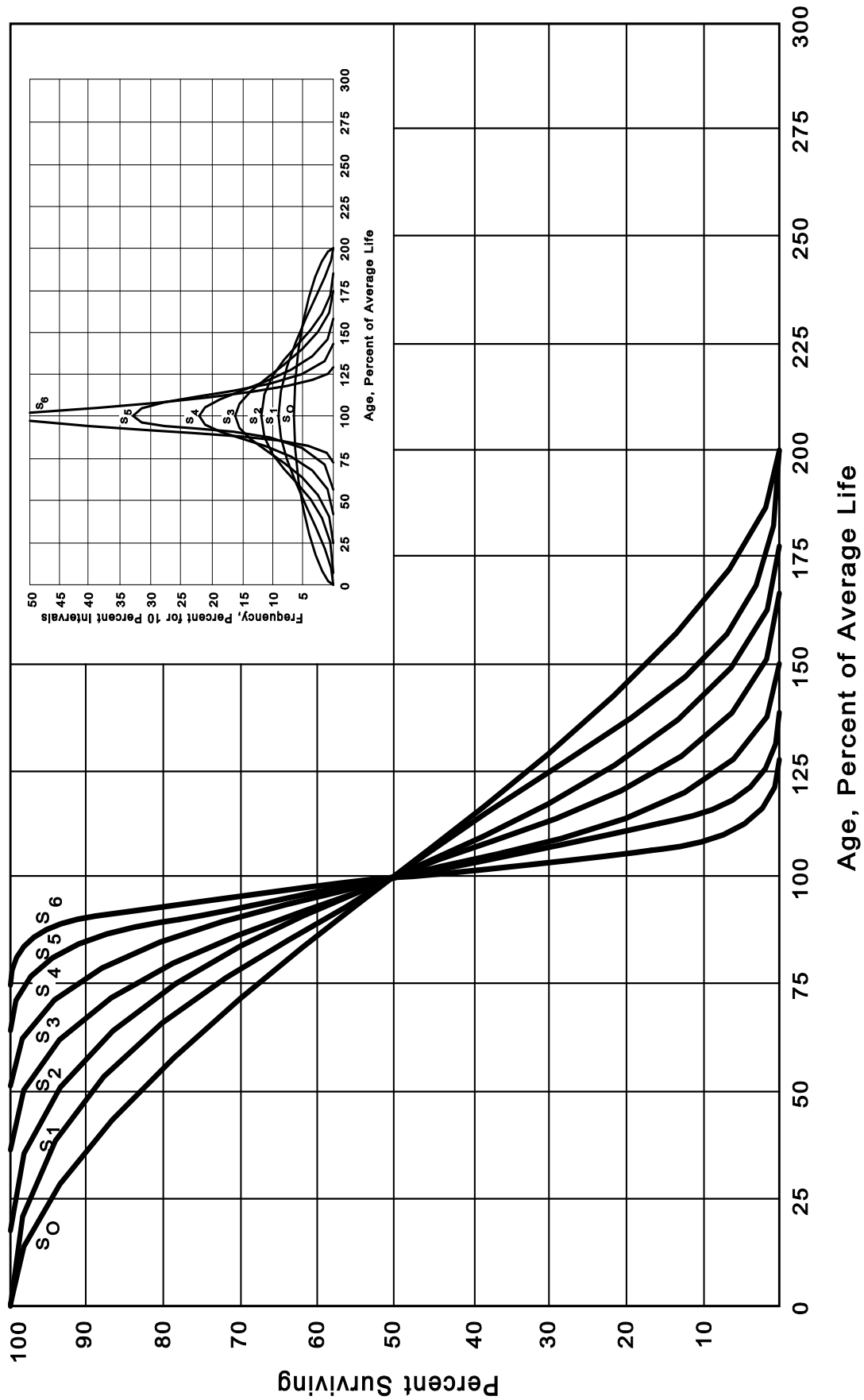


Figure 3. Symmetrical or "S" Iowa Type Survivor Curves

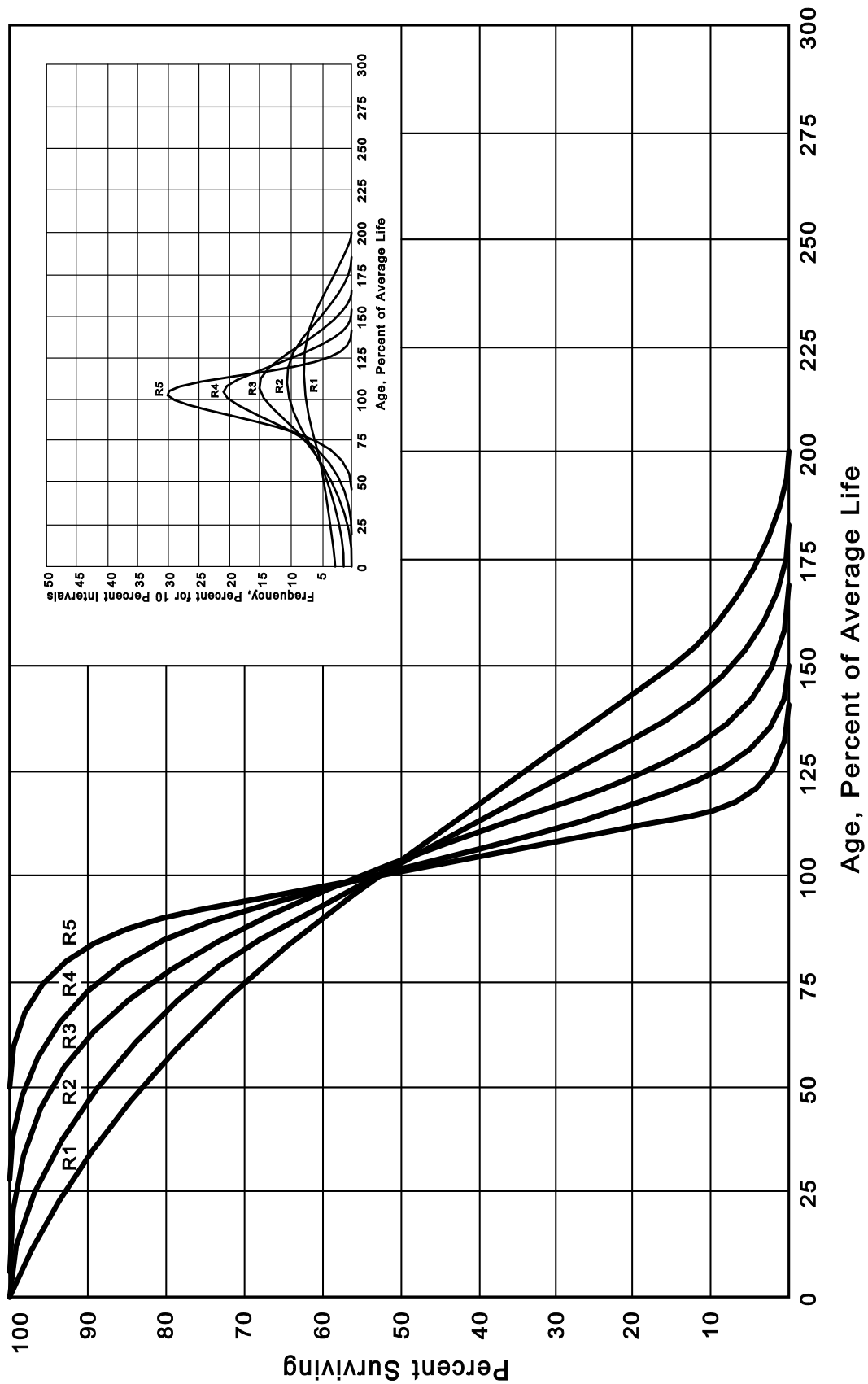


Figure 4. Right Modal or "R" Iowa Type Survivor Curves

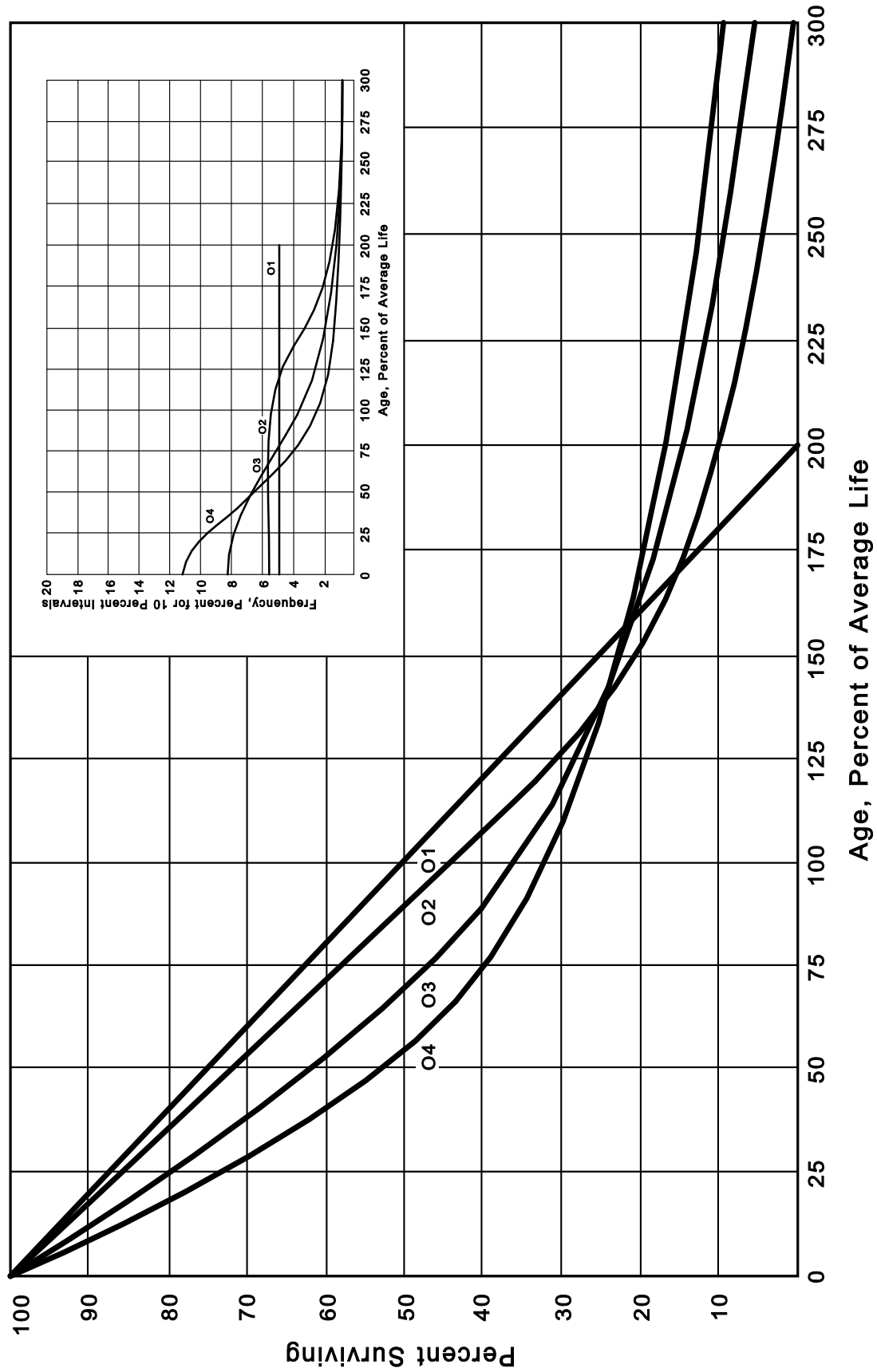


Figure 5. Origin Modal or "O" Iowa Type Survivor Curves

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,"⁴ "Engineering Valuation and Depreciation,"⁵ and "Depreciation Systems."⁶

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.

Schedules of Annual Transactions in Plant Records

The property group used to illustrate the retirement rate method is observed for the experience band 2005-2014 during which there were placements during the years 2000-2014. 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 the following pages. 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 2000 were

⁴Winfrey, Robley, Supra Note 1.

⁵Marston, Anson, Robley Winfrey, and Jean C. Hempstead, Supra Note 2.

⁶Wolf, Frank K. and W. Chester Fitch. Depreciation Systems. Iowa State University Press. 1994.

SCHEDULE 1. RETIREMENTS FOR EACH YEAR 2005-2014
SUMMARIZED BY AGE INTERVAL

Experience Band 2005-2014											Placement Band 2000-2014		
Year Placed	Retirements, Thousands of Dollars										Total During Age Interval	Age Interval	
	<u>2005</u> (2)	<u>2006</u> (3)	<u>2007</u> (4)	<u>2008</u> (5)	<u>2009</u> (6)	<u>2010</u> (7)	<u>2011</u> (8)	<u>2012</u> (9)	<u>2013</u> (10)	<u>2014</u> (11)			
(1)											(12)	(13)	
1999	10	11	12	13	14	16	23	24	25	26	26	13½-14½	
2000	11	12	13	15	16	18	20	21	22	19	44	12½-13½	
2001	11	12	13	14	16	17	19	21	22	18	64	11½-12½	
2002	8	9	10	11	11	13	14	15	16	17	83	10½-11½	
2003	9	10	11	12	13	14	16	17	19	20	93	9½-10½	
2004	4	9	10	11	12	13	14	15	16	20	105	8½-9½	
2005		5	11	12	13	14	15	16	18	20	113	7½-8½	
2006			6	12	13	15	16	17	19	19	124	6½-7½	
2007				6	13	15	16	17	19	19	131	5½-6½	
2008					7	14	16	17	19	20	143	4½-5½	
2009						8	18	20	22	23	146	3½-4½	
2010							9	20	22	25	150	2½-3½	
2011								11	23	25	151	1½-2½	
2012									11	24	153	½-1½	
2013										13	80	0-½	
Total	53	68	86	106	128	157	196	231	273	308	1,606		

**SCHEDULE 2. OTHER TRANSACTIONS FOR EACH YEAR 2005-2014
SUMMARIZED BY AGE INTERVAL**

Experience Band 2005-2014										Placement Band 2000-2014				
Acquisitions, Transfers and Sales, Thousands of Dollars														
		During Year												
Year		<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	Total During	Age	
Placed	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	Age Interval	Interval	
												(12)	(13)	
1999	-	-	-	-	-	-	-	60 ^a	-	-	-	-	13½-14½	
2000	-	-	-	-	-	-	-	-	-	-	-	-	12½-13½	
2001	-	-	-	-	-	-	-	-	-	-	-	-	11½-12½	
2002	-	-	-	-	-	-	-	-	(5) ^b	-	-	60	10½-11½	
2003	-	-	-	-	-	-	-	-	6 ^a	-	-	-	9½-10½	
2004	-	-	-	-	-	-	-	-	-	-	-	(5)	8½-9½	
2005	-	-	-	-	-	-	-	-	-	-	-	-	7½-8½	
2006	-	-	-	-	-	-	-	-	-	-	-	-	6½-7½	
2007	-	-	-	-	-	-	-	-	(12) ^b	-	-	-	5½-6½	
2008	-	-	-	-	-	-	-	-	-	22 ^a	-	-	4½-5½	
2009	-	-	-	-	-	-	-	-	(19) ^b	-	-	10	3½-4½	
2010	-	-	-	-	-	-	-	-	-	-	-	-	2½-3½	
2011	-	-	-	-	-	-	-	-	-	-	(102) ^c	(121)	1½-2½	
2012	-	-	-	-	-	-	-	-	-	-	-	-	½-1½	
2013	-	-	-	-	-	-	-	-	-	-	-	-	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.

retired in 2005. 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 2005 retirements of 2000 installations and ending with the 2014 retirements of the 2009 installations. Thus, the total amount of 143 for age interval 4½-5½ equals the sum of:

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

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 the following page. The surviving plant at the beginning of each year from 2005 through 2014 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

**SCHEDULE 3. PLANT EXPOSED TO RETIREMENT JANUARY 1
OF EACH YEAR 2005-2014
SUMMARIZED BY AGE INTERVAL**

Experience Band 2005-2014										Placement Band 2000-2014		
Year Placed (1)	Exposures, Thousands of Dollars										Total at	
	Annual Survivors at the Beginning of the Year										Beginning	
	<u>2005</u> (2)	<u>2006</u> (3)	<u>2007</u> (4)	<u>2008</u> (5)	<u>2009</u> (6)	<u>2010</u> (7)	<u>2011</u> (8)	<u>2012</u> (9)	<u>2013</u> (10)	<u>2014</u> (11)	Interval (12)	Age Interval (13)
1999	255	245	234	222	209	195	239	216	192	167	167	13½-14½
2000	279	268	256	243	228	212	194	174	153	131	323	12½-13½
2001	307	296	284	271	257	241	224	205	184	162	531	11½-12½
2002	338	330	321	311	300	289	276	262	242	226	823	10½-11½
2003	376	367	257	346	334	321	307	267	280	261	1,097	9½-10½
2004	420 ^a	416	407	397	386	374	361	347	332	316	1,503	8½-9½
2005		460 ^a	455	444	432	419	405	390	374	356	1,952	7½-8½
2006			510 ^a	504	492	479	464	448	431	412	2,463	6½-7½
2007				580 ^a	574	561	546	530	501	482	3,057	5½-6½
2008					660 ^a	653	639	623	628	609	3,789	4½-5½
2009						750 ^a	742	724	685	663	4,332	3½-4½
2010							850 ^a	841	821	799	4,955	2½-3½
2011								960 ^a	949	923	5,719	1½-2½
2012									1,080 ^a	1,069	6,579	½-1½
2013										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.

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 2006 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

For the entire experience band 2005-2014, 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 the following page, 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

SCHEDULE 4. ORIGINAL LIFE TABLE

CALCULATED BY THE RETIREMENT RATE METHOD

Experience Band 2005-2014

Placement Band 2000-2014

(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	<u>167</u>	<u>26</u>	0.1557	0.8443	42.24
					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.

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	=	$143,000 \div 3,789,000$	= 0.0377
Survivor Ratio	=	$1.000 - 0.0377$	= 0.9623
Percent surviving at age 5½	=	$(88.15) \times (0.9623)$	= 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.

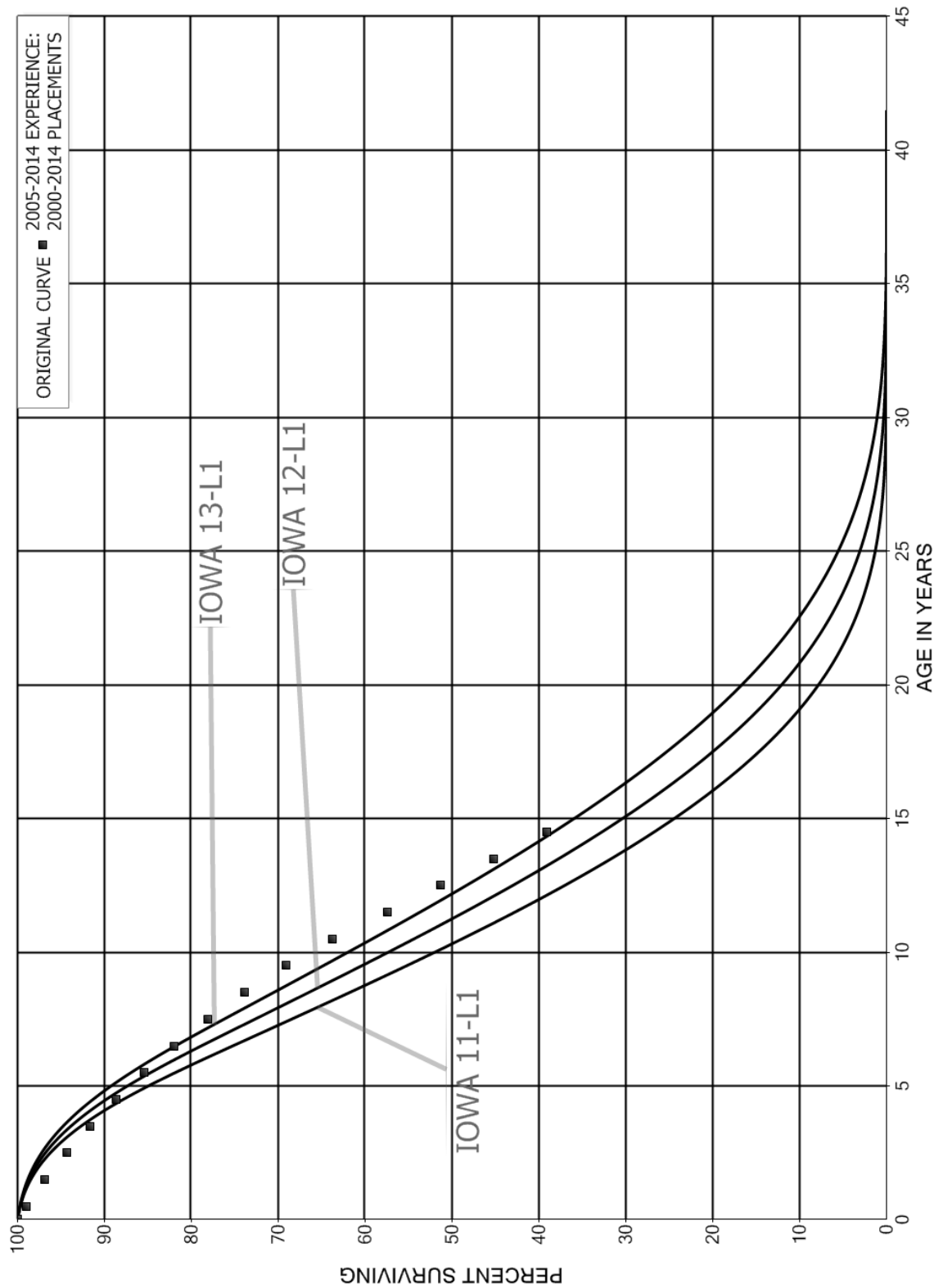
Smoothing the Original Survivor Curve

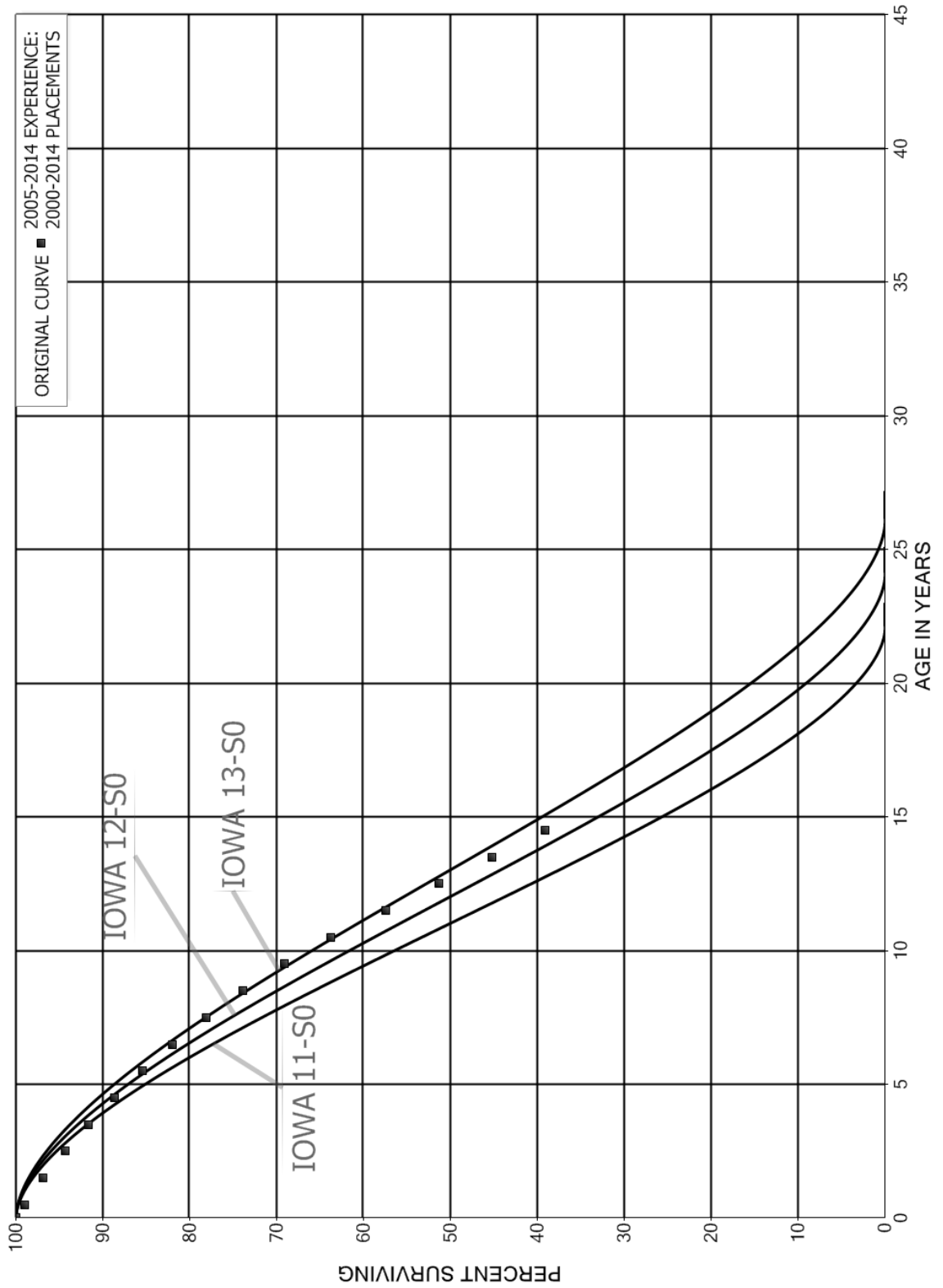
The smoothing of the original survivor curve eliminates any irregularities and serves as the basis for the preliminary extrapolation to zero percent surviving of the original stub curve. Even if the original survivor curve is complete from 100% to zero percent, it is desirable to eliminate any irregularities, 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.

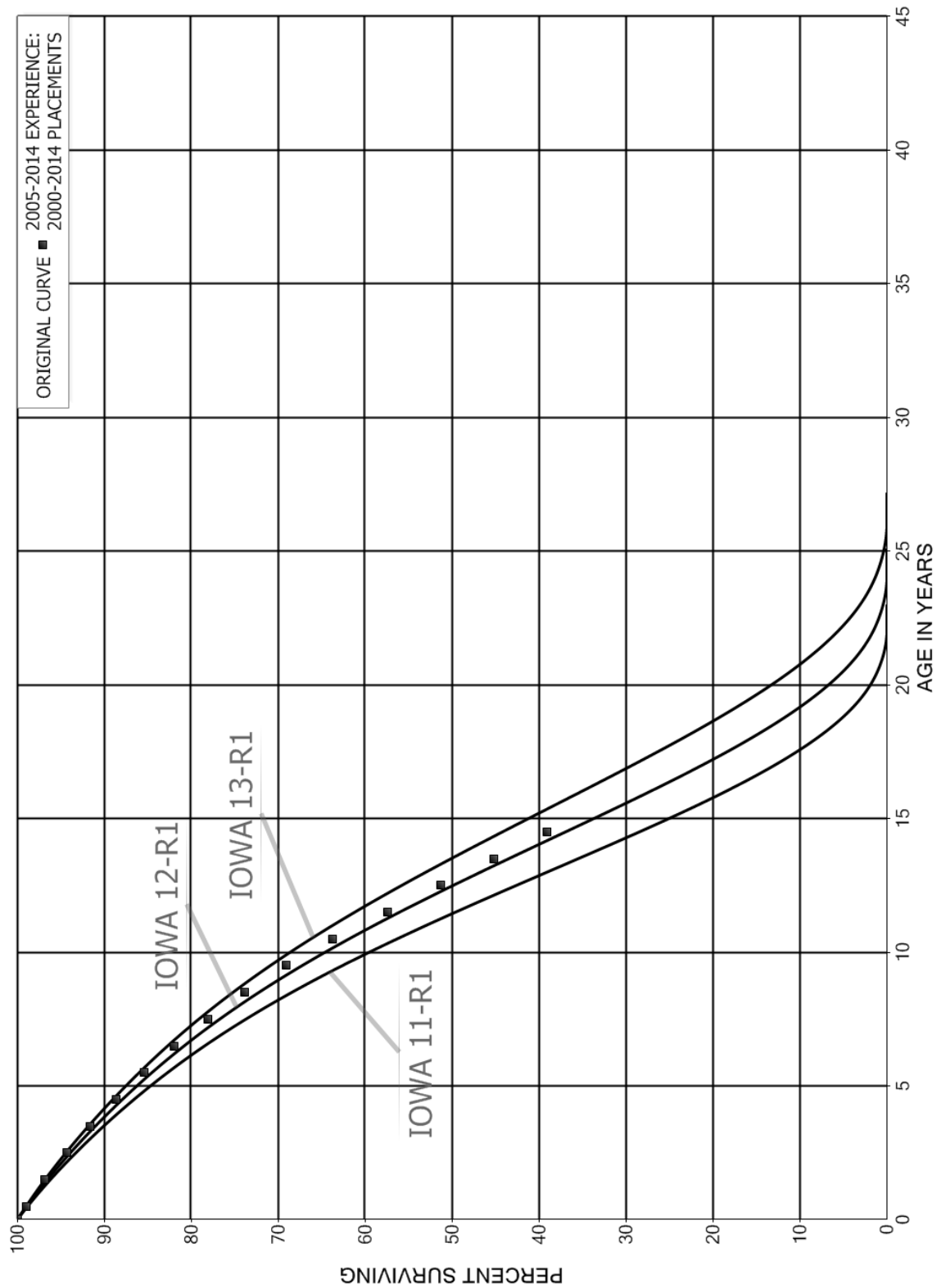
The Iowa type curves are used in this study to smooth those original stub curves which are expressed as percents surviving at ages in years. Each original survivor curve was compared to the Iowa curves using visual and mathematical matching in order to determine the better fitting smooth curves. In Figures 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

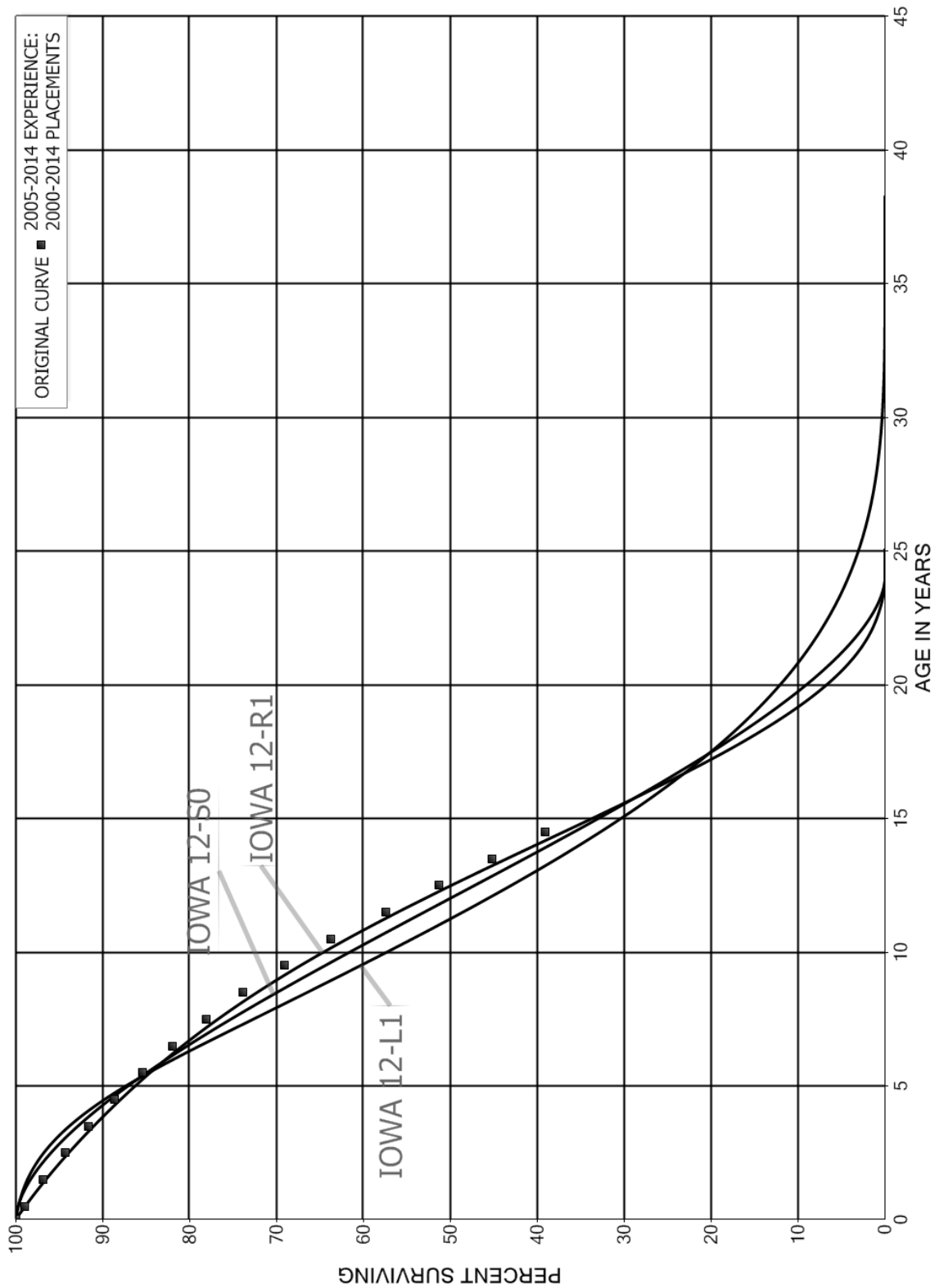
average life between 12 and 13 years appears to be the best fit. In Figure 7, the S0 type curve with a 12-year average life appears to be the best fit and appears to be better than the L1 fitting. In Figure 8, the R1 type curve with a 12-year average life appears to be the best fit and appears to be 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.









APPENDIX B

ESTIMATION OF NET SALVAGE

ESTIMATION OF NET SALVAGE

The estimates of net salvage were based primarily on the professional judgment of Gannett Fleming, in part on historical data, and in part through a comparison to peer companies. Gross salvage and cost of removal as recorded to the depreciation reserve account and related to experienced retirements are used. Percentages of the cost of plant retired are calculated for each component of net salvage on both annual and three-year moving average bases.

The net salvage percentages estimated is usually determined using the “Traditional Approach” for net salvage estimation. When a utility retires plant, the plant may be: (1) sold to a third party; (2) reused by the utility for additional service; (3) abandoned in place; or (4) physically removed. In the circumstances where the plant is sold or re-used, a salvage proceed (or positive salvage amount) is normally recognized. In circumstances where the plant is abandoned in place or physically removed, a cost of removal expenditure (or negative salvage) is incurred. The net of these estimated gross salvage proceeds and the estimated costs of removal are expressed as a percentage of the account’s original cost to determine a net salvage percentage. In the circumstances where the salvage proceeds exceed the costs of retirement, a net positive salvage percentage exists. In the circumstances where the costs of removal exceed the salvage proceeds, a net negative salvage percentage results.

The estimation of the net salvage percentages developed using the traditional approach, includes the following steps:

1. The annual retirement, gross salvage and cost of removal transactions for the period of analysis are extracted from the plant accounting systems.
2. A net salvage amount (gross salvage proceeds less cost of retirement) is calculated for each historic year. Additionally, a net salvage amount is also calculated for each historic three-year rolling band and the most recent five-year rolling band.
3. The net salvage amount determined above is compared to the original booked costs retired for each period in the manner described, which results in a net salvage percentage of original costs retired for each year, in addition to three-year rolling bands and the most recent five-year rolling band.

4. The annual, the three-year rolling average, and the most recent five-year rolling average net salvage percentages are analyzed to determine a reasonable estimated net salvage percentage. At this point the net salvage percentage is based purely upon statistical analysis.
5. Each account is then compared to the net salvage percentage currently approved, compared to peer companies, and discussed with company engineering staff. Based on the statistical analysis, the review of current and peer company net salvage percentages, and with the professional judgment of Gannett Fleming, a net salvage percentage is determined for each account.
6. The net salvage percentage is then used in the depreciation rate calculations in the technical update.



*Excellence Delivered **As Promised***

Gannett Fleming Canada ULC

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Attachment 9.2.3


Gannett Fleming
*Excellence Delivered **As Promised***

September 17, 2015

FortisBC Inc
 Suite 100, 1975 Springfield Road
 Kelowna, BC
 V1Y 7V7

Attention: Mr. Jason Cahill
 Manager, Financial Reporting

Depreciation Rates for Proposed Kootenay Operations Center

Per your request, I have undertaken a review of the depreciation rate considerations of the proposed Kootenay Operations Centre. The resultant recommendations included herein are based on the following:

- My review of the project costing information for the proposed Kootenay Operations center;
- Our telephone conversations to review the proposed Kootenay Operations Center;
- My experience in the development of depreciation rates for similar structures; and
- Our review of the structures account in the recently filed FortisBC Inc. depreciation study for electric utility assets.

Based on my review, I have concluded that there are three major elements to this operations center as follows:

- The exterior building structure and site preparation will have a long life expectation of approximately 65-75 years;
- The building sub-structure such as roofing, mechanical, and electrical systems which would have a shorter life expectation of approximately 40-45 years; and
- The fittings and fixtures which has a shorter life expectation of 20-25 years.

Overall, on a weighted average basis, the average life expectation of the above three groupings would be approximately 35 to 40 years, with the largest amount (approximately 50%) of investment related to the fitting and fixture category.

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Mr. Jason Cahill
FortisBC Inc.

September 16, 2015

The remaining 50% is split between the building structure and site preparation component (approximately 35%) and the building sub-structure component (approximately 15%).

In the recently completed FortisBC Inc. depreciation study Account 390.20 – Operations Buildings was estimated to have a 40-year average service life. Based on the consistency of the 40-year average service life as established in the current depreciation study to the 35 to 40-year weighted average estimate as determined through the review of the estimated project costs, I recommend that at this time the depreciation rate for this project be consistent with the depreciation rates as determined in the current Gannett Fleming depreciation study.

Future full depreciation studies should specifically review the Operations Buildings account to assess the need for a separate account (or accounts) related to the Kootenay Operations Center. However, at this time, the use of the depreciation parameters as recommended in the depreciation study for Account 390.20 – Operations Buildings is reasonable.

If you have any questions on these recommendations, please feel free to call me at (403)257-5946 to discuss.

Sincerely,

GANNETT FLEMING CANADA ULC
Valuation and Rates Division



Larry E. Kennedy
Vice President

LEK/hac

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, BC V6Z 2N3 CANADA
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**BRITISH COLUMBIA
UTILITIES COMMISSION**

**ORDER
NUMBER C-XX-16**

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
FACSIMILE: (604) 660-1102

DRAFT ORDER

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by FortisBC Inc.
for a Certificate of Public Convenience and Necessity for
the Construction of the Kootenay Operations Centre

BEFORE:

(Date)

WHEREAS:

- A. On July 9, 2015, FortisBC Inc. (FBC) applied to the British Columbia Utilities Commission (the Commission), pursuant to Sections 45 and 46 of the *Utilities Commission Act* (Act), for a Certificate of Public Convenience and Necessity (the Application) for construction of a new operations centre located in the Castlegar area (the Kootenay Operations Centre or KOC) (the Project);
- B. The Project will:
- Replace the Generation Administration Office and the Warehouse;
 - Address concerns related to the System Control Centre (SCC) and Back-Up Control Centre (BCC);
 - Provide a central and dedicated Emergency Operations Centre for the Kootenay region;
 - Provide a central location to house the Kootenay Station Services group; and
 - Provide storage for poles and pole trailers currently housed at the South Slokan Generation Site for Network Operations dispatched out of the Castlegar District Office;
- C. The Application is filed in two parts: the Primary Application which contains all of the information related to the Project, and the Confidential Application which contains detailed information related to the SCC and BCC;

**BRITISH COLUMBIA
UTILITIES COMMISSION**

**ORDER
NUMBER** C-XX-16

- D. FBC proposes to start construction of the Project in late Spring 2016 and be in-service by 2017;
- E. FBC estimates the capital cost of the Project to be approximately \$20.651 million including Allowance for Funds Used During Construction (AFUDC) and abandonment/demolition costs;
- F. A written public hearing process was conducted including two rounds of information requests;
- G. The Commission Panel has considered the evidence and submissions and concludes that the Project is in the public interest and that a CPCN should be granted.

Deleted: <#>FBC also requests approval pursuant to section 56 of the Act for a depreciation rate of 1.9% that would be applicable to the new facility.¶

NOW THEREFORE with Reasons attached as Appendix A to the Order, the Commission orders as follows:

- 1. Pursuant to Sections 45 and 46 of the *Utilities Commission Act*, a Certificate of Public Convenience and Necessity is granted to FBC for the construction of the Kootenay Operations Centre, as applied for in the Application.
- 2. FBC must provide the Commission an updated Total Project Cost Estimate when the construction contract is awarded.
- 3. FBC shall file with the Commission a Final Report, within six months of the actual completion of the Project, that provides a complete breakdown of the final costs of the Project, compares these costs to the cost estimate in the Application, and provides an explanation and justification of material cost variances.

Deleted: <#>Pursuant to Section 56 of the Act, a depreciation rate of 1.9% is approved to be applicable to the new facility.¶

DATED at the City of Vancouver, In the Province of British Columbia, this day of <MONTH>, 2016.

BY ORDER

Attachment 9.8

REFER TO LIVE SPREADSHEET MODEL

Provided in electronic format only

FILED CONFIDENTIALLY

(accessible by opening the Attachments Tab in Adobe)

