Twenty-Ninth Actuarial Valuation

of the Assets and Liabilities under the Railroad Retirement Acts as of December 31, 2022 with Technical Supplement

U.S. Railroad Retirement Board
Bureau of the Actuary and Research
Chicago, Illinois

Twenty-Ninth Actuarial Valuation of the Assets and Liabilities under the Railroad Retirement Acts as of December 31, 2022 with Technical Supplement

by
Keith T. Sartain, Chief Actuary

with Statements of the Railroad Retirement Board and the Actuarial Advisory Committee

U.S. Railroad Retirement Board
Bureau of the Actuary and Research
October 2024

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RAILROAD RETIREMENT BOARD
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BOARD MEMBERS:

ERHARD R. CHORLÉ, CHAIRMAN
JOHN BRAGG, LABOR MEMBER
THOMAS JAYNE, MANAGEMENT MEMBER

STATEMENT OF THE RAILROAD RETIREMENT BOARD

Section 15(g) of the Railroad Retirement Act of 1974 requires that the Railroad Retirement Board, at intervals not longer than three years, estimate the liabilities created by the Act and include the estimate in its annual report. Section 22 of the Railroad Retirement Act of 1974 requires that the Board submit to the President and the Congress, by July 1 of each year, a report containing a five-year projection of the revenues to and payments from the Railroad Retirement Account. Section 502 of the Railroad Retirement Solvency Act of 1983, Public Law 98-76, requires that the Board submit to the Congress, by July 1 of each year, a report on the actuarial status of the railroad retirement system. The 29th valuation was prepared by the Board's Chief Actuary and meets these requirements. The Actuarial Advisory Committee reviewed the valuation as to assumptions and methods as required by Section 15(f) of the Railroad Retirement Act.

The Chief Actuary's report describes the results of three valuations, each valuation differing from the others as to the employment assumption on which it is based. The system is sustainable with no cash flow problems and with a stable or improving funded status at the end of the 75-year projection period under all employment assumptions.

Section 502 of the Solvency Act requires recommendations with respect to tax rates and whether any part of the taxes on employers should be diverted to the Railroad Unemployment Insurance Account to aid in the repayment of any debt to the Railroad Retirement Account. The Chief Actuary's report does not recommend a change in the tax rate, nor does it recommend a diversion of taxes from the Railroad Retirement Account to the Railroad Unemployment Insurance Account.

The Board Members believe that the 29th valuation presents a fair picture of the financial condition of the railroad retirement system, and we support the conclusions reached in the report.

The Railroad Retirement Board wishes to thank the members of the Actuarial Advisory Committee for their assistance in this important project.

FOR THE BOARD
Stephanie Hillyard
Secretary to the Board

STATEMENT OF THE ACTUARIAL ADVISORY COMMITTEE
June 4, 2024

This statement sets forth the Committee's conclusions from their review of the twenty-ninth actuarial valuation of the railroad retirement system. This valuation, performed as of the triennial period ending December 31, 2022, was completed in the spring of 2024 by Mr. Keith T Sartain, Chief Actuary of the Railroad Retirement Board, and his staff. In both the planning and carrying out of the valuation, the Committee has consulted with the Chief Actuary as to the structure, data, actuarial methods, actuarial assumptions, and procedures applied in the performance of the valuation and as to the scope and content of this report. In all, the Committee has met with the Chief Actuary and their staff on February 24, 2023, January 19, 2024, May 10, 2024, and June 4, 2024, for the purpose of reviewing and discussing the significant elements of the twenty-ninth valuation.

The Committee believes that the actuarial assumptions and methods are reasonable along with the applicable modeling of future events and likely outcomes, that the valuation results present a fair picture of the financial conditions of the railroad retirement system, and that Mr. Sartain and his staff's work conforms to all the applicable Actuarial Standards of Practice as promulgated by the Actuarial Standards Board.

Section 502 of the Railroad Retirement Solvency Act requires the Board to report to Congress on the actuarial status of the railroad retirement system each year The report must include recommendations for any appropriate financing changes. The Chief Actuary recommends no change in the payroll tax rates structure under the railroad retirement system at this time based on the results presented in this report. The Actuarial Advisory Committee concurs with the recommendations of the Chief Actuary.

The Chief Actuary's report indicates that the average cost of the program over the projection period as measured by the excess of the present value of tier 2 payroll taxes over the actuarial surplus or (deficiency) ranges from 15.71% to 18.39% of tier 2 payroll based on three projected future employment levels as support for the Chief Actuary's recommendation. These results compare to a range of 16.57% to 21.01% of tier 2 payroll in the twenty-eighth valuation.

The Committee gratefully acknowledges the valuable help of the Board, the Chief Actuary, and his staff in assisting the Committee's review of this valuation.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board.

Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion expressed here regarding the valuation process and contents of this report.

Respectfully submitted,

Kenneth A. Kent, FSA, FCA, MAAA, EA
Chair

Janet M. Barr, ASA, MAAA

Tonya Manning, FSA, FCA, MAAA, EA

REPORT OF THE ACTUARY

STATEMENT OF ACTUARIAL OPINION
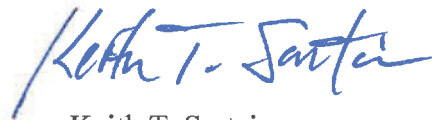
It is my opinion that this report reasonably presents the financial and actuarial status of the Railroad Retirement System in accordance with statutory requirements and actuarial standards of practice. The valuation results reflect the census data, actuarial assumptions and methods, benefit provisions and financial operations as more fully described in the following sections, the Appendix and Technical Supplement.

It is my opinion that (1) the techniques and methodology used herein are generally accepted within the actuarial profession; (2) the assumptions used and the resulting actuarial estimates are, individually and in the aggregate, reasonable for this valuation, taking into consideration the experience and expectations of the program; and (3) the benefit provisions and financial operations of the Railroad Retirement System are appropriately reflected.

Experience different from anticipated could have a material impact on the valuation results and financial status of the system. Future valuations are likely to produce different results as experience develops and actuarial assumptions and methods change. In addition, changes in benefit provisions and applicable laws could have a significant impact on the cost.

This valuation uses a projection model built and maintained by the Railroad Retirement Board's Bureau of the Actuary and Research. This model and its procedures are well documented, tested, reviewed, and updated annually. It includes sufficient quality checks and management controls to assure it produces appropriate results.

I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Keith T. Sartain
Chief Actuary, Railroad Retirement Board
Fellow of the Society of Actuaries
Member of the American Academy of Actuaries
Enrolled Actuary #23-05002

I. INTRODUCTION

Section 15 of the Railroad Retirement Act of 1974 requires that the Railroad Retirement Board, at intervals of not more than three years, prepare actuarial valuations of the railroad retirement system.

Section 22 of the Railroad Retirement Act of 1974 requires the Railroad Retirement Board to prepare an annual report containing a five-year projection of revenues to and payments from the Railroad Retirement Account and to submit the report to the President and the Congress by July 1. This report must also contain a five-year projection of the account benefits ratio and average account benefits ratio. If the five-year projection indicates that funds in the Railroad Retirement Account will be insufficient to pay full benefits, (1) representatives of railroad employees, railroad carriers and the President must submit proposals to the Congress to preserve the financial solvency of the Railroad Retirement Account, and (2) the Railroad Retirement Board must issue regulations to reduce annuity levels during any fiscal year in which there would be insufficient funds to make full payments.

Section 502 of the Railroad Retirement Solvency Act of 1983 requires the Railroad Retirement Board to prepare an annual report on the actuarial status of the railroad retirement system and to submit the report to the Congress by July 1. The report must contain recommendations for any financing changes which might be advisable, including (1) changes in the tax rates, and (2) whether any part of the taxes on employers should be diverted to the Railroad Unemployment Insurance Account to aid in the repayment of any debt to the Railroad Retirement Account.

This 29th actuarial valuation report is intended to meet these requirements for 2024. The recommendations required by Section 502 are presented below:

1. No change in the rate of tax imposed on employers and employees is recommended. The tier 2 tax rate schedule maintains a close balance between the present value of future income and expenditures. The projected cash flows show no problems for 75 years, indicating that an immediate change in the tax rate schedule is not required.

2. No diversion of taxes from the Railroad Retirement Account to the Railroad Unemployment Insurance Account is recommended at this time. There are currently no outstanding loans.

II. SUMMARY OF RECENT DEVELOPMENTS AND RESULTS

Recent actuarial reports have discussed in detail the importance of the level of railroad employment to the railroad retirement system's financial stability. The payroll tax on railroad employment has been the major source of income to the system since its establishment in the 1930s. It is clear that with a fixed tax rate the fewer railroad workers there are, the less money the retirement account collects in payroll taxes, and the more likely the system is to need additional funds. Declines in railroad employment over a long period, coupled with inflation and subsequent benefit increases, required legislation to strengthen the system's financial condition in 1974, 1981, 1983, and 1987. With the introduction of the average account benefits ratio (Appendix item 36) to automatically adjust the payroll tax rates in 2004 and later, there is less need for corrective legislation.

Key results from the 29th valuation (2024 actuarial report) and the prior 28th valuation (2021 actuarial report) under the moderate employment assumption are summarized in the table below:

	29th Valuation	28th Valuation
Valuation Date	12/31/2022	12/31/2019
Reporting Year	2024	2021
Actuarial Surplus (in millions)	$2,016	$1,372
Actuarial Surplus as a % of Tier 2 payroll	0.43%	0.33%
Average Projected Tier 2 tax rate	17.28%	18.92%
Cost of the System (tax rate less surplus)	**16.85%**	**18.59%**
Tier 2 tax rates:		
• Current (1st year)	18%	18%
• In 10th year	18%	18%
• Highest	18%	23%
• At final year	14%	18%

The cost of the system significantly improved because of higher expected railroad employment and related tier 2 payroll. The combined effect of a decrease in projected tier 2 tax rates by 1.64 percent and an increase in projected surplus by 0.10 percent results in a decrease in system cost of 1.74 percent of tier 2 payroll.

The average tier 2 tax rate is calculated by dividing the present value of tier 2 payroll taxes by the present value of tier 2 payroll as of January 1, 2023. The surplus figures given above and illustrated in Table 6 represent the change in the average tier 2 tax rate which would produce a balance of zero in the combined National Railroad Retirement Investment Trust, Railroad Retirement Account and Social Security Equivalent Benefit Account at the end of the 75-year projection period.

The current valuation increases the expected future investment return to 7.0% compared to 6.5% in the prior valuation. This change decreases the projected system cost by about 0.31 percent of tier 2 payroll under the moderate employment assumption. At the same time, we slightly increased long-term inflation and base wage increases by 0.1% to 2.5% and 3.5% respectively.

Railroad employment has recovered following the pandemic and has recently stabilized. This valuation adjusts the employment scenario assumptions to project more stable long-term employment levels. Under the moderate employment assumption shown above, ultimate employment stabilizes at 161,700 after 40 years of declines for the 29th valuation compared to 137,200 after 50 years of declines for the 28th valuation. This change improves the projected tier 2 payroll tax base.

The 29th valuation has been prepared under three assumptions as to the future behavior of railroad employment. Employment assumptions I and II assume stable passenger employment and different rates of decline in freight employment. Employment assumption III follows the structure of assumptions I and II, except that it has declines in passenger employment and steeper declines in freight employment than employment assumptions I and II. This approach is like the 28th valuation, but this year's valuation begins with slightly lower rates of decline which then become smaller linearly over the next 40 years.

See Section V for more information on assumptions.

Employment assumptions I, II and III are intended to provide an optimistic, moderate and pessimistic outlook, respectively. The results of the projections made in this report of the railroad retirement system's financial condition are as follows:

	Employment Assumption		
	I	II	III
Ultimate employment (in thousands)	194.1	161.7	128.1
Actuarial Surplus as a % of Tier 2 payroll	0.46%	0.43%	0.41%
Average Projected Tier 2 tax rate	16.17%	17.28%	18.80%
Cost of the System (tax rate less surplus)	**15.71%**	**16.85%**	**18.39%**
Tier 2 tax rates:			
• Current (1st year)	18%	18%	18%
• In 10th year	18%	18%	18%
• Highest	18%	18%	23%
• At final year	14%	14%	14%

Under employment assumption I (optimistic), assumption II (moderate), and assumption III (pessimistic), there are no cash flow problems during the 75-year projection period. The tier 2 tax rates are adequate to maintain system solvency. Under employment assumption III (pessimistic), the tier 2 tax rate increases to 23% in 2053-2067 but then declines as the system funded status improves.

The system is sustainable with no cash flow problems and with a stable or improving funded status at the end of the projection period under all employment assumptions.

The conclusion is that, barring a sudden, unanticipated, large drop in railroad employment or substantial investment losses, the railroad retirement system with its automatically adjusting tier 2 tax rate mechanism will experience no cash flow problems. The long-term stability of the system, however, is not guaranteed. Under the current financing structure, actual levels of railroad employment and investment return over the coming years will determine whether future corrective action is necessary.

Section V of this report presents details of the valuations under the three employment assumptions.

III. REGULAR AND SUPPLEMENTAL BENEFITS AND THEIR FINANCING

The Appendix contains a detailed description of the provisions of the current law. Sections III and IV provide a more general summary of the law.

Amounts available for payment of railroad retirement benefits are held in four Accounts: the National Railroad Retirement Investment Trust (NRRIT), the Railroad Retirement (RR) Account, the Social Security Equivalent Benefit (SSEB) Account, and the Dual Benefits Payments Account. Because of their intertwined nature, the NRRIT, RR Account and SSEB Account are discussed together in this Section III. Dual benefits and the Dual Benefits Payments Account are discussed in a separate Section IV.

Amounts held in the NRRIT, RR Account and SSEB Account are mainly used to pay monthly benefits to retired or disabled employees, their spouses, and survivors. The various types of benefits and their eligibility requirements are described in the Appendix. The Accounts also pay out relatively small amounts in lump sums to employees and their survivors in certain cases. The monthly benefits consist of three components, known as tier 1, tier 2 and supplemental annuity.

For all categories of recipients, the gross tier 1 benefit is generally equivalent to the benefit that the social security system would pay if all the employee's earnings (railroad and non-railroad) had been covered under the Social Security Act. Any benefit actually received from social security is subtracted to determine the net tier 1 benefit payable. Section IV explains the logic behind this determination. The cost-of-living increase paid to social security beneficiaries automatically carries over to the tier 1 component of railroad retirement annuities.

There are some differences between social security benefits and tier 1 benefits. The most significant are as follows:

1. An employee may not retire before age 62 under the social security system. Under the railroad retirement system, an employee may retire as early as age 60 with 30 years of service. A spouse of a 30-year employee may also retire as early as age 60. If the employee retired after 2001, there is no age reduction to the tier 1 benefit and tier 2 benefit.

2. Railroad retirement pays an occupational disability benefit under tier 1 and tier 2. Social security requires total and permanent disability. A five-month waiting period applies under both systems.

3. Widow(er)s who retire at age 60 or 61 under railroad retirement are deemed age 62 in the computation of the tier 1 benefit, resulting in a smaller age reduction than under social security.

4. From the start of the railroad retirement system through 1984, earnings up to a monthly maximum amount were taxed and credited for benefit computation purposes. Social security has always used an annual earnings limit. The 1983 Solvency Act changed railroad retirement to an annual earnings limit for 1985 and later years, but benefit computations for new beneficiaries continue to reflect the pre-1985 use of a monthly limit primarily because it is necessary for integrating the full career of pays in the highest 35 years of indexed earnings in the tier 1 benefit formula.

The formula used to compute the tier 2 component of railroad retirement is comparable to a private pension formula. Under the formula adopted in 1981, the employee tier 2 benefit is equal to 0.7 percent of the employee's average monthly railroad earnings for the 60 months of highest earnings, multiplied by the number of years of railroad service, less 25 percent of any vested dual benefit. Unlike many private pensions, tier 2 benefits (1) provide automatic cost-of-living increases, and (2) are paid to spouses and survivors without any reduction in employee benefit for the payment of these auxiliary benefits.

Before applicable reductions, the tier 2 benefit for spouses and survivors is a specified percentage of the employee's tier 2 benefit. The Appendix lists the percentages and also describes the initial minimum widow(er)'s amount which became payable beginning in calendar year 2002.

The tier 2 cost-of-living increases for employees, spouses and survivors are equal to 32.5 percent of the percentage increase which is used in computing social security increases (and tier 1 increases). The increase is paid at the same time as the tier 1 cost-of-living increase.

The portion of tier 1 benefits which is considered equivalent to social security benefits is subject to Federal income tax under the rules that apply to social security benefits. Tier 2 benefits, the portion of tier 1 benefits in excess of social security benefits, supplemental annuity benefits, and vested dual benefits are subject to Federal income tax under the rules that apply to private pensions.

A railroad retiree may receive a supplemental annuity in addition to his regular annuity if (1) the retiree has a "current connection" with the railroad industry at the time of retirement, and (2) the retiree has attained age 65 with 25 years of railroad service, or attained age 60 with 30 years of railroad service. A current connection is generally defined as at least 12 months of railroad service in the 30 months preceding retirement.

The monthly supplemental annuity benefit is $23, plus $4 for each year of service in excess of 25, with a maximum benefit of $43. No cost-of-living increases are applied. Spouses and survivors do not receive a supplemental annuity.

If the recipient of a supplemental annuity receives a private pension from his railroad employer, the supplemental annuity is reduced by the portion of the private pension that is attributable to the employer's contributions. This reduction is not made if the private pension is reduced for receipt of the supplemental annuity.

The 1981 amendments added the requirement that an employee must have worked in the railroad industry before October 1, 1981, to receive a supplemental annuity. This provision results in phasing out the supplemental annuity over a long period. The last supplemental annuity check will probably be paid after 2065.

Benefits paid from the NRRIT, RR Account and SSEB Account are financed by the following sources of income:

1. Payroll tax. Employees and employers pay a tax at the social security rate on earnings in a year up to the social security, or tier 1, earnings limit. There is no limit to earnings subject to the hospital insurance portion of the tier 1 tax rate. Beginning in 2013, employees pay an additional 0.9 percent on earnings above $200,000 (for those who file an individual return) or $250,000 (for those who file a joint return).

    Related to the COVID-19 pandemic, legislation and an executive order provided for certain credits and deferrals of tier 1 payroll taxes during 2020. Many railroad employers availed themselves of this relief. In accordance with the legislation, Treasury provided a reimbursement from the general fund during 2021 to cover the shortfall in 2020 tax receipts. Employers repaid half of any deferred payroll taxes by December 31, 2021, and the remainder by December 31, 2022. These employer deferred repayments were transferred to the Treasury general fund in September 2022 and September 2023 to cover the earlier reimbursements.

    In addition, employers and employees pay a tier 2 tax equal to a percentage of the employee's earnings up to the tier 2 earnings limit. The tier 2 earnings limit is what the social security limit would be if the 1977 social security amendments had not been enacted. The 2024 earnings limits are $168,600 and $125,100 for tier 1 and tier 2, respectively.

    Tier 2 taxes on both employers and employees are automatically adjusted based on a 10-year average of the ratio of certain asset balances to the sum of benefits and administrative expenses (the average account benefits ratio). Depending on the average account benefits ratio, the tier 2 tax rate for employers will range between 8.2 percent and 22.1 percent (currently 13.1 percent), while the tier 2 tax rate for employees will be between 0 percent and 4.9 percent (currently 4.9 percent). This calculation is described in the Appendix.

2. Income tax. The tax on tier 1 benefits up to the social security level is credited to the SSEB Account and then sent to social security administration through the financial interchange. Revenue derived from taxing certain RR Account benefits (tier 2 and the excess of tier 1 over the social security level) is transferred to the RR Account.

3. Investment income. The majority of assets are managed and invested in a diversified portfolio by the NRRIT Board of Trustees. The RR Account and SSEB Account are invested in special issue Treasury obligations.

4. The financial interchange with the social security system. This extremely important arrangement, which will be discussed in detail in Section IV, has resulted in the large annual lump sum transfers of money from social security to railroad retirement. As shown in Table 10, the social security system transferred $5.9 billion to the SSEB Account in 2024. At the same time, hospital insurance (HI) taxes are transferred to Center for Medicare and Medicaid Services.

5.   <u>Advances from general revenues related to certain features of the financial interchange</u>.
Financial interchange transfers are made in a lump sum for a whole fiscal year in the June
following the end of that fiscal year. For example, the transfer reflecting transactions which
occurred from October 2021 through September 2022 (fiscal year 2022) took place in June
2023. At any time, therefore, there are between 9 and 21 months' worth of financial
interchange transfers that are, in a sense, owed to the railroad retirement system. Railroad
retirement receives interest on this money, so this practice does no long-term harm to the
financial condition of the railroad retirement system. The lag in the transfers, however,
could cause short-term cash flow problems.

To avoid any cash flow problems caused by this lag, the 1983 Solvency Act provided for
monthly loans to railroad retirement from U.S. Treasury general funds. Each loan is equal
to the transfer the Railroad Retirement Board estimates railroad retirement would have
received in the preceding month, with interest, if the financial interchange with social
security were on an up-to-date basis. Railroad retirement must repay these loans when it
receives the transfer from social security against which the money was advanced.

The 1983 Solvency Act created the SSEB Account, effective October 1, 1984. Before that date, all
tier 1 benefits, tier 2 benefits, lump sums and administrative expenses had been paid from the RR
Account, and all the income described above had been credited to the RR Account. Since then, the
SSEB Account has paid the social security level of benefits and the administrative expenses
allocable to that level of benefits. The tier 1 portion of the payroll tax, the income taxes on the
social security level of benefits, the income from the financial interchange, and the advances from
general revenues are credited to the SSEB Account. Repayment of the advances is made from the
SSEB Account.

In order to maximize investment returns to the Railroad Retirement system, the Railroad Retirement
and Survivors' Improvement Act of 2001 created the National Railroad Retirement Investment
Trust (NRRIT) to manage and invest amounts collected in the RR Account and SSEB Account.
Since the initial transfer of assets to the NRRIT during calendar years 2002-2004, the NRRIT has
been transferring funds back to the RR Account as needed for the payment of benefits. The balance
of the SSEB Account not needed to pay current benefits and administrative expenses has generally
been transferred annually to the RR Account, reducing the amount needed from the NRRIT.

IV. THE FINANCIAL INTERCHANGE AND DUAL BENEFITS

In the early 1950s, an arrangement known as the financial interchange was established between the
railroad retirement and social security systems. The purpose of the financial interchange is to place
the social security trust funds in the same financial position they would have been if railroad
employment had always been covered under social security. If railroad employment had been
covered under social security, social security would have collected taxes on railroad employment,
and it would have paid benefits based on railroad employment. Under the financial interchange, the
railroad retirement system gives the social security system the taxes social security would have
collected, and the social security system gives the railroad retirement system the additional benefits
social security would have paid to railroad workers and their families over what it actually pays
them.

The word "additional" in the preceding sentence is important, because it is possible for a railroad employee to be covered under both railroad retirement and social security. The social security coverage may be based on earnings from another job while also in a railroad job or from coverage under the two systems at different times. Fulfilling the purpose of the financial interchange requires deducting from social security's fund only the difference between what social security would have paid had it covered railroad employment and what it actually pays the person based on his non-railroad employment. Under the financial interchange, therefore, social security subtracts an employee's social security benefit from the amount it would otherwise give to the railroad retirement system.

This arrangement gave rise to problems that became acute in the early 1970s. The problems arose from the weighting in the social security formula in favor of low-earning, short-service workers. A railroad employee's non-railroad earnings usually added little to the benefit social security would have paid on combined railroad and non-railroad earnings (called gross tier 1 today). However, the employee might qualify for the minimum social security benefit, receiving much more from social security than his non-railroad earnings added to his gross tier 1 benefit.

In order to improve the system's financial condition, the Railroad Retirement Act of 1974 provided that the tier 1 component of the railroad retirement annuity be reduced by any social security benefit. This essentially integrated the two systems and eliminated most of the advantage of qualifying for benefits under both systems.

It was generally considered unfair to eliminate this advantage entirely for those already retired or close to retirement when the 1974 Act became effective. The 1974 Act, therefore, provided for a restoration of social security benefits that were considered vested at the end of 1974. The restored amount is known as the "vested dual benefit."

Spouses and survivors were not awarded vested dual benefits after August 13, 1981, though they continue to receive these benefits if they were awarded before that date.

Since October 1981, vested dual benefits have been paid from a segregated Dual Benefits Payments Account, and appropriations have been made to that account. This means that, starting in fiscal year 1982, each annual appropriation is to be sufficient to pay the benefits for that year. If the appropriation for a fiscal year is less than required for full funding, the Railroad Retirement Board must reduce benefits to a level that the amount appropriated will cover.

The appropriation for vested dual benefits in fiscal years 1982, 1986 and 1988 were less than required for full funding, resulting in a cutback in benefits during those years. Benefits were cut back in January 1996 due to a lapse in government funding and then restored later that same month. Full benefits have been paid for all other years.

Vested dual benefits have been phasing out over a long period, and the last vested dual benefit payment will probably be made after 2040.

V. ASSUMPTIONS, METHODOLOGY, AND VALUATION RESULTS

A. Assumptions and Methodology

Average railroad employment begins with 198,200 in 2023 under each of the three employment assumptions, which is the estimated average for the year (subject to later adjustment). This value is close to the prior 28th valuation's projected railroad employment under the moderate assumption, which had assumed a rebound in railroad employment following the COVID-19 pandemic. Currently, railroad employment has recovered and has stabilized at about 200,000 employees since mid-2023.

A condensed history of 5-year average railroad employment from 1945 through 2019 is shown in the following table:

5-Year Period	Average employment for the period (in thousands)	Average annual rate of decline from the prior period
1945-1949	1,572,000	
1950-1954	1,396,000	2.3%
1955-1959	1,108,000	4.5%
1960-1964	825,000	5.7%
1965-1969	710,000	3.0%
1970-1974	603,000	3.2%
1975-1979	546,000	2.0%
1980-1984	453,000	3.7%
1985-1989	331,000	6.1%
1990-1994	279,000	3.4%
1995-1999	257,000	1.6%
2000-2004	233,000	1.9%
2005-2009	233,000	0.0%
2010-2014	233,000	0.0%
2015-2019	229,000	0.3%

This history shows that railroad employment has generally declined over a long period of years but less quickly since the early 2000s. Railroad employment may vary more dramatically year to year and was particularly affected by the COVID-19 pandemic in 2020 and 2021, but steadily recovered during 2022 and 2023, assisted by Amtrak hiring supported by the Infrastructure Investment and Jobs Act, as shown below:

Year	Average employment for the year (in hundreds)	Annual rate of decline from the prior year
2015	246,900	(2.0)%
2016	230,600	6.6%
2017	224,900	2.5%
2018	224,300	0.3%
2019	217,300	3.1%
2020	195,400	10.1%
2021	186,100	4.8%
2022	190,100	(2.1)%
2023	198,200	(4.3)%

The valuation includes three assumptions as to future expectations of railroad employment that are based on a model initially developed by the Association of American Railroads. This model was first adopted for the 19th valuation in 1994 and has been modified periodically in subsequent valuations based on actual experience and expectations. Employment assumptions I, II, and III are intended to provide optimistic, moderate, and pessimistic outlooks, respectively.

Employment assumptions I and II assume that (1) passenger employment will remain at the level of 46,000, and (2) the employment base excluding passenger employment will decline at a reducing annual rate for 40 years (initially 0.2 percent for assumption I and 1.4 percent for assumption II) and remain level thereafter.

Employment assumption III differs from employment assumptions I and II by assuming that (1) passenger employment will decline by 400 per year until a level of 38,000 is reached and then remain level, and (2) the employment base excluding passenger employment will decline at an initial annual rate of 2.6 percent reducing linearly for 40 years and remain level thereafter.

These assumptions were updated for the 29th valuation to reflect prior experience with slower declines in employment since 2001 and future expectation of more stable employment. This year's valuation reflects the following changes:

1. Reduce the initial rates of decline for non-passenger employment by 0.0%, 0.1% and 0.2% to 0.2%, 1.4%, and 2.6%, such that the spread is 1.2% for the optimistic, moderate, and pessimistic assumptions, respectively.

2. For the pessimistic employment assumption, reduce passenger employment by 400 per year instead of 500 per year until reaching a floor.

3. Start immediately reducing the initial rates of decline in non-passenger employment over the next 40 years. The prior valuation used a constant annual decline for 25 years and then a reducing decline for the next 25 years.

This update is consistent with reductions in the rates of decline since the model was adopted and with the model's premise that declines would become smaller in the future. This update increases expected future employment and reduces the range of outcomes between the assumptions.

To recognize the increasing employment trend to 200,000 in the first quarter of 2024, we added a 1.4 percent increase in non-passenger employment across all scenarios between 2023 and 2024. This upward adjust brings the projected 2024 employment under assumption I (optimistic) up to the actual preliminary employment estimate for the first quarter of 2024 and maintains projected 2024 employment under assumption II (moderate) at 198,200, which equals the initial 2023 average employment.

Because inflation is expected to stabilize, only one set of earnings and price inflation assumptions was used in this valuation. The ultimate base wage increase and cost-of-living increase assumptions were slightly increased to 3.5% and 2.5% in the 29th valuation from 3.4% and 2.4%, respectively, in the 28th valuation.

Consistent with higher inflation and considering capital market expectations, the long-term investment return assumption was increased to 7.0% in the 29th valuation from 6.5% in the 28th valuation. This investment return assumption reflects the combined average expected return for all accounts.

Select assumptions were applied during the first few years to reflect recent actual experience. The 2023 base wage increase is 11.4% based on preliminary data. This higher increase is due to union contracts with Class 1 railroads being ratified that include cumulative gross wage increases (GWI) and a one-time payout for prior period GWI and service bonuses. We are then assuming a lower increase of 1.5% in 2024, since the back-wages payments are inflating 2023 wages and will not reoccur. We use the ultimate 3.5% assumption thereafter.

Table 1. Employment and economic assumptions shows the assumptions used in the 29th valuation. A comparison of historical and projected employment is illustrated in Figure 1.

The valuation uses a single scenario for all other assumptions (for example, rates of mortality, disability, retirement, and withdrawal). These assumptions, many of which were changed from the 28th valuation to reflect recent experience, are discussed in the Technical Supplement to this report.

Table 1. Employment and economic assumptions

Calendar year	Average employment (thousands)			Percentage increase over prior year		Investment return
	I	II	III	Base Wages	Cost of living [a]	
2023	198.2 [c]	198.2 [c]	198.2 [c]	11.4% [c]	8.7% [b]	12.8% [b]
2024	200.0	198.2	195.9	1.5	3.2 [b]	7.0
2025	199.7	196.1	191.7	3.5	3.0	7.0
2026	199.4	194.1	187.7	3.5	2.8	7.0
2027	199.1	192.2	183.9	3.5	2.5	7.0
2028	198.9	190.3	180.2	3.5	2.5	7.0
2029	198.6	188.6	176.7	3.5	2.5	7.0
2030	198.3	186.9	173.3	3.5	2.5	7.0
2031	198.1	185.2	170.2	3.5	2.5	7.0
2032	197.8	183.7	167.1	3.5	2.5	7.0
2033	197.6	182.2	164.2	3.5	2.5	7.0
2034	197.4	180.8	161.4	3.5	2.5	7.0
2035	197.2	179.4	158.8	3.5	2.5	7.0
2036	197.0	178.1	156.2	3.5	2.5	7.0
2037	196.8	176.8	153.8	3.5	2.5	7.0
2038	196.6	175.6	151.5	3.5	2.5	7.0
2039	196.4	174.5	149.3	3.5	2.5	7.0
2040	196.2	173.4	147.2	3.5	2.5	7.0
2041	196.0	172.4	145.1	3.5	2.5	7.0
2042	195.8	171.4	143.2	3.5	2.5	7.0
2043	195.7	170.5	141.4	3.5	2.5	7.0
2044	195.5	169.6	140.0	3.5	2.5	7.0
2045	195.4	168.8	138.8	3.5	2.5	7.0
2046	195.3	168.0	137.6	3.5	2.5	7.0
2047	195.1	167.3	136.5	3.5	2.5	7.0
2048	195.0	166.6	135.5	3.5	2.5	7.0
2049	194.9	166.0	134.5	3.5	2.5	7.0
2050	194.8	165.4	133.6	3.5	2.5	7.0
2051	194.7	164.9	132.8	3.5	2.5	7.0
2052	194.6	164.4	132.1	3.5	2.5	7.0
2053	194.5	163.9	131.4	3.5	2.5	7.0
2054	194.5	163.5	130.8	3.5	2.5	7.0
2055	194.4	163.1	130.3	3.5	2.5	7.0
2056	194.3	162.8	129.8	3.5	2.5	7.0
2057	194.3	162.5	129.4	3.5	2.5	7.0
2058	194.2	162.3	129.0	3.5	2.5	7.0
2059	194.2	162.1	128.7	3.5	2.5	7.0
2060	194.2	161.9	128.5	3.5	2.5	7.0
2061	194.1	161.8	128.3	3.5	2.5	7.0
2062	194.1	161.7	128.2	3.5	2.5	7.0
2063 - 2097	194.1	161.7	128.1	3.5	2.5	7.0

[a] Cost-of-living adjustments are effective January 1 of each year. Actual Tier 1 COLA is the same as the actual social security increase. Tier 2 COLA is 32.5% of the Tier 1 COLA.

[b] Actual.

[c] Preliminary.

Figure 1. Average Railroad Employment 1940-2097, Historical and Projected
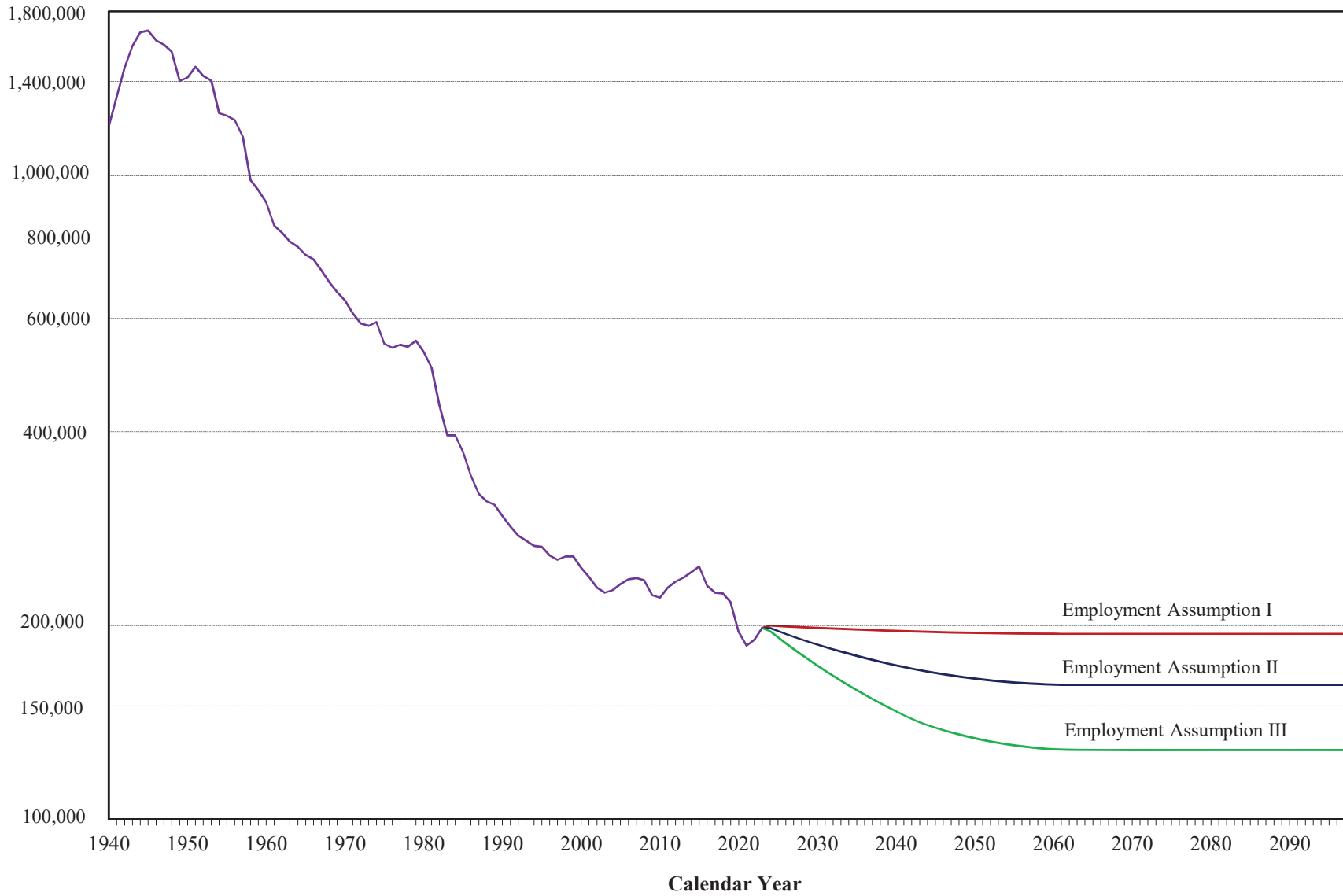
B. Valuation Results

This section sets forth the results of the valuation in the form of a discussion of the tables in which the results appear. Because it is desirable for the discussion of a table to be reasonably self-contained, there is some repetition between tables and between this section and preceding sections of this report.

Table 2. Progress of the Combined National Railroad Retirement Investment Trust (NRRIT) and Railroad Retirement (RR) Account, and the Social Security Equivalent Benefit (SSEB) Account. Projections were made for the various components of income and outgo under each employment assumption for the 75 calendar years 2023-2097. The projections of these components were combined and the investment income calculated using a single rate to produce the projected balances in the combined NRRIT and RR Account, and the SSEB Account at the end of each projection year. The results are summarized in Table 2.

Table 2 consists of three tables, one for each of employment assumptions I, II, and III. The tables show, for the SSEB Account and the combined NRRIT and RR Account for each projection year, (1) the various elements of income and outgo, (2) the account balance on December 31, and (3) the account benefits ratio, average account benefits ratio and combined employer and employee tier 2 tax rate.

The balances of the RR Account and NRRIT are combined because amounts not needed to pay current benefit and administrative costs are invested by the NRRIT. The SSEB Account is assumed to maintain a target balance of approximately 1.5 months of benefit payments in order to meet benefit obligations and contingencies and to transfer any excess to the RR Account.

Legislation related to the pandemic provided employers tier 1 tax credits and deferrals during 2020. The projections reflect deferrals being repaid by employers by December 2022 and these repayments being transferred from the SSEB Account to Treasury in September 2022 and September 2023.

The projections assume that financial interchange income to the SSEB Account will continue as in prior years, recognizing full benefits, even if the social security system has inadequate funding in the future and must reduce annuities for its beneficiaries. This assumption is reasonable and supported by statute and written procedures.

Table 2 indicates that no cash-flow problems arise under employment assumptions I, II, or III.

Figure 2 shows historical and projected account benefits ratios under the three employment assumptions.

Table 2-I: Under employment assumption I (optimistic), the combined account balance increases throughout the 75-year projection period. The combined employer and employee tier 2 tax rate remains at 18.0% through 2045, decreases to 10.0% for 2061-2065, and then fluctuates between 12.0% and 14.0% thereafter. The system is sustainable with a stable or improving funded status at the end of the projection period.

Table 2-II: Under employment assumption II (moderate), the combined account balance increases throughout the 75-year projection period. The combined employer and employee tier 2 tax rate remains at 18.0% through 2061, decreases to as low as 12.0% for 2077-2092, and ends the projection at 14.0% in 2097. The system is sustainable with a stable or improving funded status at the end of the projection period.

Table 2-III: Under employment assumption III (pessimistic), the combined account balance slowly increases from 2025-2038, then decreases until 2052, and increases thereafter. The combined employer and employee tier 2 tax rate remains at 18.0% through 2043, increases to 23.0% for 2053-2067, but starts declining thereafter until reaching 14.0% towards the end of the projection period. The system is sustainable with a stable or improving funded status at the end of the projection period.

Under all employment assumptions, the average account benefits ratio mechanism successfully adjusted tier 2 tax rates upward and downward as needed to maintain solvency and system sustainability.

As shown in Figure 2, the account benefit ratios under each employment assumption begin to converge after about 35 years once the employee population stops declining. After another 10 to 20 years of constant employment, the account benefit ratios come together around 8.0.

Table 2-I. Progress of the Combined National Railroad Retirement Investment Trust (NRRIT) and Railroad Retirement (RR) Account, and
the Social Security Equivalent Benefit (SSEB) Account under Employment Assumption I
(Dollar amounts in millions)

Calendar year	Average Account benefits ratio[a]	Average account benefits ratio[b]	Tier 2 tax rate	Combined NRRIT and RR Account Benefits and administration	Tax income[c]	Other income[d]	Balance, end year	SSEB Account Benefits and administration	Tax income[c]	Other income and expense[e]	Balance, end year	Combined balance, end year
2024	4.51	4.80	18.0%	$5,950	$4,154	$1,965	$26,632	$8,751	$3,822	$4,908	$1,091	$27,723
2025	4.48	4.70	18.0%	6,010	4,280	1,855	26,756	8,954	3,967	5,013	1,116	27,872
2026	4.49	4.70	18.0%	6,069	4,504	1,924	27,114	9,140	4,166	4,998	1,140	28,254
2027	4.52	4.60	18.0%	6,126	4,643	1,957	27,588	9,306	4,322	5,004	1,160	28,748
2028	4.56	4.60	18.0%	6,201	4,784	1,994	28,166	9,478	4,480	5,019	1,182	29,348
2029	4.60	4.60	18.0%	6,294	4,927	2,039	28,839	9,648	4,637	5,033	1,203	30,042
2030	4.65	4.60	18.0%	6,393	5,073	2,090	29,609	9,824	4,797	5,049	1,225	30,834
2031	4.71	4.60	18.0%	6,494	5,223	2,118	30,456	10,006	4,962	5,067	1,247	31,703
2032	4.79	4.50	18.0%	6,588	5,378	2,211	31,457	10,199	5,134	5,089	1,271	32,728
2033	4.90	4.60	18.0%	6,666	5,539	2,285	32,615	10,407	5,315	5,118	1,297	33,912
2034	5.02	4.70	18.0%	6,761	5,706	2,372	33,932	10,615	5,501	5,140	1,323	35,255
2035	5.14	4.70	18.0%	6,888	5,878	2,469	35,392	10,818	5,669	5,174	1,348	36,740
2036	5.27	4.80	18.0%	7,022	6,057	2,567	36,994	11,029	5,843	5,212	1,375	38,369
2037	5.41	4.90	18.0%	7,162	6,242	2,691	38,764	11,248	6,023	5,252	1,402	40,166
2038	5.56	5.00	18.0%	7,315	6,433	2,819	40,701	11,468	6,208	5,287	1,429	42,130
2039	5.73	5.10	18.0%	7,466	6,631	2,959	42,825	11,692	6,401	5,319	1,457	44,282
2040	5.91	5.20	18.0%	7,618	6,838	3,112	45,157	11,920	6,603	5,345	1,485	46,642
2041	6.11	5.30	18.0%	7,788	7,053	3,277	47,700	12,155	6,813	5,370	1,514	49,214
2042	6.31	5.40	18.0%	7,983	7,276	3,460	50,452	12,405	7,030	5,407	1,546	51,998
2043	6.50	5.60	18.0%	8,199	7,505	3,654	53,413	12,679	7,253	5,461	1,580	54,993
2044	6.69	5.70	18.0%	8,436	7,744	3,862	56,582	12,977	7,484	5,530	1,617	58,199
2045	6.89	5.90	18.0%	8,694	7,992	4,086	59,966	13,292	7,725	5,607	1,656	61,622
2046	7.05	6.10	17.0%	8,954	7,836	4,309	63,157	13,629	7,975	5,696	1,698	64,855
2047	7.22	6.30	17.0%	9,207	8,093	4,534	66,577	13,995	8,242	5,798	1,743	68,320
2048	7.40	6.40	17.0%	9,471	8,356	4,776	70,238	14,386	8,518	5,917	1,792	72,030
2049	7.56	6.60	16.0%	9,743	8,175	5,018	73,688	14,797	8,804	6,044	1,843	75,531
2050	7.72	6.80	16.0%	10,007	8,442	5,264	77,387	15,227	9,104	6,176	1,897	79,284
2051	7.89	7.00	15.0%	10,245	8,235	5,510	80,887	15,677	9,422	6,311	1,953	82,840
2052	8.08	7.20	15.0%	10,465	8,511	5,760	84,694	16,154	9,761	6,452	2,012	86,706
2053	8.26	7.30	15.0%	10,732	8,797	6,031	88,790	16,663	10,110	6,616	2,075	90,865
2054	8.39	7.50	14.0%	11,037	8,550	6,300	92,602	17,210	10,462	6,816	2,144	94,746
2055	8.53	7.70	14.0%	11,319	8,837	6,572	96,691	17,781	10,837	7,015	2,215	98,906
2056	8.62	7.90	14.0%	11,736	9,138	6,865	100,957	18,331	11,211	7,188	2,283	103,240
2057	8.54	8.00	12.0%	12,259	8,262	7,121	104,081	18,867	11,583	7,351	2,350	106,431
2058	8.53	8.10	12.0%	12,620	8,540	7,328	107,329	19,537	11,995	7,625	2,433	109,762
2059	8.58	8.30	12.0%	12,926	8,825	7,557	110,786	20,270	12,430	7,931	2,525	113,311
2060	8.63	8.40	12.0%	13,291	9,130	7,814	114,439	20,950	12,883	8,152	2,609	117,048
2061	8.52	8.50	10.0%	13,801	8,087	8,023	116,748	21,625	13,333	8,376	2,693	119,441
2062	8.32	8.50	10.0%	14,421	8,373	8,182	118,882	22,298	13,785	8,597	2,777	121,659
2063	8.17	8.50	10.0%	14,901	8,662	8,318	120,960	23,106	14,275	8,931	2,878	123,838
2064	8.07	8.50	10.0%	15,330	8,956	8,462	123,048	23,986	14,790	9,305	2,987	126,035
2065	7.96	8.50	10.0%	15,821	9,267	8,619	125,113	24,825	15,322	9,608	3,092	128,205
2066	7.91	8.40	12.0%	16,353	11,204	8,825	128,788	25,687	15,870	9,925	3,199	131,987
2067	7.86	8.40	12.0%	16,937	11,595	9,085	132,531	26,571	16,433	10,248	3,309	135,840
2068	7.82	8.30	12.0%	17,526	12,000	9,347	136,352	27,499	17,018	10,597	3,425	139,777
2069	7.77	8.20	12.0%	18,129	12,418	9,617	140,257	28,468	17,624	10,965	3,546	143,803
2070	7.73	8.20	12.0%	18,761	12,851	9,894	144,241	29,462	18,250	11,335	3,669	147,910
2071	7.68	8.10	12.0%	19,414	13,300	10,175	148,302	30,496	18,900	11,725	3,798	152,100
2076	7.79	7.80	14.0%	23,109	18,074	12,235	179,492	36,227	22,509	13,871	4,512	184,004
2081	8.02	7.80	14.0%	27,566	21,477	15,013	220,498	43,090	26,806	16,467	5,367	225,865
2086	8.01	8.00	12.0%	32,775	22,312	17,898	261,381	51,309	31,934	19,594	6,391	267,772
2091	7.76	8.00	12.0%	38,967	26,512	20,629	300,811	61,141	38,026	23,378	7,615	308,426
2096	7.72	7.90	14.0%	46,483	36,036	24,404	357,839	72,911	45,252	27,975	9,081	366,920
2097	7.75	7.80	14.0%	48,156	37,300	25,391	372,375	75,549	46,854	29,024	9,410	381,785

[a] The fair market value of the assets in the RR Account and NRRIT as of the close of the fiscal year (September 30) divided by the total benefits and administrative expenses paid from the RR Account and NRRIT during the fiscal year.

[b] The average of the account benefits ratios for the 10 most recent fiscal years ending before the calendar year.

[c] Includes payroll taxes and income taxes on benefits.

[d] Includes investment income and transfers from SSEB Account.

[e] Other income includes financial interchange income, advances from general revenues, and interest income. Other expense includes repayment of advances from general revenues and transfers to the NRRIT or RRA.

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Table 2-II. Progress of the Combined National Railroad Retirement Investment Trust (NRRIT) and Railroad Retirement (RR) Account, and
the Social Security Equivalent Benefit (SSEB) Account under Employment Assumption II
(Dollar amounts in millions)

| Calendar year | Account benefits ratio[a] | Average account benefits ratio[b] | Tier 2 tax rate | Combined NRRIT and RR Account | | | | SSEB Account | | | | Combined balance, end year |
				Benefits and admin- istration	Tax income[c]	Other income[d]	Balance, end year	Benefits and admin- istration	Tax income[c]	Other income and expense[e]	Balance, end year	
2024	4.51	4.80	18.0%	$5,950	$4,137	$1,964	$26,614	$8,751	$3,807	$4,922	$1,091	$27,705
2025	4.48	4.70	18.0%	6,010	4,232	1,852	26,689	8,954	3,926	5,054	1,116	27,805
2026	4.47	4.70	18.0%	6,069	4,426	1,916	26,962	9,140	4,097	5,067	1,140	28,102
2027	4.48	4.60	18.0%	6,125	4,532	1,942	27,310	9,306	4,223	5,103	1,160	28,470
2028	4.50	4.60	18.0%	6,200	4,639	1,970	27,719	9,478	4,350	5,149	1,182	28,901
2029	4.51	4.50	18.0%	6,292	4,745	2,002	28,174	9,648	4,474	5,195	1,203	29,377
2030	4.51	4.50	18.0%	6,391	4,854	2,036	28,672	9,824	4,600	5,245	1,225	29,897
2031	4.52	4.50	18.0%	6,492	4,965	2,044	29,190	10,005	4,729	5,299	1,247	30,437
2032	4.55	4.50	18.0%	6,584	5,080	2,112	29,798	10,197	4,864	5,356	1,271	31,069
2033	4.60	4.50	18.0%	6,660	5,200	2,157	30,495	10,404	5,006	5,423	1,297	31,792
2034	4.65	4.60	18.0%	6,754	5,322	2,210	31,274	10,609	5,152	5,483	1,322	32,596
2035	4.69	4.60	18.0%	6,879	5,450	2,269	32,114	10,809	5,278	5,556	1,347	33,461
2036	4.73	4.60	18.0%	7,010	5,582	2,322	33,008	11,015	5,408	5,633	1,373	34,381
2037	4.77	4.60	18.0%	7,147	5,719	2,394	33,975	11,229	5,542	5,713	1,399	35,374
2038	4.82	4.70	18.0%	7,296	5,861	2,465	35,005	11,442	5,681	5,788	1,426	36,431
2039	4.87	4.70	18.0%	7,443	6,009	2,540	36,111	11,658	5,826	5,859	1,453	37,564
2040	4.93	4.70	18.0%	7,589	6,165	2,620	37,307	11,876	5,978	5,924	1,480	38,787
2041	4.99	4.80	18.0%	7,754	6,328	2,704	38,586	12,099	6,138	5,988	1,507	40,093
2042	5.05	4.80	18.0%	7,942	6,496	2,797	39,937	12,336	6,301	6,064	1,537	41,474
2043	5.09	4.90	18.0%	8,150	6,670	2,891	41,348	12,594	6,470	6,157	1,569	42,917
2044	5.13	4.90	18.0%	8,377	6,851	2,989	42,811	12,874	6,645	6,264	1,604	44,415
2045	5.16	5.00	18.0%	8,623	7,039	3,092	44,319	13,168	6,827	6,377	1,640	45,959
2046	5.20	5.00	18.0%	8,870	7,235	3,197	45,881	13,480	7,017	6,502	1,679	47,560
2047	5.24	5.10	18.0%	9,108	7,444	3,307	47,524	13,818	7,224	6,636	1,721	49,245
2048	5.28	5.10	18.0%	9,356	7,658	3,424	49,250	14,177	7,436	6,786	1,766	51,016
2049	5.33	5.10	18.0%	9,609	7,880	3,547	51,068	14,551	7,657	6,941	1,812	52,880
2050	5.40	5.20	18.0%	9,852	8,112	3,677	53,006	14,939	7,891	7,096	1,861	54,867
2051	5.48	5.20	18.0%	10,067	8,356	3,818	55,113	15,343	8,141	7,252	1,911	57,024
2052	5.60	5.30	18.0%	10,263	8,614	3,971	57,435	15,769	8,410	7,412	1,964	59,399
2053	5.71	5.30	18.0%	10,504	8,881	4,137	59,950	16,221	8,687	7,591	2,020	61,970
2054	5.82	5.40	18.0%	10,778	9,149	4,316	62,638	16,704	8,963	7,801	2,080	64,718
2055	5.95	5.50	18.0%	11,025	9,437	4,511	65,561	17,201	9,262	8,001	2,142	67,703
2056	6.04	5.60	18.0%	11,398	9,737	4,724	68,624	17,667	9,558	8,167	2,200	70,824
2057	6.08	5.60	18.0%	11,853	10,046	4,942	71,759	18,114	9,853	8,317	2,256	74,015
2058	6.20	5.70	18.0%	12,120	10,368	5,155	75,161	18,691	10,190	8,573	2,328	77,489
2059	6.38	5.80	18.0%	12,332	10,700	5,401	78,930	19,310	10,545	8,842	2,405	81,335
2060	6.57	5.90	18.0%	12,611	11,060	5,685	83,064	19,854	10,915	9,007	2,472	85,536
2061	6.71	6.00	18.0%	13,030	11,430	5,982	87,447	20,386	11,281	9,171	2,539	89,986
2062	6.77	6.20	17.0%	13,544	11,226	6,271	91,400	20,910	11,648	9,327	2,604	94,004
2063	6.89	6.30	17.0%	13,888	11,602	6,541	95,655	21,563	12,055	9,590	2,685	98,340
2064	7.06	6.40	17.0%	14,178	11,990	6,846	100,312	22,269	12,483	9,874	2,773	103,085
2065	7.20	6.50	16.0%	14,539	11,749	7,167	104,689	22,912	12,923	10,069	2,853	107,542
2066	7.33	6.60	16.0%	14,934	12,150	7,481	109,386	23,568	13,376	10,274	2,934	112,320
2067	7.45	6.80	16.0%	15,370	12,564	7,817	114,397	24,238	13,841	10,480	3,018	117,415
2068	7.58	6.90	16.0%	15,804	12,993	8,173	119,760	24,941	14,324	10,705	3,105	122,865
2069	7.68	7.00	15.0%	16,248	12,690	8,528	124,730	25,676	14,824	10,943	3,197	127,927
2070	7.78	7.20	15.0%	16,718	13,124	8,883	130,020	26,425	15,341	11,177	3,290	133,310
2071	7.89	7.30	15.0%	17,206	13,573	9,259	135,645	27,205	15,876	11,426	3,387	139,032
2076	8.27	7.90	14.0%	20,013	15,126	11,278	165,326	31,551	18,850	12,817	3,928	169,254
2081	8.14	8.20	12.0%	23,470	15,685	13,039	190,187	36,859	22,397	14,605	4,588	194,775
2086	7.96	8.20	12.0%	27,603	18,613	14,996	218,683	43,364	26,642	16,897	5,397	224,080
2091	7.72	8.00	12.0%	32,633	22,100	17,211	250,759	51,307	31,699	19,823	6,386	257,145
2096	7.80	7.80	14.0%	38,824	30,028	20,595	302,026	60,955	37,709	23,507	7,587	309,613
2097	7.84	7.80	14.0%	40,201	31,080	21,429	314,334	63,134	39,043	24,363	7,858	322,192

[a] The fair market value of the assets in the RR Account and NRRIT as of the close of the fiscal year (September 30) divided by the total benefits and administrative expenses paid from the RR Account and NRRIT during the fiscal year.

[b] The average of the account benefits ratios for the 10 most recent fiscal years ending before the calendar year.

[c] Includes payroll taxes and income taxes on benefits.

[d] Includes investment income and transfers from SSEB Account.

[e] Other income includes financial interchange income, advances from general revenues, and interest income. Other expense includes repayment of advances from general revenues and transfers to the NRRIT or RRA.

Table 2-III. Progress of the Combined National Railroad Retirement Investment Trust (NRRIT) and Railroad Retirement (RR) Account, and
the Social Security Equivalent Benefit (SSEB) Account under Employment Assumption III
(Dollar amounts in millions)

| Calendar year	Average Account benefits ratio[a]	Average account benefits ratio[b]	Tier 2 tax rate	Combined NRRIT and RR Account				SSEB Account				Combined balance, end year
				Benefits and admin- istration	Tax income[c]	Other income[d]	Balance, end year	Benefits and admin- istration	Tax income[c]	Other income and expense[e]	Balance, end year	
2024	4.51	4.80	18.0%	$5,950	$4,117	$1,964	$26,593	$8,751	$3,789	$4,940	$1,091	$27,684
2025	4.46	4.70	18.0%	6,010	4,175	1,848	26,607	8,954	3,875	5,105	1,116	27,723
2026	4.44	4.70	18.0%	6,069	4,332	1,907	26,777	9,140	4,014	5,150	1,140	27,917
2027	4.43	4.60	18.0%	6,125	4,399	1,925	26,976	9,306	4,106	5,221	1,160	28,136
2028	4.42	4.60	18.0%	6,199	4,466	1,940	27,183	9,478	4,196	5,303	1,182	28,365
2029	4.39	4.50	18.0%	6,291	4,529	1,957	27,378	9,648	4,281	5,388	1,203	28,581
2030	4.35	4.50	18.0%	6,389	4,595	1,971	27,556	9,823	4,368	5,477	1,225	28,781
2031	4.31	4.50	18.0%	6,488	4,661	1,955	27,685	10,004	4,455	5,571	1,247	28,932
2032	4.27	4.40	18.0%	6,579	4,730	1,995	27,830	10,194	4,547	5,671	1,271	29,101
2033	4.24	4.40	18.0%	6,654	4,801	2,006	27,984	10,399	4,645	5,780	1,296	29,280
2034	4.21	4.40	18.0%	6,745	4,875	2,020	28,133	10,602	4,744	5,883	1,321	29,454
2035	4.16	4.40	18.0%	6,868	4,952	2,032	28,250	10,797	4,822	5,999	1,346	29,596
2036	4.09	4.40	18.0%	6,996	5,032	2,033	28,319	10,999	4,903	6,121	1,371	29,690
2037	4.02	4.30	18.0%	7,129	5,115	2,046	28,352	11,206	4,987	6,245	1,396	29,748
2038	3.94	4.30	18.0%	7,274	5,202	2,050	28,330	11,411	5,073	6,364	1,422	29,752
2039	3.86	4.20	18.0%	7,415	5,293	2,049	28,257	11,617	5,163	6,480	1,448	29,705
2040	3.77	4.20	18.0%	7,556	5,389	2,045	28,136	11,823	5,258	6,591	1,473	29,609
2041	3.68	4.10	18.0%	7,713	5,491	2,035	27,949	12,032	5,358	6,700	1,499	29,448
2042	3.56	4.10	18.0%	7,893	5,595	2,023	27,675	12,254	5,460	6,822	1,527	29,202
2043	3.43	4.00	18.0%	8,092	5,707	2,002	27,292	12,495	5,567	6,957	1,557	28,849
2044	3.32	3.90	19.0%	8,308	6,110	1,983	27,077	12,753	5,684	7,101	1,589	28,666
2045	3.19	3.80	19.0%	8,541	6,246	1,967	26,749	13,021	5,808	7,247	1,622	28,371
2046	3.06	3.70	19.0%	8,773	6,389	1,943	26,308	13,306	5,940	7,401	1,657	27,965
2047	2.93	3.60	19.0%	8,994	6,547	1,912	25,773	13,611	6,087	7,562	1,695	27,468
2048	2.79	3.50	19.0%	9,222	6,707	1,874	25,132	13,933	6,237	7,736	1,735	26,867
2049	2.67	3.40	20.0%	9,452	7,190	1,842	24,712	14,264	6,396	7,910	1,777	26,489
2050	2.56	3.30	20.0%	9,671	7,375	1,816	24,233	14,603	6,564	8,081	1,819	26,052
2051	2.46	3.20	20.0%	9,858	7,572	1,786	23,733	14,954	6,749	8,249	1,862	25,595
2052	2.37	3.00	20.0%	10,022	7,785	1,756	23,252	15,321	6,951	8,416	1,908	25,160
2053	2.36	2.90	23.0%	10,229	9,060	1,765	23,848	15,708	7,158	8,598	1,956	25,804
2054	2.37	2.80	23.0%	10,468	9,309	1,810	24,500	16,117	7,364	8,804	2,007	26,507
2055	2.40	2.70	23.0%	10,671	9,582	1,864	25,275	16,529	7,589	8,991	2,058	27,333
2056	2.41	2.60	23.0%	10,991	9,863	1,928	26,074	16,898	7,809	9,135	2,104	28,178
2057	2.40	2.60	23.0%	11,364	10,150	1,989	26,849	17,245	8,028	9,260	2,147	28,996
2058	2.44	2.50	23.0%	11,511	10,459	2,039	27,836	17,716	8,291	9,484	2,206	30,042
2059	2.52	2.50	23.0%	11,608	10,780	2,121	29,129	18,206	8,569	9,697	2,267	31,396
2060	2.62	2.50	23.0%	11,780	11,132	2,237	30,719	18,596	8,859	9,785	2,315	33,034
2061	2.70	2.50	23.0%	12,085	11,490	2,358	32,482	18,965	9,139	9,872	2,361	34,843
2062	2.78	2.50	23.0%	12,459	11,856	2,488	34,368	19,322	9,420	9,946	2,405	36,773
2063	2.90	2.50	23.0%	12,629	12,241	2,619	36,599	19,803	9,740	10,122	2,465	39,064
2064	3.07	2.60	23.0%	12,752	12,641	2,789	39,277	20,312	10,078	10,297	2,528	41,805
2065	3.26	2.70	23.0%	12,951	13,065	3,002	42,394	20,735	10,424	10,363	2,581	44,975
2066	3.47	2.80	23.0%	13,179	13,503	3,233	45,951	21,163	10,778	10,438	2,634	48,585
2067	3.70	2.90	23.0%	13,441	13,955	3,495	49,959	21,595	11,141	10,507	2,687	52,646
2068	3.85	3.00	20.0%	13,695	12,709	3,723	52,697	22,052	11,519	10,590	2,744	55,441
2069	4.00	3.10	20.0%	13,951	13,131	3,925	55,802	22,529	11,909	10,679	2,803	58,605
2070	4.16	3.30	20.0%	14,233	13,570	4,154	59,294	23,009	12,311	10,758	2,863	62,157
2071	4.34	3.40	20.0%	14,529	14,024	4,408	63,197	23,514	12,728	10,849	2,926	66,123
2076	5.10	4.30	18.0%	16,337	15,054	5,768	83,274	26,377	15,041	11,414	3,281	86,555
2081	5.93	5.10	18.0%	18,836	17,809	7,660	111,918	30,080	17,804	12,378	3,741	115,659
2086	6.94	5.90	18.0%	22,035	21,117	10,396	153,267	34,878	21,130	13,879	4,337	157,604
2091	7.71	6.80	16.0%	26,024	22,552	13,619	200,595	40,977	25,119	16,024	5,095	205,690
2096	8.10	7.60	14.0%	30,912	23,798	17,010	249,740	48,528	29,881	18,852	6,034	255,774
2097	8.15	7.70	14.0%	31,985	24,631	17,709	260,096	50,245	30,940	19,519	6,247	266,343

[a] The fair market value of the assets in the RR Account and NRRIT as of the close of the fiscal year (September 30) divided by the total benefits and administrative expenses paid from the RR Account and NRRIT during the fiscal year.

[b] The average of the account benefits ratios for the 10 most recent fiscal years ending before the calendar year.

[c] Includes payroll taxes and income taxes on benefits.

[d] Includes investment income and transfers from SSEB Account.

[e] Other income includes financial interchange income, advances from general revenues, and interest income. Other expense includes repayment of advances from general revenues and transfers to the NRRIT or RRA.

Figure 2. Account Benefits Ratio 1995-2097, Historical and Projected

Employment Assumption I

Employment Assumption II

Employment Assumption III
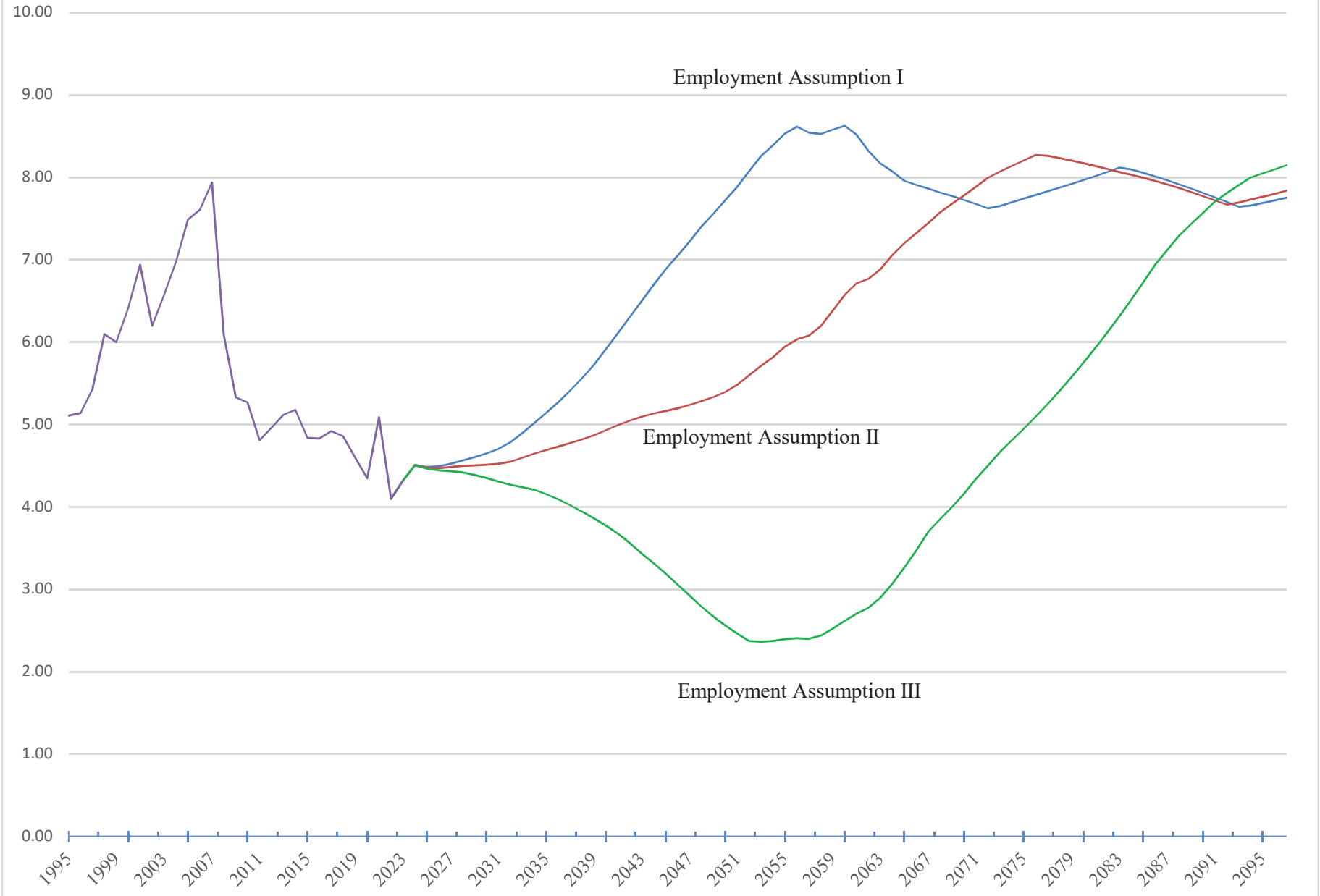
Table 3. Present value of benefits in millions of dollars. This table shows, for each employment assumption, the present value of tier 2 benefits, supplemental annuity benefits and the portion of tier 1 benefits which exceeds the social security level of benefits. The portion of tier 1 benefits in excess of the social security level is referred to as "tier 1 liability". The most important components of this liability were described in Section III. Supplemental annuity benefits are included with tier 2 benefits in this table. The present values are shown separately by type of beneficiary (employee, spouse, survivor) and by employee status on the valuation date (retired, retired and deceased, active, inactive, future entrants).

Present values were calculated by discounting benefit amounts in each projection year to December 31, 2022, using a constant 7.0% interest rate, which is equal to the ultimate investment return assumption. The total present values using a 6.5% interest rate are compared below:

Present Value of Total Benefits	Employment Assumption		
(in $millions)	I	II	III
Using a 7.0% interest rate (Tables 3 and 6)	$116,330	$113,443	$110,237
Using a 6.5% interest rate	$128,682	$124,979	$120,875
Percent change moving from 6.5% to 7.0%	(9.6%)	(9.2%)	(8.8%)

Table 4. Present value of benefits as a percentage of the present value of tier 2 payroll. The format for this table is the same as for Table 3. Each number in Table 4 was obtained by dividing the corresponding number in Table 3 by the appropriate present value of one percent of tier 2 payroll. The payroll figures are shown in Table 6.

Table 3. Present value[a] of benefits in millions of dollars

	Employment assumption I			Employment assumption II			Employment assumption III		
	Tier 2[b]	Tier 1 liability[c]	Total	Tier 2[b]	Tier 1 liability[c]	Total	Tier 2[b]	Tier 1 liability[c]	Total
Employee annuities									
Retired	$ 24,950	$ 9,124	$ 34,073	$ 24,950	$ 9,124	$ 34,073	$ 24,950	$ 9,124	$ 34,073
Active	22,576	9,791	32,367	22,576	9,791	32,367	22,576	9,791	32,367
Inactive	1,396	247	1,643	1,396	247	1,643	1,396	247	1,643
Future entrants	9,608	3,408	13,016	8,007	2,840	10,848	6,232	2,209	8,441
Total	58,530	22,569	81,099	56,929	22,002	78,931	55,154	21,370	76,524
Spouse annuities									
Retired	7,317	3,007	10,324	7,317	3,007	10,324	7,317	3,007	10,324
Active	5,752	3,455	9,207	5,752	3,455	9,207	5,752	3,455	9,207
Inactive	302	59	361	302	59	361	302	59	361
Future entrants	2,203	1,055	3,257	1,836	879	2,715	1,428	683	2,111
Total	15,575	7,575	23,150	15,208	7,399	22,607	14,799	7,203	22,003
Survivor annuities									
Retired & deceased	7,140	913	8,054	7,140	913	8,054	7,140	913	8,054
Active	2,516	312	2,828	2,516	312	2,828	2,516	312	2,828
Inactive	86	38	124	86	38	124	86	38	124
Future entrants	880	173	1,053	734	144	878	570	112	682
Total	10,623	1,436	12,059	10,476	1,407	11,884	10,312	1,375	11,688
All annuities combined									
Retired & deceased	39,407	13,044	52,451	39,407	13,044	52,451	39,407	13,044	52,451
Active	30,844	13,558	44,402	30,844	13,558	44,402	30,844	13,558	44,402
Inactive	1,784	344	2,128	1,784	344	2,128	1,784	344	2,128
Future entrants	12,691	4,635	17,326	10,577	3,863	14,440	8,230	3,004	11,234
Total annuities	$ 84,727	$ 31,581	$ 116,308	$ 82,613	$ 30,809	$ 113,421	$ 80,266	$ 29,949	$ 110,215
Lump sum payments			22			22			22
Total benefits			$ 116,330			$ 113,443			$ 110,237

Note: Detail may not add to totals due to rounding.

[a] Present values are determined using a 7.0% interest rate for all years.

[b] Includes supplemental annuity benefits.

[c] Tier 1 benefits in excess of social security level.

Table 4. Present value[a] of benefits as a percentage of the present value[a] of tier 2 payroll

| | Employment assumption I | | | Employment assumption II | | | Employment assumption III | | |
| | Tier 1 | | | Tier 1 | | | Tier 1 | | |
	Tier 2[b]	liability[c]	Total	Tier 2[b]	liability[c]	Total	Tier 2[b]	liability[c]	Total
Employee annuities									
Retired	4.83%	1.77%	6.60%	5.38%	1.97%	7.35%	6.14%	2.25%	8.39%
Active	4.37	1.90	6.27	4.87	2.11	6.98	5.56	2.41	7.97
Inactive	0.27	0.05	0.32	0.30	0.05	0.35	0.34	0.06	0.40
Future entrants	1.86	0.66	2.52	1.73	0.61	2.34	1.53	0.54	2.08
Total	11.34	4.37	15.71	12.28	4.74	17.02	13.58	5.26	18.84
Spouse annuities									
Retired	1.42	0.58	2.00	1.58	0.65	2.23	1.80	0.74	2.54
Active	1.11	0.67	1.78	1.24	0.75	1.99	1.42	0.85	2.27
Inactive	0.06	0.01	0.07	0.07	0.01	0.08	0.07	0.01	0.09
Future entrants	0.43	0.20	0.63	0.40	0.19	0.59	0.35	0.17	0.52
Total	3.02	1.47	4.48	3.28	1.60	4.88	3.64	1.77	5.42
Survivor annuities									
Retired & deceased	1.38	0.18	1.56	1.54	0.20	1.74	1.76	0.22	1.98
Active	0.49	0.06	0.55	0.54	0.07	0.61	0.62	0.08	0.70
Inactive	0.02	0.01	0.02	0.02	0.01	0.03	0.02	0.01	0.03
Future entrants	0.17	0.03	0.20	0.16	0.03	0.19	0.14	0.03	0.17
Total	2.06	0.28	2.34	2.26	0.30	2.56	2.54	0.34	2.88
All annuities combined									
Retired & deceased	7.63	2.53	10.16	8.50	2.81	11.31	9.70	3.21	12.91
Active	5.97	2.63	8.60	6.65	2.92	9.58	7.59	3.34	10.93
Inactive	0.35	0.07	0.41	0.38	0.07	0.46	0.44	0.08	0.52
Future entrants	2.46	0.90	3.36	2.28	0.83	3.11	2.03	0.74	2.77
Total annuities	16.41%	6.12%	22.53%	17.82%	6.64%	24.46%	19.76%	7.37%	27.13%
Lump sum payments			0.00			0.00			0.01
Total benefits			22.53%			24.46%			27.13%

Note: Detail may not add to totals due to rounding.

[a] Present values are determined using a 7.0% interest rate for all years.

[b] Includes supplemental annuity benefits.

[c] Tier 1 benefits in excess of social security level.

Table 5. Balance of the Combined National Railroad Retirement Investment Trust
and Railroad Retirement Account, and the Social Security
Equivalent Benefit Account as of December 31, 2022

This table derives the balance in the accounts as of December 31, 2022. No accrual adjustments
are made either for general funds reimbursements or financial interchange amounts due and
unpaid on that date or for benefits due on January 2, 2023, because these amounts are included
in the projected future cash flows. It may also include outstanding loans to the Railroad
Unemployment Insurance Account in future periods.

(Dollar amounts in millions)	Combined NRRIT and RR Account	SSEB Account
Securities:		
Market value of NRRIT investments	$ 23,937	$ -
Par value specials[a] (including accrued interest)	502	1,472
Cash accounts	41	30
Balance	24,480	1,502
Adjustment for present value calculation[b]	1,540	-
Adjusted balance for use in present value calculation	$ 26,020	$ 1,502

[a] Par value specials are securities issued by the Treasury directly to the RR and SSEB Accounts,
maturing on the first business day of the month following the month of issue. Their yield rate
each month is the average yield rate, computed as of the last day of the previous month, of
marketable Treasury notes with maturity dates not less than three years away.

[b] This adjustment accounts for the difference between the actual assets on December 31, 2023,
used in Tables 2-I, 2-II and 2-III, and the assets that would have been projected starting with
the December 31, 2022 assets using a 7.0% rate. With this adjustment, the present value of the
ultimate combined account values in Tables 2 discounted at a 7.0% rate will equal the surplus
or deficiency shown in Table 6.

Table 6. Actuarial surplus or (deficiency) for National Railroad Retirement Investment Trust and Railroad Retirement Account. The top half of Table 6 expresses the asset and liability components of the actuarial balance as present values in dollars. The bottom half expresses these components as a percentage of tier 2 payroll. The actuarial surplus or (deficiency) was calculated for the NRRIT and RR Account, but not for the SSEB Account, for the following reason.

The SSEB Account pays the social security level of benefits and administrative expenses allocable to those benefits, and it receives as income the social security level of taxes. If there were no other source of income or outgo during the course of a year, a surplus or deficiency would build up, depending on whether taxes exceeded or were less than benefits. However, the SSEB Account also receives or pays any financial interchange transfers. The financial interchange transfer, subject to qualifications described in the next paragraph, should be enough to offset any surplus or deficiency for the year. Furthermore, this would be the case even if the social security level of benefits or taxes are raised or lowered. The SSEB Account can thus be regarded as automatically fully funded, the financial interchange being the mechanism for correcting any surplus or deficiency.

The qualification mentioned above arises because, in a relatively small number of cases, the railroad retirement system does not pay benefits when social security would pay benefits. In these cases, mainly dependent children of retired railroad employees, the SSEB Account collects an amount through the financial interchange but does not pay a corresponding benefit. This imbalance between outgo and income is transferred from time to time to the RR Account. The value of these transfers, or amounts available for transfer, is included as an asset in Table 6 as "Available from SSEB Account."

Revenue derived from taxing NRRIT and RR Account benefits (tier 2 and the excess of tier 1 over the social security level) is transferred to the RR Account. The present value of these transfers is shown as an asset in Table 6 as "Income taxes on benefits."

Although the actual return of the trust funds during calendar year 2023 was approximately 12.8%, this rate is not used in the present value calculations. Instead, the present value calculations use 7.0% as the rate for 2023, as well as for the remaining 74 years of the projection. The adjusted balance as of December 31, 2022, is calculated so that, assuming a 7.0% rate of return for 2023, the combined RRA, NRRIT, and SSEBA balance projected on December 31, 2023, is equal to the actual balance on that date.

The cost of the system to the railroad industry may be considered as the excess of "Retirement taxes" over "Actuarial surplus or (deficiency)." Table 6 shows that the cost of the system is more stable when expressed in dollars than when expressed as a percentage of payroll. For example, the cost of the system under employment assumption III (pessimistic – lower employment) is $74,705 million, or 18.39 percent of payroll, whereas the cost under employment assumption I (optimistic – higher employment) is $81,070 million, or 15.71 percent of payroll. Higher employment results in higher future benefit payments but a larger tier 2 payroll and therefore lower tax rates needed to support these benefits. Using employment assumption III as the base, the percentage cost variation in dollars between the two valuations is 8.5 percent. As a percentage of payroll, the percentage cost variation is -14.6 percent.

Table 6. Actuarial surplus or (deficiency) for National Railroad Retirement Investment Trust and Railroad Retirement Account

	Employment assumption		
	I	II	III
	Present values in millions of dollars		
Adjusted funds on hand, 12/31/2022	$ 26,020	$ 26,020	$ 26,020
Retirement taxes	83,458	80,140	76,370
Income taxes on benefits	11,105	10,823	10,510
Available from SSEB Account	2,508	2,492	2,473
Total, present and prospective assets	123,091	119,475	115,373
Benefit payments	116,330	113,443	110,237
Administrative expenses	4,373	4,016	3,471
Total liabilities	120,703	117,459	113,708
Actuarial surplus or (deficiency)	2,388	2,016	1,665
One percent of tier 2 payroll	$ 5,162	$ 4,637	$ 4,063
	Present values as a percentage of tier 2 payroll		
Adjusted funds on hand, 12/31/2022	5.04%	5.61%	6.40%
Retirement taxes	16.17	17.28	18.80
Income taxes on benefits	2.15	2.33	2.59
Available from SSEB Account	0.49	0.54	0.61
Total, present and prospective assets	23.84	25.77	28.40
Benefit payments	22.53	24.46	27.13
Administrative expenses	0.85	0.87	0.85
Total liabilities	23.38	25.33	27.99
Actuarial surplus or (deficiency)	0.46	0.43	0.41
Retirement taxes	16.17%	17.28%	18.80%
Actuarial surplus or (deficiency)	0.46	0.43	0.41
Cost of the system	15.71	16.85	18.39

Table 7. Vested dual benefit amounts and average number of beneficiaries. This table shows a projection of vested dual benefit payments for every fiscal year from 2025 through 2036. After 2034, the amounts become insignificant. The amounts shown assume that the benefits are fully funded. Fiscal years are shown because vested dual benefit appropriations are made on a fiscal year basis. The table also indicates the average number of vested dual beneficiaries in each fiscal year. The table applies to all the employment assumptions discussed in this report.

The 1981 amendments removed much of the uncertainty from projections of future vested dual benefit payments. The volatility caused by inflation is gone, since future awards take into account cost-of-living increases from 1975 through 1981, rather than through the date of retirement. Also, awards of these benefits to spouses and widow(er)s ceased after August 13, 1981. The primary uncertainty which remains in projecting future vested dual benefit payments is predicting future mortality for this very old and relatively small group.

The projections of vested dual benefit payments by the Railroad Retirement Board are the basis for the agency's requests for appropriated amounts. Generally, a margin of about 2 percent is added to projected amounts to determine the appropriated amounts requested. This margin is needed because of the uncertainties in making projections and to ensure that adequate funds are available for the full payment of vested dual benefits. Appropriated amounts remaining in a fiscal year after all benefit payments have been made are returned to the Treasury.

Table 8. Supplemental annuity benefit amounts and average number of beneficiaries. This table shows a projection of supplemental annuity benefits for every calendar year from 2024 through 2059. Since service before October 1, 1981, is required for a supplemental annuity, benefit amounts after 2056 are relatively insignificant.

Table 9. Average number of railroad retirement annuitants and number of annuitants per full time employee. The left half of Table 9 shows the average number of annuitants under each employment assumption, and the right half shows the average number per full time employee. Under employment assumption I, the average number of annuitants per full time employee declines in the first half of the projection period and then remains relatively stable. Under employment assumption II, the average number of annuitants per full time employee declines until 2053, remains relatively stable until 2055, and then continues to decline. Under employment assumption III, the average number of annuitants per full time employee is relatively stable until 2058, then declines to the end of the projection period.

Figure 3 shows historical and projected annuitants per full time employee under the three employment assumptions.

Table 10. Transfers to railroad retirement system under financial interchange with social security system, 1937-2024.

Table 7. Vested dual benefit amounts and average number of beneficiaries

Fiscal year	Vested dual benefit amounts[a] (Millions)	Average number of beneficiaries
2025	6.0	3,000
2026	5.0	2,000
2027	4.0	2,000
2028	3.0	1,000
2029	2.5	1,000
2030	2.0	1,000
2031	1.5	1,000
2032	1.0	< 1,000
2033	1.0	< 1,000
2034	1.0	< 1,000
2035	0.5	< 1,000
2036	0.5	< 1,000

[a] When projected amounts are used to determine the appropriation needed for benefit payments, a margin must be added to ensure payment of full benefits.

Table 8. Supplemental annuity benefit amounts and average number of beneficiaries

Calendar year	Supplemental benefit amounts (Millions)	Average number of beneficiaries[a]
2024	$49	97,000
2025	46	92,000
2026	44	87,000
2027	42	83,000
2028	39	78,000
2029	37	73,000
2030	34	68,000
2031	32	64,000
2032	30	59,000
2033	28	55,000
2034	25	50,000
2035	23	46,000
2036	21	42,000
2037	19	38,000
2038	17	34,000
2039	15	30,000
2040	14	27,000
2041	12	24,000
2042	10	21,000
2043	9	18,000
2044	8	15,000
2045	6	13,000
2046	5	11,000
2047	4	9,000
2048	4	7,000
2049	3	6,000
2050	2	5,000
2051	2	4,000
2052	1	3,000
2053	1	2,000
2054	1	2,000
2055	1	1,000
2056	< 1	< 1,000
2057	< 1	< 1,000
2058	< 1	< 1,000
2059	< 1	< 1,000

[a] Average number in a year. Excludes cases where the supplemental annuity is totally eliminated because of a private pension. On January 1, 2023, there were about 27,000 of these cases.

Table 9. Average number of railroad retirement annuitants[a] and number of annuitants per full time employee

Calendar year	Average number of annuitants under each employment assumption			Average number of annuitants per full time employee		
	I	II	III	I	II	III
2024	467,800	467,800	467,800	2.34	2.36	2.39
2025	460,200	460,200	460,200	2.30	2.35	2.40
2026	452,600	452,600	452,600	2.27	2.33	2.41
2027	445,100	445,100	445,100	2.24	2.32	2.42
2028	438,100	438,100	438,100	2.20	2.30	2.43
2029	431,400	431,400	431,400	2.17	2.29	2.44
2030	424,800	424,800	424,700	2.14	2.27	2.45
2031	418,200	418,200	418,100	2.11	2.26	2.46
2032	411,700	411,600	411,500	2.08	2.24	2.46
2033	405,300	405,200	405,100	2.05	2.22	2.47
2034	399,200	399,000	398,700	2.02	2.21	2.47
2035	393,300	393,000	392,700	1.99	2.19	2.47
2036	387,700	387,300	386,800	1.97	2.17	2.48
2037	382,300	381,700	381,100	1.94	2.16	2.48
2038	377,100	376,300	375,500	1.92	2.14	2.48
2039	371,900	371,000	369,900	1.89	2.13	2.48
2040	366,700	365,600	364,300	1.87	2.11	2.47
2041	361,900	360,600	359,000	1.85	2.09	2.47
2042	357,700	356,000	354,200	1.83	2.08	2.47
2043	354,100	352,200	349,900	1.81	2.07	2.47
2044	351,100	348,900	346,200	1.80	2.06	2.47
2045	348,500	345,900	342,900	1.78	2.05	2.47
2046	346,200	343,200	339,700	1.77	2.04	2.47
2047	344,100	340,700	336,600	1.76	2.04	2.47
2048	342,500	338,500	333,900	1.76	2.03	2.46
2049	341,000	336,600	331,300	1.75	2.03	2.46
2050	339,700	334,600	328,700	1.74	2.02	2.46
2051	338,200	332,500	325,800	1.74	2.02	2.45
2052	336,600	330,300	322,900	1.73	2.01	2.44
2053	335,700	328,600	320,400	1.73	2.00	2.44
2054	335,100	327,300	318,200	1.72	2.00	2.43
2055	334,400	325,700	315,600	1.72	2.00	2.42
2056	334,100	324,400	313,200	1.72	1.99	2.41
2057	334,200	323,400	310,800	1.72	1.99	2.40
2058	334,000	321,800	307,800	1.72	1.98	2.39
2059	333,600	320,000	304,300	1.72	1.97	2.36
2060	332,800	317,800	300,400	1.71	1.96	2.34
2065	332,000	308,600	281,900	1.71	1.91	2.20
2070	330,800	298,600	262,200	1.70	1.85	2.05
2075	329,900	289,900	245,200	1.70	1.79	1.91
2080	329,800	283,700	233,000	1.70	1.75	1.82
2085	330,400	280,000	225,800	1.70	1.73	1.76
2090	331,600	278,500	222,500	1.71	1.72	1.74
2095	333,100	278,500	221,600	1.72	1.72	1.73
2096	333,400	278,600	221,600	1.72	1.72	1.73
2097	333,800	278,800	221,700	1.72	1.72	1.73

[a] Excludes partition payments to spouses and divorced spouses where the employee is deceased or not otherwise entitled to an annuity. On December 31, 2022, there were about 2,700 of these cases.

Figure 3. Average Number of Annuitants Per Full Time Employee 2006-2097, Historical and Projected
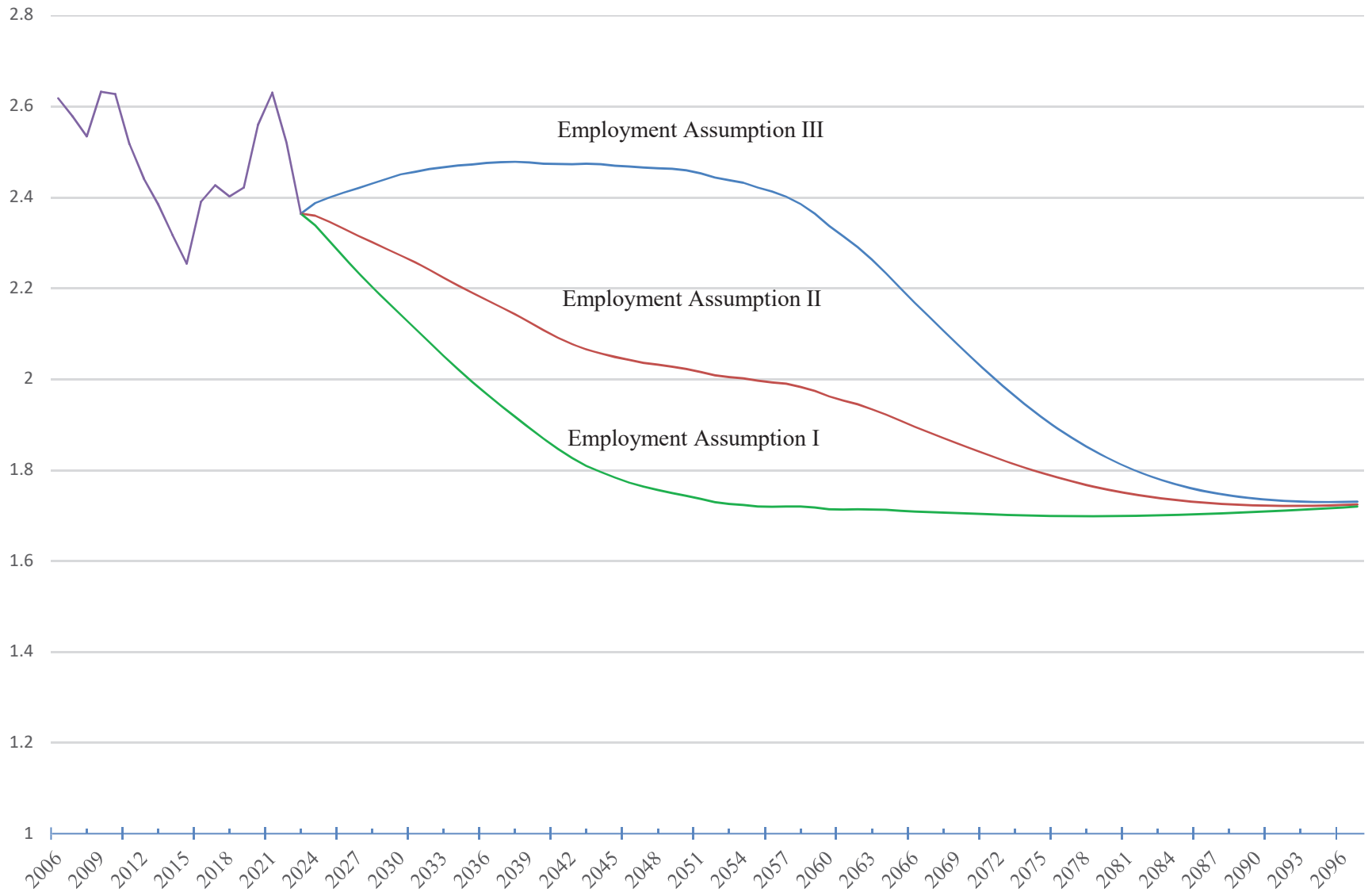
Table 10. Transfers to railroad retirement system under financial interchange with social security system, 1937-2024[a]
(Millions of dollars)

Determination number	Fiscal years covered	Benefit credits to railroad retirement[b]	Tax credits to social security	Cash transfers to[c] railroad retirement	
				Amount	Year of transfer
1-35	1937-86 d	51,467.0 e	22,223.0	32,110.6 d	1953-87 d
36	1987	3,864.4	1,305.0	2,851.3	1988
37	1988	4,028.8	1,427.3	2,933.5	1989
38	1989	4,149.5	1,418.9	3,049.1	1990
39	1990	4,415.3	1,451.1	3,456.7	1991
40	1991	4,434.7	1,476.5	3,206.4	1992
41	1992	4,720.1	1,523.1	3,435.4	1993
42	1993	4,796.5	1,583.3	3,525.5	1994
43	1994	5,199.6	1,515.5	4,120.1	1995
44	1995	4,836.2 e	1,545.1	3,556.3	1996
45	1996	5,008.0	1,566.8	3,747.2	1997
46	1997	5,114.1	1,615.4	3,819.1	1998
47	1998	5,173.5	1,641.9	3,816.0	1999
48	1999	5,195.6	1,767.5	3,697.6	2000
49	2000	4,767.8 e	1,750.9	3,282.8	2001
50	2001	5,180.5	1,756.9	3,646.8	2002
51	2002	5,217.5	1,748.2	3,747.3	2003
52	2003	5,350.6	1,731.1	3,843.5	2004
53	2004	5,480.8	1,820.0	3,917.3	2005
54	2005	5,527.6	1,906.1	3,846.3	2006
55	2006	5,746.8	1,976.5	4,019.8	2007
56	2007	5,853.6	2,076.6	4,049.9	2008
57	2008	6,005.5	2,095.6	4,137.3	2009
58	2009	6,212.0	2,035.4	4,391.6	2010
59	2010	6,431.5	2,074.1	4,574.3	2011
60	2011	6,524.1	2,143.3	4,651.0	2012
61	2012	6,714.8 e	2,442.5	4,499.0	2013
62	2013	6,939.1	2,433.4	4,700.8	2014
63	2014	7,053.1	2,575.3	4,676.6	2015
64	2015	7,226.7	2,747.6	4,662.7	2016
65	2016	7,013.8 e	2,654.3	4,522.5	2017
66	2017	7,318.7	2,562.9	4,942.4	2018
67	2018	7,461.7	2,714.6	4,946.4	2019
68	2019	7,487.8	2,643.6	4,987.7	2020
69	2020	7,270.3 e	2,515.4	4,899.6	2021
70	2021	7,700.1	2,390.8	5,471.3	2022
71	2022	8,105.5	2,623.6	5,636.2	2023
72	2023	8,698.2	2,963.6	5,933.5	2024
Total	1937-2023	269,691.4	96,442.7	185,311.2	

[a] Financial interchange transactions with the Hospital Insurance Trust Fund are not included. These involve mainly a transfer of collected taxes to the Centers for Medicare & Medicaid Services, with some adjustments for difference in earnings bases under the two systems.

[b] Amounts include allowances for administrative expenses and adjustments to previous determinations.

[c] Transfers include interest which is not shown in table.

[d] First determination covered period January 1937-June 1952. Initial balance of $488.2 million was never transferred to social security; only interest was paid until debt was liquidated by subsequent offsets in favor of railroad retirement.

[e] Includes adjustment for pre-1957 military service.

A P P E N D I X

Outline of the benefit and financing provisions
of the railroad retirement system as amended through December 31, 2023

EMPLOYEE BENEFITS

1. Normal age annuity

Requirement of 10 years of service or 5 years of service after 1995 for retirement at social security retirement age (see definition at end of outline). Employees with less than 10 years of service must meet Social Security Act eligibility requirements to receive a tier 1 benefit.

2. Other-than-normal age annuity

   A. Eligible for unreduced benefit upon later of (1) attainment of age 60 and (2) completion of 30 years of service (60/30 eligibility).

   B. Eligible for reduced benefit with less than 30 years of service upon later of (1) attainment of age 62 and (2) completion of 10 years of service or 5 years of service after 1995. The benefit is reduced by 1/180 for each of the first 36 months and by 1/240 for each additional month the employee is under social security retirement age. (Reduction for age in excess of 36 months applies only to tier 1 benefit if employee had any service before 8-12-1983.)

   C. Eligible for a deferred retirement credit (DRC) for each month a benefit is not paid from social security retirement age up until age 70. The DRC is only available for the tier 1 benefit.

3. Total and permanent disability annuity

10-year service requirement or 5 years of service after 1995. Benefit may not begin earlier than the later of (1) the first day of the sixth month following date disability begins and (2) the first day of the twelfth month before the month in which the application is filed. Employees with less than 10 years of service and at least 5 years of service after 1995 who meet Social Security eligibility requirements may qualify for a tier 1 benefit only. (An age reduced tier 2 benefit would be payable at age 62.)

4. Occupational disability annuity

Requirement of 20 years of service or attainment of age 60 with 10 years of service; current connection (see definition at end of outline) required. Benefit may not begin earlier than the later of (1) the first day of the sixth month following date disability begins and (2) the first day of the twelfth month before the month in which the application is filed.

5. Supplemental annuity

Requirement of attainment of age 60 with 30 years of service if retired on or after 7-1-1974, or age 65 with 25 years of service. Must have service before 10-1-1981. Current connection required.

6. Vested dual benefit

   A. Requirement of fully insured (see definition at end of outline) status under Social Security Act effective 12-31-1974 and either (1) 25 years of railroad service before 1975 or (2) 10 years of railroad service before 1975, with some railroad work in 1974 or a current connection on 12-31-1974 or at the time the annuity begins, or

   B. Requirement of fully insured status under Social Security Act as of last year of railroad work before 1975 and 10 years of railroad service before 1975.

7.   Work restrictions

Suspension of annuity for any month annuitant is employed by a railroad. For disabilities in 2024, loss of one month's annuity for each $1,210 in excess of $14,520 earned in a year with the last $605 of such excess treated as $1,210. (No annuity is lost for any month with earnings below $1,210.) In addition, the tier 1 portion of a regular annuity based on railroad earnings (see definition at end of outline) after 1974 and all social security earnings (see definition at end of outline) is subject to social security work restrictions, unless a social security benefit is also being paid. If annuitant is employed by last non-railroad employer preceding retirement, the tier 2 portion and the supplemental annuity are reduced by one dollar for each two dollars of earnings, subject to a maximum reduction of 50 percent. All vested dual benefits are subject to social security work restrictions.

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8.   Creditable service (continuity not required)

All service after December 31, 1936. Service before 1937 may be used if annuitant had employment relation on August 29, 1935 or 6 months of service after August 29, 1935 and before 1946. No limit on service except 30-year maximum if pre-1937 service used. Additional service months may be deemed, for years after 1984, where employee does not work in every month of year, but railroad earnings exceed monthly prorations of annual tier 2 maximum earnings creditable.

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9.   Creditable and taxable railroad earnings

From 1966 through 1978, the maximum monthly earnings were one-twelfth of the annual social security maximum. The 1977 social security amendments introduced a difference between the maximum monthly earnings creditable for tier 1 and tier 2 benefits starting in 1979.

			Tier 1	Tier 2
before July 1, 1954	$ 300			
July 1, 1954 - May 31, 1959	350	1979	$1,908.33	$1,575
June 1, 1959 – Oct. 31, 1963	400	1980	2,158.33	1,700
Nov 1, 1963 – Dec. 31, 1965	450	1981	2,475	1,850
1966-67	550	1982	2,700	2,025
1968-71	650	1983	2,975	2,225
1972	750	1984	3,150	2,350
1973	900			
1974	1,100			
1975	1,175			
1976	1,275			
1977	1,375			
1978	1,475			

Starting in 1985, earnings are credited on an annual rather than a monthly basis. The annual maximums are:

	Tier 1	Tier 2		Tier 1	Tier 2
1985	$39,600	$29,700	2005	$90,000	$66,900
1986	42,000	31,500	2006	94,200	69,900
1987	43,800	32,700	2007	97,500	72,600
1988	45,000	33,600	2008	102,000	75,900
1989	48,000	35,700	2009	106,800	79,200
1990	51,300	38,100	2010	106.800	79.200
1991	53,400	39,600	2011	106,800	79,200
1992	55,500	41,400	2012	110,100	81,900
1993	57,600	42,900	2013	113,700	84,300
1994	60,600	45,000	2014	117,000	87,000
1995	61,200	45,300	2015	118,500	88,200
1996	62,700	46,500	2016	118,500	88,200
1997	65,400	48,600	2017	127,200	94,500
1998	68,400	50,700	2018	128,400	95,400
1999	72,600	53,700	2019	132,900	98,700
2000	76,200	56,700	2020	137,700	102,300
2001	80,400	59,700	2021	142,800	106,200
2002	84,900	63,000	2022	147,000	109,200
2003	87,000	64,500	2023	160,200	118.800
2004	87,900	65,100	2024	168.600	125,100

10. Creditable military service and earnings

Military service is creditable in war and national emergency periods, and in some cases between June 15, 1948 and December 15, 1950, if preceded by railroad service in the year of entry into military service or the preceding year.

Earnings: $160 before 1968
$260 after 1967 but before 1975
For each calendar year after 1974, earnings are the same as that credited under social security.

11. Basic monthly annuity computation

Tier 1: Social security benefit based on combined railroad and social security earnings, less social security benefit actually paid (based on social security earnings only). See item 2 for computation of tier 1 benefit for employees with 60/30 eligibility.

Tier 2: 0.7% of the average monthly compensation (AMC) multiplied by the number of years of service. This amount is then reduced by 25% of the employee's gross vested dual benefit. The AMC is the average of an individual's highest 60 months of railroad earnings up to the tier 2 maximum. For each month of service in a year for which the Railroad Retirement Board's records do not show earnings on a monthly basis, the total earnings for the year divided by the months of service in that year will be considered the monthly earnings for each month of service in the year.

12. Vested dual benefit computation

A. For employees satisfying requirements in item 6.A., benefit is social security benefit based on railroad earnings through 1974, plus social security benefit based on social security earnings through 1974, less social security benefit based on combined railroad and social security earnings through 1974.

B. For employees satisfying requirements of item 6.B., benefit is the same as in A., except for the exclusion of all earnings after last pre-1975 year employee had railroad employment.

In both cases, benefit might be proportionally reduced so that the total amount paid out in vested dual benefits in any fiscal year does not exceed the total amount appropriated for that year. (See item 39.)

13. Supplemental annuity computation

For employees first entitled or potentially entitled after 1974, the monthly benefit is a minimum of $23 increased by $4 for each year of service over 25, with a maximum benefit of $43. Supplemental annuity will be reduced if employee receives a private pension from railroad employer based on employer contributions.

14. Tax rebate lump sum

Employee who has at least 10 years of railroad service and is not eligible for the vested dual benefit will receive a lump sum at retirement computed by summing for each year from 1951 through 1974 the product of the social security tax rate for the year times the excess of the employee's combined railroad and social security earnings for the year over (approximately) the maximum creditable for the year under the 1937 Act. Survivors of employee may receive refund if employee dies before receiving it.

15. Separation/severance lump sum

Lump sum, equal to tier 2 payroll taxes deducted from separation or severance payments, will be paid at retirement to employees with at least 10 years of service or 5 years of service after 1995 to the extent that separation or severance payments did not yield additional tier 2 service credits.

16. Cost-of-living increases (annually, effective with January 1 payments)

Tier 1: Same as social security increases.

Tier 2: 32.5% of social security increases.

Vested dual benefits: Frozen at the 1974 level, except that social security cost-of-living increases effective between 12-31-1974 and the earlier of January 1, 1982 and the annuity beginning date are included in the benefit computation.

Supplemental annuity: None.

SPOUSE BENEFITS

17. Eligibility

    A. Unreduced annuity:

        1. Spouse retiring at age 60 if the employee retired with an unreduced annuity, has 30 or more years of service, and is age 60 or over.

        2. Spouse retiring at social security normal retirement age or any age with a child in care, if (a) employee is age 62 or over, or (b) employee has 30 or more years of service and is age 60 or over.

    B. Reduced annuity:

        1. Spouse retiring at age 60 if employee attained 60/30 eligibility after 6-30-1984 and retired with a reduced age annuity before 1-1-2002 before attaining age 62.

        2. Spouse retiring at age 62, if employee has less than 30 years of service, is retired, and has attained age 62. Age reduction is 1/144 for each of the first 36 months spouse is under social security retirement age and 1/240 for each month in excess of 36 that spouse is under retirement age. (Reduction for age in excess of 36 months applies to tier 1, but not tier 2, if employee had any service before 8-12-1983.)

18. Work restrictions

Same as employee; in addition, spouse is not paid for any month employee annuity is not payable by virtue of work restrictions, and spouse is reduced $1 for each $2 of employee's earnings for last non-railroad employer preceding employee's retirement. (See item 7.)

19. Annuity computation

Tier 1: One-half of social security benefit based on employee's combined railroad and social security earnings. See item 17 for computation of spouse tier 1 in cases where employee is receiving a reduced 60/30 benefit. If spouse is entitled to a social security benefit, tier 1 is reduced by the amount of the benefit, but not below 0. If spouse is entitled to employee annuity or a public service pension, certain additional restrictions apply.

Tier 2: 45% of employee's tier 2 benefit. Spouse receives additional benefit if spouse is also an employee annuitant and either the employee or spouse has railroad service prior to 1975.

20. Vested dual benefit

A spouse receiving a vested dual benefit on August 13, 1981 will continue to receive a benefit (adjusted as described in item 12). No vested dual benefits will be awarded after that date.

21. Divorced spouse, partitioned spouse and partitioned divorced spouse

A divorced spouse is entitled to a tier 1 benefit if the employee is retired, the employee and divorced spouse have been married for at least 10 consecutive years and have both attained age 62, and the divorced spouse is unmarried. If the employee is not retired, but has sufficient railroad service to otherwise be eligible for an annuity, the divorced spouse can receive a tier 1 benefit if the above conditions are met and the parties have been divorced for a period of not less than 2 years, and the employee is fully insured under the Social Security Act using combined railroad and social security earnings.

If the employee is retired, a court ordered partition of tier 2, supplemental annuity, vested dual benefit or minimum guarantee amounts (see item 42) is payable with the employee's monthly annuity reduced by the amount of the partition payment. If the employee is not retired, a court ordered partition of tier 2 or vested dual benefit payments is payable if (1) the employee has 10 years of service or 5 years of service after 1995, and (2) both the employee and spouse or former spouse have attained age 62.

22. Cost-of-living increases for spouses

Each tier is subject to same percentage increase as corresponding tier of employee benefit.

SURVIVOR AND DEATH BENEFITS

23. Employee requirement for survivor benefits

All benefits except residual lump sum require deceased employee to have 10 years of railroad service or 5 years of service after 1995 and a current connection. If employee does not meet above conditions, his or her earnings record is transferred to social security, which pays any survivor benefits.

24. Aged widow's and widower's eligibility

A widow or widower must be age 60 and unremarried. Those age 60-61 are deemed age 62 in computing the benefit. The age reduction for each month of age under social security retirement age is 28.5% divided by the number of months from age 60 to social security retirement age.

25. Disabled widow's and widower's eligibility

A widow or widower must be at least age 50 and under age 60, unremarried, and totally and permanently disabled if disability occurs within 7 years of employee's death or within 7 years after widowed mother's or father's status terminated. Age reduction is 28.5%. Benefit may not begin earlier than the later of (1) the first day of the sixth month following the date disability begins and (2) the first day of the twelfth month before the month in which the application is filed.

26. Widowed mother's and father's eligibility

Unremarried surviving spouse of a deceased employee who is under social security retirement age and who at the time of filing an application has in his or her care a minor or disabled child of the deceased employee.

27. Divorced widow(er)'s, remarried widow(er)'s eligibility, partitioned surviving spouse, and partitioned surviving divorced spouse

The following are eligible for a tier 1 benefit.

   A. Divorced widow(er) - must (1) have been married to employee at least 10 years, be unmarried or remarried after age 60 (after age 50 and disability onset if disabled), and have attained age 60 or age 50 if disabled, or (2) be unmarried at any age with a child of the employee in care.

   B. Remarried widow(er) - must have remarried after age 60 (after age 50 and disability onset if disabled), or the remarriage must have ended. Widow(er) must have attained age 60, be between 50 and 59 and disabled or be any age with a child in care.

Benefits for divorced aged widow(er)s and remarried aged widow(er)s are reduced for the full number of months under social security retirement age.

Where court ordered partition of tier 2, supplemental annuity, and vested dual benefit payments are in effect at the time of the employee's death, such payments will continue after the employee's death unless the court order requires termination upon the employee's death. Where the employee dies before partition payments are initiated, and the employee acquired 120 months of railroad service, or 60 months of service after 1995, such payments may be made when both the surviving spouse/divorced spouse and the employee, if he or she had survived, would be 62.

28. Child's eligibility

A child of a deceased employee must be under 18 or under 19 and a full-time elementary or secondary school student. Unmarried children continuously disabled since before age 22 are also eligible, regardless of age.

29. Parent's eligibility

A parent of a deceased employee who has attained age 60 and received at least one-half of his or her support from the employee will be eligible for an annuity. If the employee died leaving a widow, widower, or child who is or might become eligible in the future, the parent will be eligible for a tier 1 benefit only. In certain instances, a remarried parent of a deceased employee will be eligible for a tier 1 benefit.

30. Work restrictions

Annuity not payable for any month in which survivor engages in railroad employment. Entire benefit subject to social security work restrictions.

31. Annuity computation

Tier 1: Amount payable to survivor under Social Security Act, based on the deceased employee's combined railroad and social security earnings after 12-31-1936, less the amount of any social security benefit received. Additional restrictions exist for a widow or widower who also receives an annuity as a railroad employee or who receives a public service pension.

Tier 2: Widow or widower - 50% of employee tier 2 benefit
Parent - 35% of employee tier 2 benefit
Children - 15% of employee tier 2 benefit for each child
The total family tier 2 benefit has a minimum of 35% and a maximum of 80% of the employee's tier 2 benefit. (A maximum of 130% is used for the purpose of calculating the widow(er) initial minimum amount.)

For a widow or widower an "initial minimum amount" based on the two-tier annuity amount that would have been payable to the railroad employee at the time the widow(er)'s annuity is awarded is computed with a widow(er)'s tier 2 amount equal to 100 percent of the employee's tier 2 amount. Widow(er)s' annuities computed on the basis of the initial minimum amount are not adjusted for annual cost-of-living increases until the total annuity amount is exceeded by the annuity amount the widow(er) would have been paid under prior law (tier 2 amount equal to 50 percent of the employee's tier 2 amount), with all interim cost-of-living increases otherwise payable.

For an aged widow or widower, the total benefit exclusive of any vested dual benefit may not be less than amount received as spouse in month before employee's death.

All percentages are before deductions for work or entitlement to social security benefit or railroad retirement employee annuity.

32. Vested dual benefit for widow or widower

A widow or widower receiving a vested dual benefit on August 13, 1981, will continue to receive a benefit (adjusted as described in item 12). No vested dual benefits will be awarded after that date.

33. Insurance lump sum

Payable if employee leaves no survivor eligible for monthly benefits in the month of his or her death.

 A. If employee had 10 years of service before 1-1-1975, the benefit is 10 times the basic amount. The basic amount is 52.4% of the first $75 of average monthly remuneration (AMR), plus 12.8% of the remainder, increased by 1% for each year before 1975 with earnings of $200 or more. The AMR is based on combined railroad and social security earnings before 1975 and after 1936.

 B. If employee had less than 10 years of service as of 12-31-1974, the amount will be the amount social security would have paid (currently $255). This amount will only be paid to a widow or widower living with the employee at the time of the employee's death.

34. Residual lump sum death benefit

Payable when it appears no further benefits will derive from deceased employee except possibly to a widow, widower or parent at a future date. In this case, survivor must waive the right to all future benefits based on the deceased employee's railroad service. The amount payable is the sum of 4% of taxable railroad earnings from 1-1-1937 to 12-31-1946, 7% from 1-1-1947 to 12-31-1958, 7-1/2% from 1-1-1959 to 12-31-1961, 8% from 1-1-1962 to 12-31-1965, 8.1% from 1-1-1966 to 12-31-1966, 8.65% from 1-1-1967 to 12-31-1967, 8.8% from 1-1-1968 to 12-31-1968, 9.45% from 1-1-1969 to 12-31-1970, 9.85% from 1-1-1971 to 12-31-1972, 10.1% from 1-1-1973 to 9-30-1973, 5.35% from 10-1-1973 to 12-31-1973, and 5.45% from 1-1-1974 to 12-31-1974. Railroad earnings after 1974 are not taken into account. The amount actually paid is reduced by the amount of benefits paid deriving from the deceased employee.

35. Cost-of-living increases for survivors

Each tier is subject to same percentage increase as corresponding tier of employee benefit.

FINANCING, INVESTMENTS AND TAXATION OF BENEFITS

36. Employee and employer payroll taxes

Employees and employers contribute at the prevailing social security rate up to the tier 1 earnings limit. There is no limit to earnings subject to the hospital insurance portion of the tier 1 tax rate. Beginning in 2013, employees pay an additional 0.9 percent on earnings above $200,000 (for those who file an individual return) or $250,000 (for those who file a joint return).

In addition, employees and employers pay a tier 2 tax up to the tier 2 earnings limit. Tier 2 taxes on both employers and employees are based on the ratio of certain asset balances to the sum of benefits and administrative expenses (the average account benefits ratio). At the end of each fiscal year (September 30), an Account Benefits Ratio (ABR) is calculated by dividing the fair market value of the assets in the RR Account and the NRRIT (and for years before 2002, the SSEB Account) as of the close of such fiscal year by the total benefits and administrative expenses paid from the RR Account and the NRRIT during such fiscal year. The Average Account Benefits Ratio (AABR), with respect to any calendar year, is then calculated as the average of the account benefits ratios for the 10 most recent fiscal years ending before such calendar year. If the AABR is not a multiple of 0.1, it is increased to the next highest multiple of 0.1. The tier 2 tax rate is determined from a tax rate table based on the AABR.

AABR		Tier 2 tax rate	
At least	But less than	Employer	Employee
	2.5	22.1	4.9
2.5	3.0	18.1	4.9
3.0	3.5	15.1	4.9
3.5	4.0	14.1	4.9
4.0	6.1	13.1	4.9
6.1	6.5	12.6	4.4
6.5	7.0	12.1	3.9
7.0	7.5	11.6	3.4
7.5	8.0	11.1	2.9
8.0	8.5	10.1	1.9
8.5	9.0	9.1	0.9
9.0		8.2	0.0

Contributions to 401(k) deferred compensation plans and the value of employer-paid premiums for group term life insurance coverage in excess of $50,000 are included in railroad earnings for payroll tax purposes. Stock options, however, are not included in railroad earnings for payroll tax purposes.

37. Financial interchange

Railroad retirement system pays to social security system the taxes social security would have collected and receives the additional amount of benefits and administrative expenses social security would have paid if railroad employment had been covered under social security. The net difference (including interest) is transferred in the June after the fiscal year for which the transfer is made. The system also transfers to the Hospital Insurance Trust Fund the payroll taxes net of income taxes and administrative expenses that the Centers for Medicare & Medicaid Services would have otherwise collected.

The Railroad Retirement Board estimates the amount and direction of the financial interchange transfer that would be made for each month if transfers were on a current monthly basis. If this estimate favors the railroad retirement system, Treasury advances the amount with interest to the Railroad Retirement Account, as a loan from the general fund, by the middle of the succeeding month. Within 10 days after receipt of the annual financial interchange for a fiscal year, the RRB must repay the amount, with interest, advanced during the fiscal year.

38. Investments

Amounts in the Railroad Retirement Account and in the Social Security Equivalent Benefit Account are invested in special issue Treasury obligations with a minimum return of 3 percent. Amounts in the two accounts not needed to pay current benefits and administrative expenses are invested by the National Railroad Retirement Investment Trust, whose Board of seven trustees is empowered to invest Trust assets in non-governmental assets, such as equities and debt, as well as in governmental securities. The Trust transfers funds back to the Railroad Retirement Account as needed for the payment of benefits.

39. Financing of vested dual benefits

General revenue appropriations finance all vested dual benefit payments since September 1981. Beginning October 1, 1981, each annual appropriation is placed in the Dual Benefits Payments Account. Total benefits paid in any fiscal year (starting with 1982) may not exceed the total available in the account. The account may borrow at the end of a fiscal year the amount that the Railroad Retirement Board estimates will be necessary to pay vested dual benefits for the first month of the next fiscal year.

40. Taxability of benefits

The portion of tier 1 benefits equivalent to social security benefits is taxed under the same rules as are social security benefits. Tier 1 benefits in excess of social security equivalent benefits, tier 2 benefits, vested dual benefits, and supplemental annuities are taxed under the rules by which private pensions are taxed.

Revenues from taxes on social security equivalent benefits are transferred to the social security system through the financial interchange. Revenues from taxes on tier 1 benefits in excess of social security equivalent benefits and tier 2 benefits are transferred to the Railroad Retirement Account. Revenues from taxes on vested dual benefits are transferred to the Dual Benefits Payments Account.

MISCELLANEOUS PROVISIONS

41. Benefit preservation

Each year the Railroad Retirement Board must report to the President and Congress the results of a five-year projection of anticipated revenues to and payments from the Railroad Retirement Account. If the results show that the funds in the account will be insufficient to pay full benefits at any time during the five-year period, the report must indicate (1) the first fiscal year in which benefits would have to be reduced because of insufficient funds in the absence of any changes, and (2) the amount of adjustments necessary to preserve financial solvency. Within 180 days after publication of this report, representatives of railroad labor and management are obligated to submit proposals designed to preserve the fund's solvency. The Railroad Retirement Board will publish regulations necessary to provide a constant level of benefits at the maximum level possible and to insure that no individual receives less than what he or she would have had all his earnings been covered under social security. The Railroad Retirement Board's regulations will take effect beginning with the first year in which benefit reductions will be necessary and continue until legislative action supersedes them.

42. Minimum annuity

The overall minimum guaranty for employees and dependents is 100% of the amount, or the additional amount, the family would receive under the Social Security Act if the employee's railroad earnings after 1936 were credited as social security earnings.

43. Automatic benefit eligibility adjustments

A liberalization of entitlement provisions enacted for title II of the Social Security Act will be applied to provide entitlement to a tier 1 benefit under the Railroad Retirement Act.

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44. Transfer of credits

Transfer of railroad retirement credits is made to social security if an employee had less than 10 years of railroad service and less than 5 years of service after 1995 or, in the case of a survivor, if the employee lacked a current connection. In other words, all earnings and credits will be used in calculating your Social Security benefit.

For other employees eligible for a railroad retirement annuity, railroad retirement earnings and credits will not be used by Social Security. If such an employee chooses to commence a Social Security annuity, then this monthly amount will be offset from the Tier 1 annuity.

DEFINITIONS

The meanings of terms used in the outline are defined below:

Railroad earnings - earnings derived from covered railroad employment, up to the maximums specified in item 9.

Social security earnings - earnings derived from employment covered under the Social Security Act (excludes railroad earnings), up to the maximums allowed.

Current connection - generally defined as having at least 12 months of railroad service in the 30 months preceding death or retirement. An employee whose last 12 months of railroad service occurred prior to the 30 months before retirement or death may maintain a current connection if the employee did not perform any regular employment between the end of the 30 month period containing the last 12 months of railroad service and the month of retirement or death. For purposes of the supplemental annuity or survivors' benefits, an employee who was terminated involuntarily and without fault on or after October 1, 1975, after 25 years of service and did not thereafter decline an offer of employment in the same class or craft in the railroad industry is deemed to have a current connection.

Fully insured - insured for retirement at age 62 under social security; does not necessarily imply an insured status for disability benefits or for survivor benefits for death before age 62.

Social security benefit - when used in describing the computation of the vested dual benefit, the term "social security benefit" means a primary insurance amount computed by using the social security formula in effect in 1974 and the specified earnings; it does not imply an actual benefit.

Social security retirement age - the age at which an individual may receive an unreduced benefit at retirement under the Social Security Act, as follows:

Year of attainment of early retirement age (62 for employees and spouses, 60 for widows and widowers)	Retirement age (age for unreduced benefit)
1999 or earlier	65 years, 0 months
2000	65 years, 2 months
2001	65 years, 4 months
2002	65 years, 6 months
2003	65 years, 8 months
2004	65 years, 10 months
2005-2016	66 years, 0 months
2017	66 years, 2 months
2018	66 years, 4 months
2019	66 years, 6 months
2020	66 years, 8 months
2021	66 years, 10 months
2022 or later	67 years, 0 months

TECHNICAL SUPPLEMENT
GENERAL METHODOLOGY AND ASSUMPTIONS

1. Approach. The 29th valuation presents results under three different employment assumptions. The same set of earnings inflation, price inflation, and investment return assumptions was used with each of the three employment assumptions. This set of assumptions is discussed in Section V and listed in Table 1 of the valuation report.

   A projection of the progress of the railroad retirement fund through 2097 is shown under each of the three employment assumptions. All the projections are based on an open group (that is, they include future entrants). The calculations were arranged so that closed-group valuations, limited to former and present employees, could be obtained as a by-product. A balance sheet deriving actuarial surplus or deficiency is also shown.

2. Basic data. All data concerning current beneficiaries were derived from "universe" files (files including all beneficiaries as of December 31, 2022) extracted from agency databases. These files included information needed to make projections for current beneficiaries. Information needed to derive exposures, deaths, terminations, remarriages, and family composition for conducting the experience studies of beneficiaries was obtained from similar universe files created at an earlier date.

   Active and inactive census data for valuation and data needed to study the immediate age retirement, immediate disability retirement, (including disability freeze rates), withdrawal, service months, and mortality of active employees were also compiled from universe files extracted from agency databases.

   The extracted data is reviewed for reasonableness and completeness, which includes comparability with prior year's data and a review of test cases. Duplicate records are eliminated. Nonvested inactive employees and inactive employees over age 72 are eliminated. Missing dates of birth and dates of death are searched against Social Security data.

   The census data for valuation are grouped as follows:

   - Active employees and inactive employees are grouped by age and years of service.
   - Beneficiaries are grouped by type of beneficiary (nondisabled employees, spouses, etc.) and by age.

3. Employees. For the projections of employees in active service and new entrants, a service month table was prepared to reflect the average number of months worked per year based on years of service.

   Five sets of withdrawal rates were used with the differentiation made by attained age. Four sets of rates for disability retirement and two sets of rates for age retirement were used, with the differentiation made by completed years of service. A separate mortality table was constructed for employees in active service and new entrants.

Vested inactive employees and employees withdrawing in the future with a deferred vested benefit use similar demographic assumptions as active employees with several exceptions noted in the following section.

4. Actuarial assumptions.

Mortality after age retirement. Mortality studies for nondisability retirements covering the period 2015-2021 showed that mortality had improved in 2018-2019 and 2019-2020 but had become much worse in 2020-2021, most likely due to COVID-19. Rather than developing a new mortality table based on three recent years of experience, as in the past, the new table was developed based on six policy years of experience, with the last period 2020-2021 weighted 50% to lessen the impact of excess deaths from COVID-19 and reduce volatility. The overall ratio of actual to expected deaths based on the 2016 Base Year RRB Annuitants Mortality Table was 101.3%, while the overall ratio of actual to expected deaths based on the 2021 RRB Annuitants Mortality Table was 100.9%. The 2021 RRB Annuitants Mortality Table is intended to be projected using the 2021 RRB Mortality Improvement Scale.

Mortality after disability retirement. The overall ratio of actual to expected deaths after disability retirement with disability freeze based on the 2016 Base Year RRB Disabled Mortality Table for Annuitants with Disability Freeze was 102.8%. The overall ratio of actual to expected deaths after disability retirement without disability freeze based on the 2016 Base Year RRB Disabled Mortality Table for Annuitants without Disability Freeze was 100.4%. Consistent with the mortality experience for age annuitants, the increased mortality for disabled annuitants was presumed to be influenced by the pandemic. It has been the practice to update these tables every three years. Similar to the Annuitants Mortality Table, the new tables, the 2021 RRB Disabled Mortality Table for Annuitants with Disability Freeze and the 2021 RRB Disabled Mortality Table for Annuitants without Disability Freeze, were based on experience between the anniversaries of retirement in 2015 and 2021, with a 50% weight applied to the period 2020-2021. The tables are intended to be projected using the 2021 RRB Mortality Improvement Scale.

Mortality of employees in active service. The study of active service mortality for calendar years 2016-2020 showed an overall ratio of actual to expected deaths of 98.1% based on the 28th valuation standard with 2020 weighted 50%. With 2020 weighted 100%, the overall ratio of actual to expected deaths was 100.6%. Active mortality, based on recent experience, has improved, but at a slower pace than in the past. The full 2020 experience shows a slight aberration to this trend and was weighted 50% to reduce its impact. A new table, the 2018 Active Service Mortality Table, was constructed to reflect current experience. Because of the relatively low rates of active service mortality, the relatively small impact on the valuation results, and the volatility of the improvement in active service mortality, we continue to provide no margin for active service mortality improvement and do not use the mortality improvement scale in conjunction with these rates.

Inactive employee mortality. Pre-retirement mortality reflected the Active Service Mortality Table set forward five (5) years but then switched to the Annuitant Mortality Table at age 60. This pre-retirement mortality was projected with the Mortality Improvement Scale.

Total termination for spouses. Total termination rates are used in projecting future tier 1 and tier 2 benefits for spouses receiving these benefits on the valuation date. Spouse benefits terminate at either the spouse's or the employee's death. A spouse receiving benefits at the time of the employee's death would begin to receive survivor benefits if the employee maintained a current connection.

The overall ratio of actual terminations to those expected on the basis of the 2016 Base Year RRB Spouse Total Termination Table was 101.0%. There have been more spouse terminations in the study period between 2015-2021 except for the age groups 70-74 and 75-79. There has generally not been mortality improvement from the prior study. Consistent with prior practice and so that the assumed termination rates will have a better fit, a new table, the 2021 RRB Spouse Total Termination Table, was constructed. The table is intended to be projected using the 2021 RRB Mortality Improvement Scale.

Probability of a retired employee having an eligible spouse. Projected tier 1 and tier 2 benefits for spouses of active employees and future entrants were determined by applying factors to the projected employee tier 1 and tier 2 benefits, respectively. These factors, shown in Table S-6, reflect the age-by-age probability that an employee annuitant has a spouse receiving benefits. Although the overall ratio of the actual number of spouses on December 31, 2021, to the expected number based on the 28th valuation standard was 98.0% and 99.6%, for employees with fewer than 30 years of service and 30 or more years of service, respectively, it has been past practice to update this table for each new valuation.

Mortality of widow annuitants. The ratio of actual to expected deaths for widow annuitants was 108.0%, based on the 28th valuation standard, the 2013 RRB Mortality Table for Widows. On the basis of the most recent six years of experience, 2015-2021, a new table, the 2021 RRB Mortality Table for Widows, was constructed. The ratio of actual to expected deaths based on the new table is 106.7%. The 2021 Mortality Table was graduated with a 6% margin to provide for future mortality improvement. Mortality rates for widows have not shown large improvements over time. A one-year rateback in age is used to provide for longer-term mortality improvement for widows coming from future employee deaths.

Remarriage of widows. The overall ratio of actual to expected remarriages on the basis of the 28th valuation standard, the 1997 RRB Remarriage Table, was 67.7%. An updated table, the 2021 RRB Remarriage Table, was developed based on the most recent experience, 2006-2021, and produced an actual to expected ratio of 100%.

Total termination for disabled children. The overall ratio of actual terminations to those expected on the basis of the 28th valuation standard, the 2004 RRB Total Termination Table for Disabled Children, was 126.1%. Based on the recent experience from policy years 2015-2021, with a weight of 50% used for the last 2020-2021 policy year of experience, a new 2021 RRB Total Termination Table for Disabled Children was developed to provide a better fit.

Mortality Improvement. For the 29th valuation, the RRB historical mortality and spouse termination experience was updated through 2020, as shown in Table S-29. Other sources, such as the mortality experience of the U. S. population through 2019 and the mortality assumptions in the 2022 OASDI Trustees' Report, were also reviewed. Based on results of this review, showing decreasing mortality improvement, the 2021 RRB Mortality Improvement Scale shown in Table S-10 was developed as the 29th valuation standard.

Age retirement. A normal age annuity is payable at social security normal retirement age (SSNRA) with 10 years of total service or 5 years of service after 1995. For employees with 30 or more years of service, an unreduced benefit is payable to those who retire after the attainment of age 60. Benefits are reduced for employees who retire from age 62 to SSNRA with 5-29 years of service. A supplemental annuity is payable to employees with service before October, 1981, who have attained age 60 with 30 or more years of service, or attained age 65 with 25 or more years of service.

A comparison between the rates of age retirements assumed in the 28[h] valuation and the crude rates during calendar years 2019-2021 is shown in Table S-30. For employees with 5-29 years of service, there have been more retirements than expected, except at ages 62, 67, and 72. The assumed 29th valuation rates produce a better fit. For employees with 30 or more years of service, the assumed 29th valuation rates are higher than the previous rates, except at ages 62, 72, and 73, and produce a better fit.

Inactive employees use the same rates except for reflecting actual experience at first eligibility age and being set to 1.0 at age 70+.

Disability retirement. An employee is eligible for disability retirement based on total and permanent disability at any age with at least 10 years of service or 5 years of service after 1995. Eligibility for occupational disability requires (i) permanent disability for an employee's regular railroad occupation, (ii) attainment of age 60 with 10 years of service or any age with 20 years of service, and (iii) a current connection.

For employees with 10-19 years of service, the ratio of actual disability retirements during 2015-2020 to those expected based on the 28th valuation standard was 109.5%. The ratio of actual to expected disability retirements for employees with 20-24 years of service was 105.7%, and for employees with 25-29 years of service it was 88.1%. For employees with 30 or more years of service the ratio of actual to expected disability retirements was 101.2%. The overall ratio of actual to expected disability retirements for all employees was 103.1%. Because of the volatility of experience, the new table of rates of disability retirement was constructed based on the combined 2015-2020 experience, with the 2020 experience weighted 50%, consistent with other analysis for the 29th valuation. In prior valuations, the same rates were used for employees under age 60 in both the 25-29 years of service group and the 30 or more years of service group. For the 29th valuation study period, the crude rates of disability retirement for the two groups continued to diverge, and separate rates were graduated for a better fit.

Disability retirements are not projected for participants with 5-9 years of service because the benefits are limited to what social security would pay and are reimbursed through the financial

interchange. These employees become eligible for tier 2 benefits at age 62 and are treated as vested withdrawals in our projections.

The ratio of actual to expected disability retirements qualifying for a disability freeze based on the 28th valuation standard was 100.7%, 103.9% 104.7%, and 99.2% for employees with 10-19 years of service, 20-24 years of service, 25-29 years of service, and 30 or more years of service, respectively. The 2020 experience during the COVID pandemic is not materially different than expected and has been reflected in the new rates. A new table of percentages eligible for a disability freeze was constructed for the 29th valuation. These rates are shown in Table S-12.

Expected disability retirement rates for 10-19 years of service were assumed for inactive employees with an adjustment to remove occupational disabilities from the decrement at age 60 forward.

Withdrawal from the railroad industry. The withdrawal experience during 2019-2021 was much higher than in prior periods, and calendar years 2013-2018 were used as the study period for withdrawals. Based on the wide variation in withdrawal experience and considering that the last two study periods included several unique events likely driving much of the volatility, the 29th valuation withdrawal rates were set by loading the 28th valuation withdrawal rates by 25% to partially recognize recent experience and potential changes to the employment relationship. The overall ratio of actual final withdrawals (withdrawals net of re-entrants) to those expected on the basis of the 29th valuation standard was 118.7%.

Unisex rates. The valuation projections use unisex, combined male and female rates for the demographic assumptions. Although males typically have higher rates of mortality than females, the assumptions are simplified by combining the experience because the covered employees are predominately male and assumed to remain at a similar proportion in the future. The valuation results are not adversely affected by this approach.

Other assumptions. Assumptions involving (1) service months and salary scales, (2) family composition, and (3) the age distribution of new entrants are shown in Tables S-14, S-15, and S-44, respectively.

Investment and administrative expenses. For investment and administrative expenses, best estimates are used in the initial projection years. Thereafter, investment expenses are assumed to equal 0.3% (30 basis points) of the prior year end combined NRRIT and RR Account fund balance. Administrative expenses are assumed to increase at the same rate as the wage increase assumption shown in Table 1 of the valuation report, subject to the following limits. Administrative expenses for the RR Account are limited to 2% of benefits paid from the RR Account and NRRIT. Administrative expenses for the SSEB Account are limited to 0.7% of benefits paid from the SSEB Account.

A complete list of the assumptions and the tables that present them follows.

List of assumptions and tables used in the 29th valuation

Item	Assumption or table
A. Mortality and total termination rates	
1. After age retirement	Table S-1 with Table S-10
2. After disability retirement	
(a) with Disability Freeze	Table S-2 with Table S-10
(b) without Disability Freeze	Table S-3 with Table S-10
3. Employees	
(a) in active service	Table S-4
(b) deferred inactive	Table S-4 and Table S-1 with Table S-10
4. Spouses	Table S-5 with Table S-10
5. Nondisabled widows	
(a) Widows of deceased employees	Table S-7
(b) Widows coming from future employee deaths	Table S-7 with a 1-year rateback in age
6. Disabled widows	Table S-2 with Table S-10
7. Children under age 18	Disregarded
8. Disabled children age 18 and over	Table S-9
9. Mortality improvement	Table S-10
B. Remarriage rates for widows	Table S-8
C. Retirement rates	
1. Age retirement	Table S-11
2. Disability (with "disability freeze" percentages)	Table S-12
D. Withdrawal rates	Table S-13
E. Other assumptions	
1. Probability of a retired employee having an eligible spouse	Table S-6
2. Economic assumptions	Table 1 of valuation report
3. Service months and salary scales	Table S-14
4. Family composition	Table S-15
5. Age distribution of future entrants	Table S-44

Table S-1. 2021[a] RRB Annuitants Mortality Table

Age[b]	$1,000q_x$		Age[b]	$1,000q_x$
60	5.66		95	271.95
61	6.37		96	296.04
62	7.17		97	317.40
63	8.07		98	336.43
64	9.08		99	353.46
65	10.20		100	368.80
66	11.47		101	382.71
67	12.89		102	395.45
68	14.48		103	407.25
69	16.26		104	418.29
70	18.25		105	428.79
71	20.49		106	438.91
72	22.98		107	448.92
73	25.77		108	458.75
74	28.89		109	468.41
75	32.37		110	1,000.00
76	36.26			
77	40.60			
78	45.43			
79	50.81			
80	56.80			
81	63.45			
82	70.84			
83	79.04			
84	88.12			
85	98.16			
86	109.26			
87	121.51			
88	134.99			
89	149.81			
90	166.05			
91	183.83			
92	203.22			
93	224.33			
94	247.21			

[a] For use with 2021 RRB Mortality Improvement Scale.

[b] Age nearest birthday.

Table S-2. 2021[a] RRB Disabled Mortality Table for Annuitants with Disability Freeze[b]

Age[c]	$1{,}000q_x$	Age[c]	$1{,}000q_x$	Age[c]	$1{,}000q_x$
30	14.88	65	28.71	100	379.11
31	15.31	66	30.04	101	393.67
32	15.73	67	31.58	102	406.99
33	16.15	68	33.36	103	419.27
34	16.56	69	35.43	104	430.70
35	16.97	70	37.83	105	441.44
36	17.36	71	40.61	106	451.66
37	17.74	72	43.82	107	461.83
38	18.12	73	47.55	108	471.81
39	18.48	74	51.86	109	481.61
40	18.82	75	56.84	110	1,000.00
41	19.16	76	62.29		
42	19.47	77	68.24		
43	19.77	78	74.73		
44	20.06	79	81.82		
45	20.32	80	89.54		
46	20.57	81	97.95		
47	20.79	82	107.11		
48	21.00	83	117.06		
49	21.18	84	127.87		
50	21.35	85	139.60		
51	21.49	86	152.31		
52	21.65	87	166.05		
53	21.84	88	180.91		
54	22.06	89	196.92		
55	22.32	90	214.16		
56	22.62	91	231.91		
57	22.96	92	249.49		
58	23.37	93	266.84		
59	23.83	94	283.94		
60	24.37	95	300.73		
61	25.00	96	317.19		
62	25.73	97	333.28		
63	26.58	98	348.98		
64	27.57	99	364.26		

[a] For use with 2021 RRB Mortality Improvement Scale.

[b] Qualified under social security definition of disability.

[c] Age nearest birthday.

Table S-3. 2021[a] RRB Disabled Mortality Table for Annuitants without Disability Freeze [b]

Age[c]	$1{,}000q_x$	Age[c]	$1{,}000q_x$	Age[c]	$1{,}000q_x$
40	4.56	70	28.54	100	373.39
41	4.75	71	31.16	101	387.80
42	4.98	72	34.08	102	401.00
43	5.15	73	37.32	103	413.17
44	5.39	74	40.93	104	424.50
45	5.64	75	44.93	105	435.15
46	5.90	76	49.37	106	445.29
47	6.18	77	54.30	107	455.38
48	6.50	78	59.77	108	465.29
49	6.86	79	65.82	109	475.02
50	8.06	80	72.53	110	1,000.00
51	8.37	81	79.95		
52	8.71	82	88.16		
53	9.08	83	97.23		
54	9.50	84	107.23		
55	9.97	85	118.25		
56	10.50	86	130.37		
57	11.08	87	143.70		
58	11.73	88	158.32		
59	12.45	89	174.32		
60	13.26	90	191.81		
61	14.16	91	210.37		
62	15.16	92	229.49		
63	16.27	93	248.87		
64	17.51	94	268.27		
65	18.90	95	287.45		
66	20.44	96	306.19		
67	22.15	97	324.32		
68	24.05	98	341.66		
69	26.18	99	358.06		

[a] For use with 2021 RRB Mortality Improvement Scale.

[b] Not qualified under social security definition of disability.

[c] Age nearest birthday.

Table S-4. 2018 RRB Active Service Mortality Table[a]

Age[b]	$1{,}000q_{x-1/2}$	Age[b]	$1{,}000q_{x-1/2}$
		45	1.36
		46	1.42
17	.94	47	1.48
18	.94	48	1.55
19	.94	49	1.64
20	.94	50	1.73
21	.94	51	1.83
22	.94	52	1.94
23	.94	53	2.07
24	.94	54	2.22
25	.94	55	2.38
26	.94	56	2.55
27	.94	57	2.75
28	.94	58	2.98
29	.94	59	3.23
30	.95	60	3.51
31	.96	61	3.82
32	.98	62	4.17
33	.99	63	4.56
34	1.01	64	4.99
35	1.02	65	5.48
36	1.04	66	6.03
37	1.06	67	6.64
38	1.09	68	7.32
39	1.11	69	8.08
40	1.14	70	8.93
41	1.18	71	9.88
42	1.22	72	10.94
43	1.26	73	12.13
44	1.30	74	13.46
		75	14.95

[a] Deaths in active service are those of employees who last worked in the railroad industry in the year in which death occurred or in the preceding calendar year. The exposures correspond to this definition.

[b] Age attained in calendar year of exposure.

Table S-5. 2021[a] RRB Spouse Total Termination[b] Table

Age[c]	$1{,}000q_x^t$	Age[c]	$1{,}000q_x^t$
60	17.89	95	385.16
61	19.53	96	405.39
62	21.31	97	424.84
63	23.26	98	443.46
64	25.38	99	461.26
65	27.69	100	478.19
66	30.21	101	494.26
67	32.95	102	509.45
68	35.94	103	523.75
69	39.19	104	537.17
70	42.79	105	549.71
71	46.77	106	561.36
72	51.18	107	572.13
73	56.07	108	582.02
74	61.50	109	591.04
75	67.51	110	1,000.00
76	74.19		
77	81.61		
78	89.85		
79	99.00		
80	109.03		
81	120.01		
82	132.00		
83	145.09		
84	159.36		
85	174.88		
86	191.73		
87	209.99		
88	229.73		
89	251.02		
90	273.90		
91	297.30		
92	320.20		
93	342.52		
94	364.19		

[a] For use with 2021 RRB Mortality Improvement Scale.

[b] Mainly death of employee or death of spouse.

[c] Age nearest birthday.

Table S-6. Probability of a retired employee having a spouse eligible for railroad retirement benefits

Age[a] of employee	Employees with 30 or more years of service	Employees with less than 30 years of service
59 and under	0.000	0.000
60	0.277	0.000
61	0.365	0.000
62	0.472	0.106
63	0.553	0.177
64	0.613	0.242
65	0.656	0.302
66	0.690	0.356
67	0.716	0.404
68	0.738	0.446
69	0.755	0.482
70	0.767	0.512
71	0.775	0.535
72	0.780	0.554
73	0.782	0.568
74	0.780	0.578
75	0.777	0.586
76	0.771	0.591
77	0.764	0.593
78	0.754	0.592
79	0.744	0.589
80	0.731	0.583
81	0.717	0.575
82	0.701	0.564
83	0.683	0.551
84	0.663	0.535
85	0.642	0.518
86	0.619	0.498
87	0.593	0.475
88	0.566	0.451
89	0.537	0.425
90	0.506	0.397
91	0.472	0.366
92	0.437	0.334
93	0.400	0.301
94	0.360	0.265
95	0.319	0.228
96	0.275	0.189
97	0.229	0.148
98	0.181	0.108
99 & over	0.130	0.068

[a] Age nearest birthday.

Table S-7. 2021 RRB Mortality Table for Widows

Age[a]	$1,000q_x$	Age[a]	$1,000q_x$	Age[a]	$1,000q_x$
20	0.35	55	4.74	90	130.98
21	0.37	56	5.20	91	145.26
22	0.39	57	5.70	92	161.41
23	0.41	58	6.25	93	178.95
24	0.43	59	6.85	94	197.46
25	0.45	60	7.51	95	216.52
26	0.47	61	8.23	96	235.76
27	0.49	62	9.02	97	254.82
28	0.51	63	9.89	98	273.40
29	0.53	64	10.84	99	291.23
30	0.55	65	11.88	100	308.06
31	0.57	66	13.02	101	323.66
32	0.60	67	14.27	102	337.85
33	0.64	68	15.64	103	350.43
34	0.69	69	17.14	104	361.24
35	0.75	70	18.78	105	370.12
36	0.82	71	20.58	106	376.89
37	0.90	72	22.55	107	382.53
38	0.99	73	24.70	108	388.11
39	1.08	74	27.05	109	393.63
40	1.19	75	29.63	110	1,000.00
41	1.30	76	32.50		
42	1.43	77	35.71		
43	1.57	78	39.29		
44	1.72	79	43.29		
45	1.89	80	47.74		
46	2.07	81	52.71		
47	2.27	82	58.23		
48	2.49	83	64.38		
49	2.73	84	71.22		
50	2.99	85	78.81		
51	3.28	86	87.24		
52	3.59	87	96.58		
53	3.94	88	106.92		
54	4.32	89	118.36		

[a] Age nearest birthday.

Table S-8. 2021 RRB Remarriage Table
(Probabilities of remarriage)

Age[a] at widowhood [x]	$1{,}000q^m_{[x]+n}$ for n equal to					Age[a] x	$1{,}000q^m_x$
	0	1	2	3	4		
20	21.63	34.83	54.65	43.32	35.46	25	30.93
21	20.58	33.12	51.94	41.15	33.66	26	29.35
22	19.56	31.47	49.34	39.07	31.94	27	27.83
23	18.59	29.90	46.84	37.07	30.29	28	26.37
24	17.66	28.38	44.44	35.15	28.70	29	24.97
25	16.77	26.93	42.14	33.31	27.18	30	23.63
26	15.91	25.54	39.93	31.54	25.71	31	22.34
27	15.09	24.20	37.81	29.84	24.31	32	21.10
28	14.30	22.91	35.78	28.22	22.96	33	19.91
29	13.54	21.68	33.83	26.65	21.67	34	18.77
30	12.81	20.50	31.95	25.15	20.43	35	17.68
31	12.11	19.36	30.15	23.71	19.24	36	16.63
32	11.44	18.27	28.43	22.33	18.10	37	15.62
33	10.80	17.23	26.77	21.00	17.00	38	14.65
34	10.18	16.22	25.18	19.73	15.95	39	13.72
35	9.58	15.26	23.66	18.51	14.94	40	12.83
36	9.01	14.33	22.19	17.34	13.97	41	11.98
37	8.47	13.45	20.78	16.21	13.04	42	11.16
38	7.94	12.60	19.44	15.13	12.14	43	10.37
39	7.44	11.78	18.14	14.09	11.29	44	9.61
40	6.96	10.99	16.90	13.10	10.46	45	8.89
41	6.49	10.24	15.70	12.14	9.67	46	8.19
42	6.05	9.52	14.56	11.23	8.92	47	7.52
43	5.62	8.82	13.46	10.35	8.19	48	6.88
44	5.21	8.16	12.41	9.50	7.49	49	6.27
45	4.82	7.52	11.39	8.69	6.82	50	5.68
46	4.44	6.90	10.42	7.92	6.18	51	5.11
47	4.08	6.32	9.49	7.17	5.56	52	4.56
48	3.73	5.75	8.59	6.45	4.97	53	4.04
49	3.40	5.21	7.74	5.76	4.40	54	3.54
50	3.08	4.69	6.91	5.10	3.85	55	3.06
51	2.77	4.19	6.12	4.47	3.33	56	2.60
52	2.47	3.71	5.36	3.86	2.83	57	2.15
53	2.19	3.25	4.63	3.28	2.34	58	1.73
54	1.92	2.81	3.93	2.72	1.88	59	1.32
55	1.66	2.38	3.26	2.18	1.44	60	4.15
56	1.41	1.98	2.62	1.67	7.55	61	3.03
57	1.17	1.59	2.00	5.34	4.81	62	3.29
58	0.94	1.21	4.72	4.07	5.48	63	3.10
59	0.72	4.83	3.73	4.36	5.06	64	2.93
60	0.87	3.97	3.95	4.15	4.66	65	2.76
61	1.05	4.16	3.78	3.94	4.30	66	2.60
62	1.02	4.01	3.61	3.76	3.97	67	2.45
63	1.06	3.86	3.46	3.57	3.67	68	2.31
64	1.10	3.72	3.30	3.39	3.38	69	2.18
65	1.14	3.58	3.16	3.22	3.12	70	2.06
66	1.18	3.45	3.02	3.07	2.88	71	1.94
67	1.23	3.32	2.89	2.91	2.66	72	1.78
68	1.28	3.20	2.77	2.77	2.42	73	1.59
69	1.33	3.09	2.65	2.61	2.16	74	1.37
70	1.38	2.98	2.49	2.43	1.91	75	1.16
71	1.44	2.83	2.30	2.26	1.67	76	0.95
72	1.33	2.64	2.08	2.07	1.42	77	0.76
73	1.11	2.44	1.86	1.87	1.20	78	0.60
74	0.85	2.23	1.62	1.70	1.01	79	0.45
75	0.59	2.01	1.40	1.51	0.82	80	0.34
76	0.38	1.77	1.19	1.33	0.67	81	0.25
77	0.23	1.55	0.99	1.17	0.53	82	0.17
78	0.13	1.34	0.82	1.02	0.43	83	0.12
79	0.07	1.14	0.66	0.88	0.34	84	0.08
80	0.03	0.97	0.52	0.75	0.25	85	0.06
81	0.02	0.81	0.41	0.64	0.20	86	0.03
82	0.01	0.66	0.32	0.54	0.15	87	0.02
83	0.01	0.53	0.24	0.44	0.10	88	0.02
84	0.00	0.43	0.18	0.37	0.08	89	0.01

[a] Age nearest birthday.

Table S-9. 2021 RRB Total Termination Table for Disabled Children

Age[a]	$1,000q_x^t$	Age[a]	$1,000q_x^t$	Age[a]	$1,000q_x^t$
		50	19.31	85	159.65
		51	20.57	86	169.44
		52	21.90	87	179.85
18	16.20	53	23.30	88	190.91
19	16.16	54	24.80	89	202.68
20	15.95	55	26.39	90	215.19
21	15.61	56	28.08	91	221.59
22	15.11	57	29.86	92	238.31
23	14.48	58	31.75	93	254.55
24	13.71	59	33.77	94	270.38
25	12.82	60	35.89	95	285.81
26	11.82	61	38.15	96	300.87
27	10.71	62	40.53	97	315.61
28	9.80	63	43.07	98	330.04
29	9.07	64	45.75	99	344.19
30	8.53	65	48.59	100	358.09
31	8.15	66	51.60	101	371.82
32	7.92	67	54.79	102	384.37
33	7.83	68	58.17	103	395.94
34	7.88	69	61.76	104	406.72
35	8.04	70	65.55	105	416.86
36	8.31	71	69.57	106	426.52
37	8.69	72	73.84	107	436.12
38	9.15	73	78.36	108	445.55
39	9.69	74	83.14	109	454.79
40	10.29	75	88.22	110	1,000.00
41	10.95	76	93.61		
42	11.66	77	99.33		
43	12.42	78	105.39		
44	13.23	79	111.82		
45	14.09	80	118.65		
46	15.01	81	125.89		
47	15.99	82	133.59		
48	17.03	83	141.76		
49	18.13	84	150.43		

[a] Age nearest birthday.

Table S-10. 2021 RRB Mortality Improvement Scale

Age[a]	Annual rate of mortality improvement
85 & under	0.80%
86	0.76%
87	0.72%
88	0.69%
89	0.65%
90	0.62%
91	0.59%
92	0.56%
93	0.53%
94	0.50%
95	0.48%
96	0.46%
97	0.43%
98	0.41%
99	0.39%
100	0.37%
101	0.35%
102	0.33%
103	0.32%
104	0.30%
105	0.29%
106	0.27%
107	0.26%
108	0.25%
109	0.23%
110	0.00%

[a] Age nearest birthday.

Table S-11. Calendar year rates[a] of immediate[b] age retirement
(Retirements per 1,000 exposed)

Age[c]	Years of service	
	5-29	30 & over
60		630
61		500
62	110	400
63	100	370
64	90	370
65	190	370
66	340	370
67	340	320
68	300	320
69	300	320
70	300	320
71	300	320
72	290	310
73	290	310
74	290	310
75 & over	290	310

[a] Technically probabilities.

[b] Immediate retirements are defined as those for which the calendar year of retirement is the same as, or the year following, the calendar year of last employment in the railroad industry.

[c] The age interval is from x-.5 to x+.5, except as indicated below:

Age	Years of service	Interval for	
		Exposure	Retirements
60	30 or more	59.5-60.5	60-60.5
62	5-29	61.5-62.5	62-62.5

Table S-12. Rates[a] of immediate[b] disability retirement and of eligibility for disability freeze[c]

Age[d]	Calendar year rates per 1,000 exposed				Percent of retirements eligible for disability freeze			
	10-19 years of service	20-24 years of service	25-29 years of service	30 or more years of service	10-19 years of service	20-24 years of service	25-29 years of service	30 or more years of service
Under 35	1.1				98.5%			
35	1.2				98.5			
36	1.3				98.5			
37	1.4	6.4			98.5	52.9%		
38	1.5	6.6			98.5	53.1		
39	1.6	6.8			98.5	53.3		
40	1.7	6.9			98.5	53.5		
41	1.9	7.2	4.3		98.5	53.8	56.7%	
42	2.1	7.5	4.5		98.5	54.2	57.1	
43	2.3	7.8	4.8		98.5	54.7	57.7	
44	2.6	8.1	5.1		98.5	55.3	58.3	
45	2.9	8.6	5.4		98.5	56.2	59.3	
46	3.2	9.1	5.8		98.5	57.2	60.3	
47	3.6	9.7	6.2	13.6	98.5	58.6	61.8	47.0%
48	4.1	10.4	6.7	14.4	98.5	60.4	63.7	48.4
49	4.6	11.3	7.4	15.2	98.5	62.7	66.1	50.2
50	5.3	12.2	8.1	16.0	98.5	65.5	69.1	52.5
51	6.0	13.4	8.9	16.8	98.5	69.3	73.1	55.5
52	6.9	14.7	9.8	17.6	98.5	73.9	78.0	59.2
53	7.9	16.3	11.0	18.4	98.5	80.1	84.5	64.2
54	9.0	18.2	12.3	19.2	98.5	87.8	92.6	70.3
55	10.4	20.4	13.8	20.0	98.5	94.4	94.4	94.4
56	12.0	23.0	15.6	20.8	98.5	94.4	94.4	94.4
57	13.8	26.0	17.6	21.6	98.5	94.4	94.4	94.4
58	16.0	29.6	20.0	22.4	98.5	94.4	94.4	94.4
59	18.5	33.7	22.9	23.2	98.5	94.4	94.4	94.4
60	27.7	38.7	26.1	9.2	94.7	94.4	94.4	94.4
61	34.1	44.4	30.0	6.7	94.7	94.4	94.4	94.4
62	34.9	46.0	38.1	4.7	94.7	94.4	94.4	94.4
63	31.2	41.7	33.8	3.1	94.7	94.4	94.4	94.4
64	23.9	34.8	26.9	2.0	94.7	94.4	94.4	94.4
65	14.1	23.6	15.8	1.3	94.7	94.4	94.4	94.4
66	2.7	4.9	5.7	1.1	94.7	94.4	94.4	94.4

[a] Technically probabilities.

[b] Immediate retirements are defined as those for which the calendar year of retirement is the same as, or the year following, the calendar year of last employment in the railroad industry.

[c] Qualified under the social security definition of disability.

[d] Age attained in calendar year of exposure.

Table S-13. Calendar year rates[a] of final[b] withdrawal

Years of service[c]	Attained age[d]				
	Under 25	25-34	35-44	45-54	55 & over
0	0.198	0.138	0.183	0.235	0.248
1	0.149	0.103	0.105	0.119	0.129
2	0.086	0.066	0.058	0.063	0.083
3	0.061	0.046	0.036	0.040	0.063
4	0.051	0.039	0.031	0.035	0.053
5	0.046	0.035	0.029	0.031	0.046
6	0.041	0.033	0.026	0.029	0.041
7	0.038	0.030	0.025	0.026	0.035
8	0.034	0.028	0.023	0.024	0.031
9	0.030	0.025	0.021	0.021	0.028
10	0.028	0.023	0.019	0.020	0.024
11		0.020	0.018	0.018	0.021
12		0.018	0.016	0.016	0.020
13		0.015	0.015	0.015	0.018
14		0.014	0.014	0.014	0.016
15		0.013	0.013	0.013	0.015
16		0.013	0.011	0.013	0.015
17		0.011	0.011	0.011	0.014
18		0.011	0.010	0.010	0.014
19		0.010	0.009	0.010	0.013
20		0.010	0.008	0.009	0.013
21			0.008	0.009	0.013
22			0.006	0.008	0.013
23			0.006	0.008	0.011
24			0.005	0.006	0.011
25			0.005	0.006	0.010
26			0.005	0.006	0.009
27			0.004	0.006	0.008
28			0.004	0.005	0.005
29			0.003	0.005	0.004
30 or more			0.006	0.006	0.013

[a] Technically probabilities.

[b] Withdrawals net of re-entrants.

[c] Rounded up to nearest whole year.

[d] Age attained in calendar year of exposure.

Table S-14. Service months and salary scales

Years of service[a]	Service months	Increase in average monthly salary from prior service level	
		Tier 1	Tier 2
0	6.5		
1	11.3	24.4%	22.3%
2	11.4	9.1%	8.1%
3	11.6	7.3%	6.3%
4	11.6	4.7%	3.9%
5	11.7	2.7%	2.2%
6	11.7	2.2%	1.6%
7	11.7	1.8%	1.3%
8	11.7	1.5%	1.0%
9	11.7	1.3%	0.8%
10	11.8	1.1%	0.7%
11	11.8	1.0%	0.6%
12	11.8	0.9%	0.5%
13	11.8	0.8%	0.5%
14	11.8	0.7%	0.4%
15	11.8	0.6%	0.4%
16	11.8	0.6%	0.3%
17	11.8	0.5%	0.3%
18	11.8	0.5%	0.3%
19	11.8	0.5%	0.2%
20	11.8	0.4%	0.2%
21	11.8	0.4%	0.2%
22	11.8	0.4%	0.2%
23	11.8	0.4%	0.2%
24	11.9	0.3%	0.2%
25	11.9	0.3%	0.2%
26	11.9	0.3%	0.2%
27	11.9	0.3%	0.1%
28	11.9	0.3%	0.1%
29	11.9	0.3%	0.1%
30	11.9	3.5%	2.4%
31	11.9	0.7%	0.3%
32	11.9	0.7%	0.3%
33	11.9	0.7%	0.3%
34	11.9	0.7%	0.3%
35	11.9	0.7%	0.3%
36	11.9	0.7%	0.3%
37	11.9	0.7%	0.3%
38	11.9	0.7%	0.3%
39	11.9	0.7%	0.3%
40	11.9	0.7%	0.3%
41	11.9	0.7%	0.3%
42	11.9	0.7%	0.3%
43	11.9	0.7%	0.3%
44	11.9	0.7%	0.3%
45 & over	11.9	0.7%	0.3%

[a] Rounded up to nearest whole year.

Table S-15. Family characteristics of railroad employees assumed for the valuation of survivor benefits

Age of employee[a]	Percent married				Widow under 60 with eligible child			Percent with eligible child	
	Total	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Minor child	Disabled child
Under 35	66.7	-	-	66.7	49.8	-	-	76.5	-
35 - 39	66.7	-	-	66.7	56.0	2.9	-	86.1	-
40 - 44	66.7	-	-	66.7	57.0	5.1	-	84.1	1.6
45 - 49	66.7	-	1.4	65.4	39.4	7.3	0.4	64.8	1.6
50 - 54	66.7	1.7	2.5	62.6	17.9	8.2	1.2	36.5	1.6
55 - 59	66.7	6.6	5.0	55.1	6.9	3.0	1.0	14.5	1.6
60 - 64	66.7	23.0	14.0	29.8	1.6	0.5	0.4	4.0	1.6
65 - 69	66.7	51.4	6.1	9.3	0.6	0.4	0.2	1.6	1.2
70 - 74	66.7	61.8	2.2	2.7	0.2	0.1	-	0.7	0.9
75 - 79	66.7	64.0	0.9	1.8	0.1	-	-	0.4	0.8
80 - 84	60.9	59.7	0.5	0.7	-	-	-	0.3	0.6
85 - 89	51.5	51.1	0.1	0.3	-	-	-	0.1	0.5
90 & over	34.3	34.1	0.0	0.2	-	-	-	-	-

Age of employee[a]	Average ages of widows						Average ages of children			Average number of minor children[c]
	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Youngest child under 16[b]	All minor children	All disabled children	
Under 35	-	-	31	30	-	-	3	5	-	2.1
35 - 39	-	-	36	36	39	-	7	8	-	2.1
40 - 44	-	-	41	40	41	-	8	10	15	2.0
45 - 49	-	61	46	45	46	43	11	11	16	1.7
50 - 54	65	61	51	48	52	52	11	13	24	1.4
55 - 59	65	61	54	51	51	56	11	13	25	1.4
60 - 64	65	61	56	49	55	57	11	13	29	1.4
65 - 69	67	61	56	49	55	59	11	13	33	1.4
70 - 74	70	61	56	52	55	-	11	13	37	1.4
75 - 79	74	61	55	52	-	-	11	13	45	1.4
80 - 84	78	61	56	-	-	-	-	13	49	1.4
85 - 89	83	61	56	-	-	-	-	13	52	1.4
90 & over	87	61	56	-	-	-	-	-	-	-

[a] Age nearest birthday at time of death.

[b] Includes families with widows under 60 and children under 16 only.

[c] Includes families with minor children only.

MORTALITY, REMARRIAGE, AND RELATED EXPERIENCE

1. <u>Mortality of age annuitants</u>. The mortality studies conducted for age annuitants are summarized in Tables S-16 through S-18. The tables show actual-to-expected ratios by age, sex, year and duration on the basis of the 28th and 29th valuation standards.

2. <u>Mortality after disability retirement</u>. The mortality studies conducted for disability annuitants are summarized in Tables S-19 through S-21. The tables show select, ultimate and aggregate crude death rates, actual-to-expected ratios on the basis of the 28th and 29th valuation standards, and disability freeze percentages.

3. <u>Mortality in active service</u>. The mortality experience of active railroad employees is shown in Table S-22. The table provides crude rates and actual-to-expected ratios on the basis of the 28th and 29th valuation standards.

4. <u>Total termination, mortality and probability of spouse</u>. Tables S-23 and S-24 show, respectively, the total termination and mortality experience of spouse annuitants between anniversaries of retirement in 2015 and 2021. Spouse mortality is not used directly in any part of the valuation. Table S-25 shows, as of December 31, 2021, the number of retired employees and the number of eligible spouses of employees, by age of employee. The probabilities shown in Table S-6 are based on the results shown in Table S-25.

5. <u>Mortality and remarriage of widows</u>. Table S-26 shows ratios of actual deaths of widow annuitants to those expected on the basis of the 28th and 29th valuation standards. Table S-27 shows ratios of actual remarriages to those expected on the basis of the 28th and 29th valuation standards

6. <u>Termination of disabled children</u>. Table S-28 shows ratios of actual terminations of disabled children annuitants to those expected on the basis of the 28th and 29th valuation standards.

7. <u>Mortality improvement</u>. Table S-29 shows average annual improvement in annuitant mortality and spouse total termination from 1957 through 2020.

Table S-16. Mortality experience of railroad age annuitants[a] between anniversaries of retirement in 2015 and 2021, by sex and type of retirement

	All ages	60-64	65-69	70-74	Age[b] 75-79	80-84	85-89	90-94	95 & over
A. Both sexes combined									
Exposed (100% weight 2016-2020, 50% weight 2021)	1,067,730	145,178	269,900	230,548	146,988	110,318	92,350	56,155	16,294
Deaths (100% weight 2016-2020, 50% weight 2021)	51,086	1,168	3,425	5,277	6,015	7,732	11,358	11,104	5,009
Age specific death rates (per thousand)	47.8	8.0	12.7	22.9	40.9	70.1	123.0	197.7	307.4
Exposed (100% crude data 2016-2021)	1,162,967	154,695	293,415	255,037	162,619	119,552	99,173	60,642	17,834
Deaths (100% crude data 2016-2021)	56,052	1,250	3,773	5,911	6,740	8,478	12,299	12,105	5,496
Age specific death rates (per thousand)	48.2	8.1	12.9	23.2	41.4	70.9	124.0	199.6	308.2
Ratio of actual to expected deaths (100% crude data)									
RP-2014 Blue Collar, males[c]	108.6%	78.4%	84.2%	98.3%	108.8%	111.0%	115.6%	115.9%	119.1%
2016 Base Year RRB[d]	101.3%	104.7%	97.4%	101.4%	103.1%	100.3%	102.5%	101.7%	99.6%
2021 RRB[e]	100.9%	105.2%	97.6%	101.3%	102.8%	99.8%	101.9%	101.0%	99.1%
B. Male									
Exposed (100% crude data 2016-2021)	1,038,887	142,890	263,555	227,494	145,747	106,696	88,172	50,356	13,977
Deaths (100% crude data 2016-2021)	50,388	1,187	3,539	5,465	6,257	7,776	11,258	10,394	4,512
Age specific death rates (per thousand)	48.5	8.3	13.4	24.0	42.9	72.9	127.7	206.4	322.8
Ratio of actual to expected deaths (100% crude data)									
RP-2014 Blue Collar, males[c]	112.1%	80.7%	88.0%	101.9%	112.7%	114.1%	119.2%	120.2%	125.0%
2016 Base Year RRB[d]	105.0%	107.7%	101.8%	105.0%	106.9%	103.1%	105.7%	105.5%	104.5%
2021 RRB[e]	104.5%	108.3%	102.0%	105.0%	106.5%	102.5%	105.0%	104.8%	103.9%
C. Female									
Exposed (100% crude data 2016-2021)	124,080	11,805	29,860	27,543	16,872	12,856	11,001	10,286	3,857
Deaths (100% crude data 2016-2021)	5,664	63	234	446	483	702	1,041	1,711	984
Age specific death rates (per thousand)	45.6	5.3	7.8	16.2	28.6	54.6	94.6	166.3	255.1
Ratio of actual to expected deaths (100% crude data)									
2013 RRB Widows[f], 1-year rateback	101.1%	60.1%	58.2%	78.6%	87.8%	103.2%	108.5%	118.2%	110.4%
2016 Base Year RRB[d]	77.6%	68.0%	58.8%	71.0%	71.2%	77.2%	77.5%	83.4%	82.2%
2021 RRB[e]	77.2%	68.3%	58.9%	71.0%	71.0%	76.8%	77.0%	82.8%	81.7%

Table S-16. Mortality experience of railroad age annuitants[a] between anniversaries of retirement in 2015 and 2021, by sex and type of retirement (continued)

	All ages	60-64	65-69	70-74	Age[b] 75-79	80-84	85-89	90-94	95 & over
D. Immediate[g]									
Exposed (100% crude data 2016-2021)	774,472	126,595	202,100	165,226	102,599	71,439	57,300	37,199	12,014
Deaths (100% crude data 2016-2021)	35,065	911	2,502	3,846	4,273	5,091	7,179	7,500	3,763
Age specific death rates (per thousand)	45.3	7.2	12.4	23.3	41.6	71.3	125.3	201.6	313.2
Ratio of actual to expected deaths (100% crude data)									
2016 Base Year RRB[d]	101.5%	94.1%	94.2%	102.0%	103.8%	101.1%	103.4%	102.4%	101.2%
2021 RRB[e]	101.1%	94.5%	94.4%	101.9%	103.5%	100.6%	102.8%	101.7%	100.7%
E. Deferred[g]									
Exposed (100% crude data 2016-2021)	388,495	28,100	91,315	89,811	60,020	48,113	41,873	23,443	5,820
Deaths (100% crude data 2016-2021)	20,987	339	1,271	2,065	2,467	3,387	5,120	4,605	1,733
Age specific death rates (per thousand)	54.0	12.1	13.9	23.0	41.1	70.4	122.3	196.4	297.8
Ratio of actual to expected deaths (100% crude data)									
2016 Base Year RRB[d]	101.0%	150.0%	104.2%	100.3%	102.1%	99.1%	101.3%	100.6%	96.3%
2021 RRB[e]	100.6%	150.7%	104.4%	100.2%	101.8%	98.6%	100.7%	99.9%	95.8%

[a] Nondisability retirement.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Retirement Plans 2014 Blue Collar Mortality Table.

[d] 2016 Base Year RRB Annuitants Mortality Table.

[e] 2021 RRB Annuitants Mortality Table.

[f] 2013 RRB Mortality Table for Widows.

[g] Immediate retirements are those which occur in the same calendar year as, or the calendar year following, the year of last employment in the railroad industry; all others are deferred retirements.

Table S-17. Mortality experience of railroad age annuitants[a] between anniversaries of retirement in 2015 and 2021, by year

	All ages	60-64	65-69	70-74	Age[b] 75-79	80-84	85-89	90-94	95 & over
1. 2015-2021 experience (100% crude data)									
Exposed[c]	1,162,967	154,695	293,415	255,037	162,619	119,552	99,173	60,642	17,834
Deaths	56,052	1,250	3,773	5,911	6,740	8,478	12,299	12,105	5,496
Crude rate per 1,000	48.2	8.1	12.9	23.2	41.4	70.9	124.0	199.6	308.2
Ratio Act./Exp. [d]	101.3%	104.7%	97.4%	101.4%	103.1%	100.3%	102.5%	101.7%	99.6%
Ratio Act./Exp. [e]	100.9%	105.2%	97.6%	101.3%	102.8%	99.8%	101.9%	101.0%	99.1%
2. Crude rate per 1,000 for individual years									
2015-2016	48.7	7.9	13.3	22.5	40.1	71.1	119.3	197.6	294.4
2016-2017	48.9	8.3	12.6	23.7	41.1	70.0	125.2	195.3	318.0
2017-2018	47.4	7.6	12.5	23.1	42.5	67.8	119.1	192.6	319.1
2018-2019	45.7	8.1	12.1	22.3	38.0	68.3	118.6	195.8	287.4
2019-2020	46.4	8.0	12.0	21.3	39.8	67.9	127.4	196.3	312.9
2020-2021	52.1	8.6	14.8	25.9	46.4	80.8	137.9	223.2	316.6
3. Ratio Act./Exp. for individual years[d]									
2015-2016	99.3%	103.8%	101.2%	97.7%	98.1%	100.2%	98.4%	101.3%	95.5%
2016-2017	101.2%	108.8%	95.5%	103.0%	101.4%	98.9%	103.0%	100.1%	102.9%
2017-2018	99.6%	99.0%	94.8%	101.8%	106.4%	96.2%	98.3%	98.7%	103.2%
2018-2019	97.2%	105.0%	91.4%	98.4%	95.8%	96.9%	98.1%	99.8%	93.3%
2019-2020	99.1%	102.8%	90.3%	93.6%	99.9%	96.1%	105.6%	99.2%	100.9%
2020-2021	112.1%	109.5%	111.3%	112.2%	115.0%	114.1%	114.9%	112.1%	101.8%
4. Ratio Act./Exp. for individual years[e]									
2015-2016	98.8%	104.3%	101.4%	97.7%	97.8%	99.7%	97.8%	100.6%	94.9%
2016-2017	100.7%	109.3%	95.7%	102.9%	101.1%	98.4%	102.4%	99.4%	102.3%
2017-2018	99.2%	99.5%	95.0%	101.8%	106.1%	95.7%	97.7%	98.0%	102.6%
2018-2019	96.8%	105.5%	91.6%	98.3%	95.6%	96.4%	97.5%	99.2%	92.8%
2019-2020	98.6%	103.3%	90.5%	93.6%	99.6%	95.7%	105.0%	98.6%	100.4%
2020-2021	111.7%	110.0%	111.6%	112.2%	114.7%	113.6%	114.2%	111.4%	101.3%

[a] Nondisability retirement.
[b] Age nearest birthday at the beginning of the year of exposure.
[c] Exposure is between anniversaries of retirement in indicated years.
[d] Expected based on 2016 Base Year RRB Annuitants Mortality Table.
[e] Expected based on 2021 RRB Annuitants Mortality Table.

Table S-18. Mortality ratios for railroad age annuitants on a select and ultimate
basis between anniversaries of retirement in 2015 and 2021

Duration	Exposure	Actual deaths	Crude rate per 1,000	Ratio Act./Exp.[a]	Ratio Act./Exp.[b]
0	51,360	428	8.3	94.9%	95.3%
1	54,103	521	9.6	100.7	101.1
2	56,463	549	9.7	93.1	93.4
3	57,860	622	10.8	93.9	94.2
4	58,465	704	12.0	96.0	96.2
5	58,597	768	13.1	95.0	95.2
6	58,160	872	15.0	98.5	98.6
7	56,832	973	17.1	101.8	101.8
8	55,455	1,012	18.2	98.1	98.1
9	52,842	1,082	20.5	99.1	99.1
10 & over	602,830	48,521	80.5	102.0	101.4
All durations	1,162,967	56,052	48.2	101.3%	100.9%

[a] Expected based on 2016 Base Year RRB Annuitants Mortality Table.

[b] Expected based on 2021 RRB Annuitants Mortality Table.

Table S-19. Age specific death rates of railroad disability annuitants between anniversaries
of retirement in 2015 and 2021, by age and duration

Select section

			Age at retirement[a]				
	All ages	Under 40	40-44	45-49	50-54	55-59	60 & over
Exposed							
Duration 0	10,564	282	553	1,112	1,835	3,628	3,155
1	10,518	300	560	997	1,762	3,797	3,103
2	10,765	288	515	902	1,766	4,125	3,170
3	11,199	287	483	848	1,811	4,608	3,163
4	11,807	296	486	744	1,954	5,162	3,167
Actual deaths							
Duration 0	305	10	11	21	52	113	98
1	297	b	15	18	42	117	98
2	268	b	b	12	36	100	105
3	261	b	b	18	46	101	89
4	290	b	b	21	41	119	98
Crude rate per 1,000							
Duration 0	28.9	35.5	19.9	18.9	28.3	31.2	31.1
1	28.2	b	26.8	18.1	23.8	30.8	31.6
2	24.9	b	b	13.3	20.4	24.2	33.1
3	23.3	b	b	21.2	25.4	21.9	28.1
4	24.6	b	b	28.2	21.0	23.1	30.9

Ultimate section, durations 5 and over

Age[c]	Exposed	Actual deaths	Crude rate per 1,000
Under 50	3,959	52	13.1
50-54	5,119	87	17.0
55-59	19,553	350	17.9
60-64	69,818	1,559	22.3
65-69	114,345	3,361	29.4
70-74	91,958	3,830	41.6
75-79	51,172	3,256	63.6
80-84	27,536	2,761	100.3
85 & over	23,123	4,243	183.5
All ages	406,582	19,499	48.0

[a] Age nearest birthday.

[b] Fewer than 10 actual deaths.

[c] Age nearest birthday at the beginning of the year of exposure.

Table S-20. Mortality experience of railroad disability annuitants between anniversaries of retirement in 2015 and 2021, by disability freeze status

	All disability annuitants			Annuitants with disability freeze					Annuitants without disability freeze				
Age[a]	Exposed	Actual deaths	Crude rate per 1,000	Exposed	Actual deaths	Crude rate per 1,000	Ratio Act./Exp[b]	Ratio Act./Exp[c]	Exposed	Actual deaths	Crude rate per 1,000	Ratio Act./Exp[d]	Ratio Act./Exp[e]
Under 40	1,217	25	20.6	1,150	24	20.9	113.2	118.6	67	f	f	f	f
40-44	2,844	52	18.3	2,488	51	20.5	101.0	104.7	356	f	f	f	f
45-49	6,767	102	15.1	5,551	93	16.8	78.2	80.5	1,216	f	f	f	f
50-54	12,062	258	21.4	9,592	234	24.4	110.1	112.3	2,470	24	9.7	106.9	109.8
55-59	34,039	725	21.3	26,025	646	24.8	106.3	107.0	8,014	79	9.9	83.5	85.9
60-64	115,050	2,159	18.8	86,629	1,794	20.7	100.6	99.6	28,421	365	12.8	101.7	104.5
65-69	117,441	3,508	29.9	85,359	2,772	32.5	102.7	100.0	32,082	736	22.9	100.7	103.0
70-74	83,012	3,831	46.1	58,367	2,917	50.0	106.4	102.9	24,645	914	37.1	98.5	100.2
75-79	45,136	3,256	72.1	30,532	2,368	77.6	103.2	100.8	14,604	888	60.8	101.4	102.2
80-84	24,630	2,761	112.1	14,965	1,853	123.8	103.4	102.4	9,665	908	93.9	100.1	99.9
85-89	13,796	2,372	171.9	7,200	1,331	184.9	96.5	96.8	6,596	1,041	157.8	101.5	100.4
90-94	4,561	1,455	319.0	2,207	735	333.0	102.8	103.9	2,354	720	305.9	105.8	104.3
95 & over	881	416	472.2	468	241	515.0	104.5	104.8	413	175	423.7	87.1	86.8
All ages	461,435	20,920	45.3	330,533	15,059	45.6	102.8%	101.2%	130,902	5,861	44.8	100.4%	101.0%

[a] Age nearest birthday at the beginning of the year of exposure.

[b] Expected based on 2016 Base Year RRB Disabled Mortality Table for Annuitants with Disability Freeze.

[c] Expected based on 2021 RRB Disabled Mortality Table for Annuitants with Disability Freeze.

[d] Expected based on 2016 Base Year RRB Disabled Mortality Table for Annuitants without Disability Freeze.

[e] Expected based on 2021 RRB Disabled Mortality Table for Annuitants without Disability Freeze.

[f] Fewer than 10 actual deaths.

Table S-21. Percentages of railroad disability annuitants included in the 29th valuation mortality studies
who would have qualified for a benefit under the social security disability standards

| | Period between anniversaries of retirement | | | | | | | | | | | |
| | 2015-2016 | | 2016-2017 | | 2017-2018 | | 2018-2019 | | 2019-2020 | | 2020-2021 | |
Duration and type of freeze decision	Exposures	Actual deaths	Exposures	Actual deaths	Exposures	Actual deaths	Exposures	Actual deaths	Exposures	Actual deaths	Exposures	Actual deaths
Duration 0												
Freeze allowed	89.1%	91.5%	89.7%	98.2%	87.6%	94.0%	78.6%	100.0%	63.4%	97.7%	48.1%	86.3%
Freeze disallowed	10.9	8.5	10.2	1.8	9.0	6.0	6.8	0.0	4.9	2.3	4.7	5.9
No freeze decision	0.0	0.0	0.1	0.0	3.4	0.0	14.6	0.0	31.7	0.0	47.1	7.8
Duration 1												
Freeze allowed	90.2	96.7	89.1	97.7	89.4	95.7	87.5	92.9	78.2	93.7	62.5	90.5
Freeze disallowed	9.8	3.3	10.9	2.3	10.4	4.3	8.9	7.1	6.9	6.3	5.0	7.1
No freeze decision	0.0	0.0	0.0	0.0	0.1	0.0	3.5	0.0	14.9	0.0	32.6	2.4
Duration 2												
Freeze allowed	88.1	93.9	90.1	91.2	88.9	93.5	89.4	86.7	87.6	100.0	77.7	95.6
Freeze disallowed	11.9	6.1	9.9	8.8	11.1	6.5	10.5	13.3	8.8	0.0	6.8	2.2
No freeze decision	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	3.6	0.0	15.5	2.2
Duration 3												
Freeze allowed	87.9	92.5	88.0	77.8	90.1	90.0	88.9	97.6	89.6	98.1	87.4	93.1
Freeze disallowed	12.1	7.5	12.0	22.2	9.9	10.0	11.1	2.4	10.3	1.9	8.9	6.9
No freeze decision	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	3.7	0.0
Duration 4												
Freeze allowed	86.0	87.1	87.9	87.5	88.4	97.6	90.2	95.7	88.8	95.0	89.4	88.2
Freeze disallowed	14.0	12.9	12.1	12.5	11.6	2.4	9.8	4.3	11.2	5.0	10.5	11.8
No freeze decision	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Duration 5 and over												
Freeze allowed	68.5	69.3	69.1	69.8	69.6	69.5	70.2	70.8	70.7	71.4	71.1	71.6
Freeze disallowed	31.5	30.7	30.9	30.2	30.3	30.5	29.8	29.2	29.3	28.6	28.9	28.4
No freeze decision	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table S-22. Mortality experience of active[a] railroad employees during calendar years 2016-2020

Age[b]	Exposed	Actual deaths	Crude rate per 1,000	Ratio Act./Exp.[c]	Ratio Act./Exp.[d]
Under 35	252,198	211	0.8	109.1%	87.0%
35-39	161,761	174	1.1	110.5	101.0
40-44	163,427	196	1.2	97.4	98.3
45-49	166,794	288	1.7	106.6	115.9
50-54	143,137	322	2.2	102.5	115.4
55-59	133,275	392	2.9	95.4	105.7
60-64	77,949	322	4.1	97.7	102.4
65 & over	22,572	131	5.8	89.3	83.1
All ages	1,121,113	2,036	1.8	100.6%	102.6%

[a] An employee is said to have died in active service if he died before retirement and had last worked in the railroad industry in the calendar year of his death or the calendar year immediately preceding.

[b] Age attained in calendar year of exposure.

[c] Expected deaths based on 2015 RRB Active Service Mortality Table.

[d] Expected deaths based on 2018 RRB Active Service Mortality Table.

Table S-23. Total termination experience of spouse annuitants between anniversaries of retirement in 2015 and 2021[a]

	All ages	60-64	65-69	70-74	75-79	80-84	85-89	90 & over
					Age[b]			
1. 2015-2021 experience								
Exposed (100% weight 2016-2020, 50% weight 2021)	837,777	159,256	250,537	193,209	116,881	68,888	36,382	12,626
Terminations (100% weight 2016-2020, 50% weight 2021)	51,580	3,618	8,485	9,643	9,182	9,043	7,576	4,035
Crude rate per 1,000	61.6	22.7	33.9	49.9	78.6	131.3	208.2	319.6
Exposed (100% crude data)[c]	914,162	171,251	273,032	213,522	128,506	74,957	39,232	13,662
Terminations (100% crude data)	56,742	3,940	9,333	10,760	10,180	9,923	8,233	4,373
Crude rate per 1,000	62.1	23.0	34.2	50.4	79.2	132.4	209.9	320.1
Ratio Act./Exp. I (100% crude data)[d]	101.0%	110.6%	104.8%	97.5%	95.8%	100.8%	103.4%	103.1%
Ratio Act./Exp. II (100% crude data)[e]	100.8%	103.6%	102.8%	99.2%	98.0%	101.5%	102.4%	100.6%
2. Crude rate per 1,000 for								
individual years								
2015 - 2016 (100% crude data)	61.0	21.5	33.8	48.6	80.4	129.5	199.9	280.7
2016 - 2017 (100% crude data)	62.7	20.9	32.2	52.6	79.2	134.1	219.3	335.5
2017 - 2018 (100% crude data)	61.3	22.7	33.6	50.3	77.7	134.7	201.2	329.2
2018 - 2019 (100% crude data)	59.1	23.3	33.2	46.6	75.0	128.7	199.8	318.2
2019 - 2020 (100% crude data)	60.6	23.9	34.6	49.0	76.8	122.4	211.2	332.7
2020 - 2021 (100% crude data)	67.6	26.9	37.7	55.0	85.9	145.0	230.7	326.6
3. Ratio Act./Exp. for								
individual years I[d]								
2015 - 2016 (100% crude data)	97.9%	103.5%	104.0%	93.4%	96.7%	98.0%	98.7%	90.9%
2016 - 2017 (100% crude data)	101.5%	100.6%	98.6%	101.4%	95.5%	101.8%	108.2%	107.8%
2017 - 2018 (100% crude data)	100.5%	109.2%	103.3%	97.9%	94.2%	102.5%	99.2%	105.9%
2018 - 2019 (100% crude data)	97.2%	112.1%	102.1%	90.9%	91.1%	98.2%	98.3%	102.6%
2019 - 2020 (100% crude data)	99.3%	114.4%	106.1%	95.0%	92.9%	93.5%	103.8%	107.2%
2020 - 2021 (100% crude data)	109.8%	128.3%	115.0%	105.7%	103.6%	111.0%	113.6%	105.2%
4. Ratio Act./Exp. for								
individual years II[e]								
2015 - 2016 (100% crude data)	97.5%	97.0%	102.0%	95.0%	99.0%	98.7%	97.7%	88.7%
2016 - 2017 (100% crude data)	101.2%	94.2%	96.7%	103.1%	97.8%	102.5%	107.1%	105.2%
2017 - 2018 (100% crude data)	100.2%	102.4%	101.3%	99.5%	96.4%	103.3%	98.2%	103.3%
2018 - 2019 (100% crude data)	97.0%	105.1%	100.1%	92.3%	93.3%	98.9%	97.4%	100.1%
2019 - 2020 (100% crude data)	99.2%	107.3%	104.0%	96.5%	95.1%	94.2%	102.7%	104.6%
2020 - 2021 (100% crude data)	109.8%	120.3%	112.8%	107.5%	106.1%	111.8%	112.5%	102.6%

[a] Excludes spouses under age 60 with child in care.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Exposure is between anniversaries of retirement in indicated years.

[d] Expected based on 2016 Base Year RRB Spouse Total Termination Table.

[e] Expected based on 2021 RRB Spouse Total Termination Table.

Table S-24. Mortality experience of spouse annuitants between anniversaries of retirement in 2015 and 2021[a]

	Age[b]							
	All ages	60-64	65-69	70-74	75-79	80-84	85-89	90 & over
1. 2015-2021 experience								
Exposed[c]	895,439	169,823	269,684	209,902	125,190	71,730	36,660	12,451
Actual deaths	19,296	1,084	2,637	3,520	3,547	3,468	3,089	1,951
Crude rate per 1,000	21.5	6.4	9.8	16.8	28.3	48.3	84.3	156.7
Ratio Act./Exp.[d]	76.7%	66.5%	66.3%	73.1%	77.4%	80.4%	84.7%	89.4%
2. Crude rate per 1,000 for individual years								
2015 - 2016	21.0	6.3	9.8	15.1	27.6	46.3	84.3	132.0
2016 - 2017	21.8	5.6	8.6	17.9	28.2	49.8	89.9	156.5
2017 - 2018	21.1	6.6	9.4	16.4	27.3	49.6	78.9	161.9
2018 - 2019	20.5	6.3	9.9	16.0	27.3	44.7	78.7	155.2
2019 - 2020	21.6	6.3	10.0	17.0	28.2	48.3	82.7	170.8
2020 - 2021	23.3	7.5	11.0	17.9	31.1	51.7	91.4	167.0
3. Ratio Act./Exp. for individual years[d]								
2015 - 2016	73.7%	65.8%	67.1%	65.4%	75.1%	76.4%	85.4%	76.7%
2016 - 2017	76.9%	58.4%	58.1%	77.6%	76.9%	82.6%	90.2%	88.1%
2017 - 2018	75.6%	69.1%	63.7%	72.1%	74.7%	82.3%	79.5%	91.8%
2018 - 2019	73.9%	65.3%	67.3%	70.2%	75.1%	74.5%	79.2%	88.6%
2019 - 2020	77.4%	65.5%	67.8%	74.2%	77.1%	81.0%	82.7%	97.5%
2020 - 2021	82.9%	77.0%	74.1%	77.5%	84.8%	85.9%	91.1%	95.4%

[a] Excludes spouses under age 60 with child in care.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Exposure is between anniversaries of retirement in indicated years.

[d] Expected based on 2013 RRB Mortality Table for Widows.

Table S-25. Number of retired employees and number with a spouse eligible for railroad retirement benefits, by age of employee on December 31, 2021

Age[a] of employee	30 or more years of service			Less than 30 years of service		
	Number of employees	Number of eligible spouses	Ratio of spouses to employees	Number of employees	Number of eligible spouses	Ratio of spouses to employees
60	564	156	0.277			
61	1,628	604	0.371			
62	2,385	1,100	0.461	1,506	151	0.100
63	3,167	1,751	0.553	2,402	441	0.184
64	4,187	2,606	0.622	2,937	711	0.242
65	4,877	3,170	0.650	3,677	1,103	0.300
66	6,023	4,160	0.691	4,583	1,623	0.354
67	6,417	4,620	0.720	5,547	2,249	0.405
68	7,015	5,069	0.723	6,119	2,727	0.446
69	7,050	5,413	0.768	6,121	2,930	0.479
70	7,296	5,615	0.770	6,381	3,336	0.523
71	7,496	5,799	0.774	6,491	3,457	0.533
72	7,171	5,593	0.780	6,127	3,397	0.554
73	7,146	5,666	0.793	6,101	3,475	0.570
74	6,986	5,376	0.770	5,877	3,301	0.562
75	6,986	5,429	0.777	6,067	3,564	0.587
76	4,854	3,700	0.762	3,959	2,364	0.597
77	4,763	3,642	0.765	3,786	2,305	0.609
78	4,308	3,198	0.742	3,560	2,066	0.580
79	4,313	3,211	0.744	3,355	1,945	0.580
80	3,454	2,555	0.740	2,841	1,667	0.587
81	3,020	2,184	0.723	2,454	1,418	0.578
82	2,460	1,709	0.695	2,109	1,209	0.573
83	2,331	1,621	0.695	1,976	1,093	0.553
84	2,196	1,460	0.665	1,866	1,006	0.539
85	2,036	1,315	0.646	1,604	828	0.516
86	1,760	1,105	0.628	1,475	744	0.504
87	1,629	991	0.608	1,385	659	0.476
88	1,444	833	0.577	1,177	512	0.435
89	1,352	695	0.514	1,053	460	0.437
90	1,171	582	0.497	867	340	0.392
91	1,066	494	0.463	818	278	0.340
92	967	413	0.427	712	260	0.365
93	846	331	0.391	595	185	0.311
94	767	275	0.359	540	132	0.244
95	600	185	0.308	459	91	0.198
96	439	118	0.269	334	61	0.183
97	293	67	0.229	200	31	0.155
98	206	40	0.194	156	15	0.096
99 & over	370	61	0.165	273	28	0.103

[a] Age nearest birthday.

Table S-26. Mortality experience of widow annuitants between anniversaries of retirement in 2015 and 2021

	All ages	under 50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95 & over
							Age[a]					
1. 2015-2021 experience												
Exposed (100% weight 2016-2020, 50% weight 2021)[b]	577,171	2,043	817	685	24,989	52,385	69,802	82,422	99,936	115,772	86,885	41,437
Actual deaths (100% weight 2016-2020, 50% weight 2021)	50,250	e	e	e	228	783	1,760	3,228	6,327	11,868	14,802	11,243
Crude rate per 1,000	87.1	e	e	e	9.1	14.9	25.2	39.2	63.3	102.5	170.4	271.3
Exposed (100% crude data)[b]	625,616	2,238	877	736	26,994	56,948	76,691	89,813	108,019	124,320	93,953	45,030
Actual deaths (100% crude data)	54,755	e	e	e	251	866	1,957	3,531	6,880	12,847	16,122	12,287
Crude rate per 1,000	87.5	e	e	e	e	15.2	25.5	39.3	63.7	103.3	171.6	272.9
2021 RRB Widow Table Act/Exp[c]	106.7%	e	e	e	98.8%	103.6%	111.6%	108.2%	107.4%	105.9%	108.1%	104.7%
2013 RRB Widow Table Act/Exp[d]	108.0%	e	e	e	97.8%	102.5%	110.5%	107.5%	107.5%	107.4%	110.5%	105.8%
2. Crude rate per 1,000 for individual years												
2015 - 2016	85.6	e	e	e	8.7	14.8	28.4	37.7	61.1	98.5	167.3	262.6
2016 - 2017	87.8	e	e	e	6.7	15.4	23.9	40.6	63.4	101.8	168.8	275.2
2017 - 2018	87.0	e	e	e	9.4	16.3	23.2	39.2	63.3	101.1	169.2	272.2
2018 - 2019	86.1	e	e	e	10.5	14.0	23.9	38.2	63.4	101.9	169.2	270.6
2019 - 2020	86.0	e	e	e	9.5	12.4	24.9	39.3	63.3	105.4	170.2	266.8
2020 - 2021	93.0	e	e	e	11.5	18.3	28.7	41.1	68.4	114.5	186.8	290.7
3. Ratio Act/Exp[c] for individual years												
2015 - 2016	103.5%	e	e	e	92.4%	100.8%	123.5%	103.5%	102.5%	101.4%	105.6%	101.8%
2016 - 2017	105.9%	e	e	e	71.6%	105.1%	104.2%	111.3%	106.6%	104.6%	106.3%	106.1%
2017 - 2018	105.5%	e	e	e	100.2%	111.3%	101.9%	107.8%	106.8%	103.7%	106.7%	104.6%
2018 - 2019	105.0%	e	e	e	111.8%	95.5%	105.3%	105.5%	107.0%	104.0%	106.5%	103.6%
2019 - 2020	105.7%	e	e	e	100.3%	84.7%	109.1%	108.4%	107.0%	107.6%	107.2%	101.8%
2020 - 2021	115.7%	e	e	e	121.3%	124.3%	124.6%	113.0%	116.1%	117.2%	117.4%	110.6%

[a] Age nearest birthday at the beginning of the year of exposure.

[b] Exposure is between anniversaries of retirement in indicated years.

[c] Expected based on 2021 RRB Mortality Table for Widows.

[d] Expected based on 2013 RRB Mortality Table for Widows.

[e] Fewer than 10 actual deaths.

Table S-27. Remarriage experience of widows between 2006 and 2021 anniversaries of widowhood

	All ages	Under 35	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 & over
					Age[a]					

1. Exposed

Duration[b]										
0	79,806	119	196	270	370	661	956	7,179	10,251	59,805
1	78,238	122	185	261	372	772	1,981	7,319	10,035	57,191
2	76,835	120	187	268	388	821	2,800	7,383	9,809	55,060
3	74,988	115	179	245	374	840	3,532	7,398	9,616	52,689
4	73,214	106	168	225	384	874	4,199	7,424	9,461	50,373
5 or more	1,318,426	62	281	751	1,244	2,754	6,301	44,826	81,684	1,180,523
Total	*1,701,505*	*643*	*1,196*	*2,019*	*3,133*	*6,721*	*19,769*	*81,528*	*130,855*	*1,455,641*

2. Actual remarriages

Duration[b]										
0	67	c	c	c	c	c	c	15	12	31
1	136	c	c	c	c	c	c	28	33	59
2	124	c	c	c	c	c	12	23	22	47
3	117	c	c	c	c	c	17	21	19	47
4	106	c	c	c	c	c	19	31	23	24
5 or more	828	c	c	c	c	c	18	163	174	443
Total	*1,378*	*19*	*12*	*20*	*17*	*25*	*70*	*281*	*283*	*651*

3. Crude remarriage rate per 1,000

Duration[b]										
0	0.84	c	c	c	c	c	c	2.09	1.17	0.52
1	1.74	c	c	c	c	c	c	3.83	3.29	1.03
2	1.61	c	c	c	c	c	4.29	3.12	2.24	0.85
3	1.56	c	c	c	c	c	4.81	2.84	1.98	0.89
4	1.45	c	c	c	c	c	4.52	4.18	2.43	0.48
5 or more	0.63	c	c	c	c	c	2.86	3.64	2.13	0.38
Total	*0.81*	*29.53*	*10.03*	*9.90*	*5.43*	*3.72*	*3.54*	*3.45*	*2.16*	*0.45*

4. Ratio Act/Exp[d]

Duration[b]										
0	54.6%	c	c	c	c	c	c	45.1%	43.7%	60.6%
1	53.7%	c	c	c	c	c	c	44.7%	56.2%	63.7%
2	51.8%	c	c	c	c	c	45.6%	37.6%	42.3%	62.4%
3	58.2%	c	c	c	c	c	47.1%	38.8%	46.7%	103.1%
4	56.3%	c	c	c	c	c	45.9%	62.9%	60.8%	59.6%
5 or more	80.3%	c	c	c	c	c	80.2%	71.4%	72.8%	91.0%
Total	*67.7%*	*95.4%*	*46.5%*	*62.8%*	*51.3%*	*58.5%*	*47.9%*	*57.5%*	*62.1%*	*82.2%*

5. Ratio Act/Exp[e]

Duration[b]										
0	138.8%	c	c	c	c	c	c	203.6%	94.6%	161.4%
1	91.2%	c	c	c	c	c	c	97.3%	99.2%	87.1%
2	95.3%	c	c	c	c	c	112.8%	86.6%	77.7%	103.5%
3	85.7%	c	c	c	c	c	114.7%	75.9%	68.1%	89.7%
4	91.9%	c	c	c	c	c	84.1%	105.4%	92.5%	86.3%
5 or more	103.7%	c	c	c	c	c	140.4%	112.4%	87.5%	109.0%
Total	*100.0%*	*142.0%*	*69.7%*	*95.0%*	*80.8%*	*94.9%*	*101.6%*	*106.1%*	*86.9%*	*105.2%*

[a] For durations 0-4, age nearest birthday on date of employee's death. For durations 5 and over, age nearest birthday at beginning of year of exposure which is on an anniversary of employee's death.

[b] Completed years since employee's death.

[c] Fewer than 10 actual remarriages.

[d] Expected based on 1997 RRB Remarriage Table.

[e] Expected based on 2021 RRB Remarriage Table.

Table S-28. Total termination experience of disabled children annuitants
between anniversaries of retirement in 2015 and 2021

Age[a]	Exposed	Actual terminations	Ratio Act./Exp.[b]	Ratio Act./Exp.[c]
Under 25	693	9	63.8%	86.1%
25-29	895	10	77.5	104.4
30-34	1,200	13	105.4	134.7
35-39	1,615	16	99.2	112.4
40-44	2,063	24	98.1	98.6
45-49	2,904	53	123.2	112.8
50-54	4,540	96	111.0	95.0
55-59	6,014	221	148.6	122.4
60-64	6,285	272	131.6	106.5
65-69	5,527	355	144.9	117.4
70-74	4,362	306	115.7	95.3
75-79	2,855	271	114.3	96.5
80-84	1,640	264	140.1	122.1
85-89	757	153	125.9	113.7
90 & over	387	99	106.5	102.7
All ages	41,737	2,162	126.1%	107.9%

[a] Age nearest birthday at beginning of the year of exposure.

[b] Expected based on 2004 RRB Total Termination Table for Disabled Children.

[c] Expected based on 2021 RRB Total Termination Table for Disabled Children.

Table S-29. Improvement in RRB Annuitant Mortality and Spouse Total Termination

Age of employee	Average annual improvement in annuitant mortality[a]		
	1957 - 1984	1984 - 2020	1957 - 2020
60 - 64	2.7%	1.7%	2.1%
65 - 69	1.4%	1.6%	1.5%
70 - 74	0.9%	1.5%	1.2%
75 - 79	0.8%	1.1%	1.0%
80 - 84	0.8%	0.8%	0.8%
85 - 89	0.9%	0.4%	0.6%
90 +	0.5%	-0.1%	0.2%

Age of spouse	Average annual improvement in spouse total termination[b]		
	1957 - 1984	1984 - 2020	1957 - 2020
60 - 64	c	1.5%	c
65 - 69	1.2%	1.4%	1.3%
70 - 74	0.7%	1.4%	1.1%
75 - 79	0.7%	1.1%	0.9%
80 - 84	0.8%	0.6%	0.7%
85+	0.4%	0.0%	0.1%

[a] Includes both disabled and nondisabled annuitants.

[b] Mainly death of employee or death of spouse.

[c] Insufficient data.

RETIREMENT STUDIES

1. <u>Age retirement</u>. Age retirement studies covering experience during calendar years 2019-2021 are summarized in Tables S-30 through S-32. Table S-30 shows a comparison among crude retirement rates for 2019-2021, the 28th valuation retirement rates, and the 29th valuation retirement rates. Tables S-31 and S-32 show ratios of actual retirements to those expected for employees with 5-29 years of service and for employees with 30 or more years of service, respectively.

2. <u>Disability retirement</u>. Table S-33 shows a comparison of crude disability retirement rates for 2015-2020 with the 28th and 29th valuation standards. Table S-34 shows ratios of actual retirements in 2015-2020 to those expected by age and service.

   Table S-35 shows percentages of disability retirements in 2015-2020 that were eligible for a disability freeze. Disability freeze standards are needed because of the financial interchange with social security. Assumptions must be made regarding the percentage of railroad retirement disability annuitants who would qualify under the social security definition of disability. Only these disabilities qualify for reimbursement under the financial interchange.

Table S-30. Rates[a] of immediate age retirement

Age[b]	5-29 years of service			30 or more years of service		
	Assumed rates 28th valuation	Assumed rates 29th valuation	2019-2021 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2019-2021 Crude rates
60				0.62	0.63	0.64
61				0.48	0.50	0.50
62	0.11	0.11	0.11	0.40	0.40	0.41
63	0.09	0.10	0.10	0.35	0.37	0.38
64	0.09	0.09	0.09	0.35	0.37	0.33
65	0.19	0.19	0.19	0.35	0.37	0.40
66	0.33	0.34	0.36	0.35	0.37	0.37
67	0.33	0.34	0.32	0.31	0.32	0.33
68	0.27	0.30	0.30	0.31	0.32	0.31
69	0.27	0.30	0.28	0.31	0.32	0.30
70	0.27	0.30	0.37	0.31	0.32	0.33
71	0.27	0.30	0.30	0.31	0.32	0.39
72	0.27	0.29	0.26	0.31	0.31	0.33
73	0.27	0.29	0.32	0.31	0.31	0.32
74	0.23	0.29	0.34	0.25	0.31	0.28
75 & over	0.23	0.29	0.27	0.25	0.31	0.30

[a] Technically probabilities, because exposures were not adjusted for other separations.

[b] Age attained in calendar year of exposure.

Table S-31. Immediate age[a] retirement experience of railroad employees with
5-29 years of service during calendar years 2019-2021

Age[b]	Exposed[c]	Actual retirements	Crude rate[d] per 1,000	Expected retirements I[e]	Ratio Act./Exp. I[e]	Expected retirements II[e]	Ratio Act./Exp. II[e]
62	7,054	760	107.7	776	97.9%	776	97.9%
63	5,678	557	98.1	511	109.0	568	98.1
64	4,436	403	90.8	399	100.9	399	100.9
65	3,570	686	192.2	678	101.1	678	101.1
66	2,595	937	361.1	856	109.4	882	106.2
67	1,552	499	321.5	512	97.4	528	94.6
68	953	284	298.0	257	110.4	286	99.3
69	671	190	283.2	181	104.9	201	94.4
70	470	174	370.2	127	137.1	141	123.4
71	305	93	304.9	82	112.9	92	101.6
72	201	52	258.7	54	95.8	58	89.2
73	139	44	316.5	38	117.2	40	109.2
74	86	29	337.2	20	146.6	25	116.3
75 & over	207	56	270.5	48	117.6	60	93.3
All ages	27,917	4,764	170.6	4,540	104.9	4,735	100.6

[a] Nondisability retirement.

[b] Age attained in calendar year of exposure.

[c] Exposure includes part of the year that employees were not eligible for age retirement because they were under 62.

[d] Technically probabilities, because exposures were not adjusted for other separations.

[e] I and II denote expected according to rates used in the 28th and 29th valuations, respectively.

Table S-32. Immediate age[a] retirement experience of railroad employees with
30 or more years of service during calendar years 2019-2021

Age[b]	Exposed[c]	Actual retirements	Crude rate[d] per 1,000	Expected retirements I[e]	Ratio Act./Exp. I[e]	Expected retirements II[e]	Ratio Act./Exp. II[e]
60	5,417	3,460	638.7	3,359	103.0%	3,413	101.4%
61	2,837	1,431	504.4	1,362	105.1	1,419	100.9
62	2,051	838	408.6	820	102.1	820	102.1
63	1,673	643	384.3	586	109.8	619	103.9
64	1,405	467	332.4	492	95.0	520	89.8
65	1,241	494	398.1	434	113.7	459	107.6
66	948	352	371.3	332	106.1	351	100.4
67	720	241	334.7	223	108.0	230	104.6
68	571	179	313.5	177	101.1	183	98.0
69	451	135	299.3	140	96.6	144	93.5
70	318	106	333.3	99	107.5	102	104.2
71	219	85	388.1	68	125.2	70	121.3
72	124	41	330.6	38	106.7	38	106.7
73	87	28	321.8	27	103.8	27	103.8
74	53	15	283.0	13	113.2	16	91.3
75 & over	193	57	295.3	48	118.1	60	95.3
All ages	18,308	8,572	468.2	8,218	104.3	8,471	101.2

[a] Nondisability retirement.

[b] Age attained in calendar year of exposure.

[c] Exposure includes part of the year that employees were not eligible for age retirement because they were under 60.

[d] Technically probabilities, because exposures were not adjusted for other separations.

[e] I and II denote expected according to rates used in the 28th and 29th valuations, respectively.

Table S-33. Rates[a] of immediate[b] disability retirement and weighted crude rates

Age[c]	10-19 years of service			20-24 years of service			25-29 years of service			30 or more years of service		
	Assumed rates 28th valuation	Assumed rates 29th valuation	2015 - 2020 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2015 - 2020 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2015 - 2020 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2015 - 2020 Crude rates
Under 35	0.0012	0.0011	0.0006	0.0046	d	d	0.0033	d	d	0.0033	d	d
35	0.0012	0.0012	d	0.0049	d	d	0.0034	d	d	0.0034	d	d
36	0.0012	0.0013	0.0011	0.0052	d	d	0.0035	d	d	0.0035	d	d
37	0.0013	0.0014	0.0009	0.0055	0.0064	d	0.0036	d	d	0.0036	d	d
38	0.0014	0.0015	0.0013	0.0058	0.0066	d	0.0037	d	d	0.0037	d	d
39	0.0014	0.0016	0.0015	0.0061	0.0068	d	0.0038	d	d	0.0038	d	d
40	0.0015	0.0017	0.0017	0.0064	0.0069	0.0067	0.0039	d	d	0.0039	d	d
41	0.0017	0.0019	0.0026	0.0067	0.0072	0.0053	0.0041	0.0043	d	0.0041	d	d
42	0.0018	0.0021	0.0021	0.0070	0.0075	0.0071	0.0044	0.0045	d	0.0044	d	d
43	0.0020	0.0023	0.0033	0.0073	0.0078	0.0083	0.0049	0.0048	d	0.0049	d	d
44	0.0021	0.0026	0.0028	0.0076	0.0081	0.0078	0.0054	0.0051	d	0.0054	d	d
45	0.0024	0.0029	0.0034	0.0079	0.0086	0.0088	0.0060	0.0054	d	0.0060	d	d
46	0.0027	0.0032	0.0036	0.0083	0.0091	0.0100	0.0066	0.0058	0.0059	0.0066	d	d
47	0.0030	0.0036	0.0037	0.0087	0.0097	0.0094	0.0074	0.0062	0.0049	0.0074	0.0136	d
48	0.0034	0.0041	0.0045	0.0093	0.0104	0.0102	0.0082	0.0067	0.0045	0.0082	0.0144	d
49	0.0039	0.0046	0.0042	0.0100	0.0113	0.0131	0.0090	0.0074	0.0092	0.0090	0.0152	d
50	0.0044	0.0053	0.0058	0.0108	0.0122	0.0130	0.0100	0.0081	0.0106	0.0100	0.0160	0.0262
51	0.0051	0.0060	0.0062	0.0118	0.0134	0.0158	0.0111	0.0089	0.0084	0.0111	0.0168	0.0224
52	0.0059	0.0069	0.0068	0.0130	0.0147	0.0141	0.0123	0.0098	0.0078	0.0123	0.0176	0.0212
53	0.0069	0.0079	0.0074	0.0145	0.0163	0.0132	0.0136	0.0110	0.0127	0.0136	0.0184	0.0128
54	0.0080	0.0090	0.0057	0.0163	0.0182	0.0173	0.0150	0.0123	0.0123	0.0150	0.0192	0.0130
55	0.0094	0.0104	0.0101	0.0185	0.0204	0.0185	0.0166	0.0138	0.0159	0.0166	0.0200	0.0210
56	0.0111	0.0120	0.0137	0.0212	0.0230	0.0218	0.0184	0.0156	0.0157	0.0184	0.0208	0.0204
57	0.0131	0.0138	0.0124	0.0244	0.0260	0.0265	0.0203	0.0176	0.0148	0.0203	0.0216	0.0191
58	0.0155	0.0160	0.0182	0.0284	0.0296	0.0324	0.0225	0.0200	0.0199	0.0225	0.0224	0.0248
59	0.0183	0.0185	0.0182	0.0333	0.0337	0.0324	0.0249	0.0229	0.0255	0.0249	0.0232	0.0238
60	0.0267	0.0277	0.0280	0.0393	0.0387	0.0420	0.0275	0.0261	0.0218	0.0107	0.0092	0.0093
61	0.0312	0.0341	0.0326	0.0465	0.0444	0.0421	0.0304	0.0300	0.0322	0.0078	0.0067	0.0063
62	0.0318	0.0349	0.0377	0.0458	0.0460	0.0488	0.0396	0.0381	0.0307	0.0054	0.0047	0.0051
63	0.0288	0.0312	0.0283	0.0436	0.0417	0.0462	0.0373	0.0338	0.0345	0.0035	0.0031	0.0026
64	0.0229	0.0239	0.0252	0.0375	0.0348	0.0326	0.0312	0.0269	0.0307	0.0021	0.0020	d
65	0.0143	0.0141	0.0140	0.0215	0.0236	0.0135	0.0153	0.0158	0.0246	0.0012	0.0013	d
66	0.0036	0.0027	d	0.0039	0.0049	d	0.0039	0.0057	d	0.0008	0.0011	d

[a] Technically probabilities, because exposures were not adjusted for other terminations.

[b] Immediate retirements are defined as those for which the calendar year of retirement is the same as, or the year following, the calendar year of last employment in the railroad industry.

[c] Age attained in calendar year of exposure.

[d] Insufficient data.

Table S-34. Immediate disability retirement experience (weighted) of railroad employees during calendar years 2015-2020

		Attained age[a]							
	All ages	Under 40	40-44	45-49	50-54	55-59	60-64	65	66[b]
1. 10-19 years of service									
Exposed	414,804	106,528	90,473	81,236	62,180	45,379	24,589	2,544	1,877
Actual retirements	2,478	104	225	313	396	644	757	36	5
Crude rate per 1,000[c]	6.0	1.0	2.5	3.8	6.4	14.2	30.8	14.0	2.7
Ratio Act./Exp.[d]	109.5%	76.2%	137.0%	126.2%	106.4%	108.3%	107.4%	97.6%	f
Ratio Act./Exp.[e]	99.8%	73.4%	117.6%	105.6%	91.7%	102.9%	100.0%	99.0%	f
2. 20-24 years of service									
Exposed	122,135	747	18,962	35,518	29,375	21,950	13,180	1,374	1,030
Actual retirements	2,092	1	140	367	429	567	566	19	5
Crude rate per 1,000[c]	17.1	1.3	7.4	10.3	14.6	25.8	42.9	13.5	4.9
Ratio Act./Exp.[d]	105.7%	f	102.5%	116.7%	111.2%	104.7%	100.3%	62.6%	f
Ratio Act./Exp.[e]	100.0%	f	95.8%	105.0%	98.7%	99.0%	103.3%	57.1%	f
3. 25-29 years of service									
Exposed	66,745	0	564	12,785	21,450	18,217	11,642	1,219	870
Actual retirements	1,009	0	2	78	222	331	342	30	5
Crude rate per 1,000[c]	15.1	f	2.7	6.1	10.3	18.1	29.4	24.6	5.7
Ratio Act./Exp.[d]	88.1%	f	f	77.4%	83.3%	89.2%	89.5%	160.9%	f
Ratio Act./Exp.[e]	99.9%	f	f	92.7%	103.1%	102.2%	95.1%	155.8%	f
4. 30 or more years of service									
Exposed	105,766	0	0	391	8,782	49,036	42,599	2,861	2,099
Actual retirements	1,543	f	f	4	145	1,099	288	8	0
Crude rate per 1,000[c]	14.6	f	f	9.0	16.5	22.4	6.8	2.6	0.0
Ratio Act./Exp.[d]	101.2%	f	f	f	123.8%	103.3%	86.1%	f	f
Ratio Act./Exp.[e]	100.0%	f	f	f	90.6%	101.6%	99.6%	f	f

[a] Age attained in calendar year of exposure.

[b] Refers to employees retiring before normal retirement age. Exposure includes part of the year in which employees were not eligible for disability retirement because they passed normal retirement age.

[c] Technically probabilities of retirement, because exposures were not adjusted for other terminations.

[d] Expected based on 28th valuation disability rates.

[e] Expected based on 29th valuation disability rates.

[f] Insufficient data.

Table S-35. Percentages of immediate[a] disability retirements meeting the disability freeze standards of the Social Security Act

Age[b]	10-19 years of service			20-24 years of service			25-29 years of service			30 or more years of service		
	Assumed rates 28th valuation	Assumed rates 29th valuation	2015-2020 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2015-2020 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2015-2020 Crude rates	Assumed rates 28th valuation	Assumed rates 29th valuation	2015-2020 Crude rates
Under 35	97.6%	98.5%	100.0%	52.8%	d	c	52.8%	d	c	52.8%	d	c
35	97.6	98.5	c	52.8	d	c	52.8	d	c	52.8	d	c
36	97.6	98.5	100.0	52.8	d	c	52.8	d	c	52.8	d	c
37	97.6	98.5	93.3	52.8	52.9%	c	52.8	d	c	52.8	d	c
38	97.6	98.5	100.0	52.8	53.1	c	52.8	d	c	52.8	d	c
39	97.6	98.5	96.4	52.8	53.3	c	52.8	d	c	52.8	d	c
40	97.6	98.5	96.8	52.8	53.5	c	52.8	d	c	52.8	d	c
41	97.6	98.5	95.6	52.8	53.8	53.8%	52.8	56.7%	c	52.8	d	c
42	97.6	98.5	100.0	52.8	54.2	66.7	52.8	57.1	c	52.8	d	c
43	97.6	98.5	96.3	52.8	54.7	41.5	52.8	57.7	c	52.8	d	c
44	97.6	98.5	98.0	52.8	55.3	40.5	52.8	58.3	c	52.8	d	c
45	97.6	98.5	96.6	52.9	56.2	61.8	52.9	59.3	c	52.9	d	c
46	97.6	98.5	100.0	53.0	57.2	56.5	53.0	60.3	54.5%	53.0	d	c
47	97.6	98.5	98.3	53.3	58.6	67.2	53.3	61.8	61.5	53.3	47.0%	c
48	97.6	98.5	98.6	53.6	60.4	60.9	53.6	63.7	60.0	53.6	48.4	c
49	97.6	98.5	100.0	54.3	62.7	60.3	54.3	66.1	71.8	54.3	50.2	c
50	97.6	98.5	98.7	55.6	65.5	72.6	55.6	69.1	66.7	55.6	52.5	44.4%
51	97.6	98.5	100.0	57.8	69.3	72.4	57.8	73.1	73.0	57.8	55.5	34.8
52	97.6	98.5	100.0	61.7	73.9	73.1	61.7	78.0	87.1	61.7	59.2	34.3
53	97.6	98.5	97.8	68.8	80.1	81.2	68.8	84.5	85.5	68.8	64.2	77.4
54	97.6	98.5	98.5	81.2	87.8	88.3	81.2	92.6	92.5	81.2	70.3	78.7
55	97.6	98.5	97.1	94.6	94.4	96.7	94.6	94.4	95.3	94.6	94.4	97.1
56	97.6	98.5	97.8	94.6	94.4	95.9	94.6	94.4	93.1	94.6	94.4	97.9
57	97.6	98.5	99.1	94.6	94.4	94.4	94.6	94.4	96.2	94.6	94.4	92.7
58	97.6	98.5	100.0	94.6	94.4	90.3	94.6	94.4	97.0	94.6	94.4	94.0
59	97.6	98.5	99.3	94.6	94.4	87.7	94.6	94.4	93.9	94.6	94.4	93.9
60	94.5	94.7	97.3	94.6	94.4	94.7	94.6	94.4	93.1	94.6	94.4	96.8
61	94.5	94.7	93.6	94.6	94.4	95.9	94.6	94.4	93.3	94.6	94.4	98.3
62	94.5	94.7	94.5	94.6	94.4	94.6	94.6	94.4	95.8	94.6	94.4	93.8
63	94.5	94.7	95.0	94.6	94.4	92.5	94.6	94.4	93.4	94.6	94.4	91.7
64	94.5	94.7	88.9	94.6	94.4	92.9	94.6	94.4	90.7	94.6	94.4	c
65	94.5	94.7	96.9	94.6	94.4	100.0	94.6	94.4	91.7	94.6	94.4	c
66	94.5	94.7	c	94.6	94.4	c	94.6	94.4	c	94.6	94.4	c

[a] Immediate retirements are defined as those for which the calendar year of retirement is the same as, or the year following, the calendar year of last employment in the railroad industry.

[b] Age attained in calendar year of exposure.

[c] Insufficient data.

[d] Not applicable.

WITHDRAWAL STUDIES

Table S-36 shows the select withdrawal experience for the years 2013-2018. The actual withdrawals are shown net of re-entrants into the industry for each attained age and service group. Since a re-entrant maintains his prior earnings and service credit, he cannot be considered a final withdrawal. The table presents crude net withdrawal rates by attained age and years of service along with ratios of actual net withdrawals to those expected on the basis of the 29th valuation standard.

Table S-36. Withdrawal experience of railroad employees during calendar years 2013-2018, by attained age and years of service

Years of service[a]	Attained age[b] under 25				Attained age[b] 25-34				Attained age[b] 35-44			
	Exposed	Actual net[c] withdrawals	Crude rate per 100	Ratio Act./Exp.[d]	Exposed	Actual net[c] withdrawals	Crude rate per 100	Ratio Act./Exp.[d]	Exposed	Actual net[c] withdrawals	Crude rate per 100	Ratio Act./Exp.[d]
0	24,827	5,455	22.0	111.0%	45,284	7,127	15.7	114.0%	22,903	4,132	18.0	98.6%
1	15,556	2,676	17.2	115.5	41,491	5,039	12.1	117.9	20,890	2,700	12.9	123.1
2	9,517	904	9.5	110.5	42,705	3,270	7.7	116.0	22,883	1,734	7.6	130.6
3	5,369	390	7.3	119.1	39,868	2,574	6.5	140.4	23,645	1,241	5.2	145.8
4	2,469	159	6.4	126.3	32,825	1,803	5.5	140.8	22,393	1,016	4.5	146.4
5	907	52	5.7	124.6	28,251	1,297	4.6	131.2	22,187	881	4.0	136.9
6	167	15	9.0	219.1	24,470	1,099	4.5	136.1	22,708	847	3.7	143.5
7	13	e	e	e	20,847	753	3.6	120.4	22,872	743	3.2	129.9
8	4	e	e	e	17,065	508	3.0	106.3	22,504	653	2.9	126.2
9	-	e	e	e	15,029	431	2.9	114.7	24,383	582	2.4	113.7
10	-	e	e	e	12,155	315	2.6	112.7	25,163	655	2.6	137.0
11	-	e	e	e	8,405	221	2.6	131.5	24,151	549	2.3	126.3
12	-	e	e	e	5,297	146	2.8	153.1	22,251	447	2.0	125.6
13	-	e	e	e	3,005	62	2.1	137.5	19,936	387	1.9	129.4
14	-	e	e	e	1,444	28	1.9	138.5	17,539	298	1.7	121.4
15	-	e	e	e	576	e	e	e	16,432	259	1.6	121.2
16	-	e	e	e	105	e	e	e	15,254	245	1.6	146.0
17	e	-	e	e	11	e	e	e	13,583	173	1.3	115.8
18	e	-	e	e	-	e	e	e	11,938	133	1.1	111.4
19	e	-	e	e	-	e	e	e	10,040	117	1.2	129.5
20	e	-	e	e	-	e	e	e	7,710	89	1.2	144.3
21	e	-	e	e	-	e	e	e	4,986	57	1.1	142.9
22	e	-	e	e	-	e	e	e	3,201	12	0.4	62.5
23	e	-	e	e	-	e	e	e	2,074	13	0.6	104.5
24	e	-	e	e	-	e	e	e	1,157	e	e	e
25	e	-	e	e	-	e	e	e	444	e	e	e
26	e	-	e	e	e	-	e	e	86	e	e	e
27	e	-	e	e	e	-	e	e	2	e	e	e
28	e	-	e	e	e	-	e	e	1	e	e	e
29	e	-	e	e	e	-	e	e	e	-	e	e
30 & over	e	-	e	e	e	-	e	e	e	-	e	e
All years	58,829	9,651	16.4	112.8%	338,833	24,679	7.3	121.3%	423,316	17,969	4.2	121.5%

[a] Service as of beginning of calendar year of exposure rounded up to next highest whole year.

[b] Age attained in calendar year of exposure.

[c] Withdrawals less re-entrants.

[d] Expected based on 29th valuation withdrawal rates.

[e] Less than 10 actual net withdrawals.

Table S-36. Withdrawal experience of railroad employees during calendar years 2013-2018, by attained age and years of service (continued)

Years of service[a]	Attained age[b] 45-54				Attained age[b] 55 and over				All ages			
	Exposed	Actual net[c] withdrawals	Crude rate per 100	Ratio Act./Exp.[d]	Exposed	Actual net[c] withdrawals	Crude rate per 100	Ratio Act./Exp.[d]	Exposed	Actual net[c] withdrawals	Crude rate per 100	Ratio Act./Exp.[d]
0	10,340	2,233	21.6	91.9%	2,758	586	21.2	85.7%	106,112	19,533	18.4	105.8%
1	9,522	1,268	13.3	111.9	2,735	314	11.5	89.0	90,194	11,997	13.3	116.8
2	10,505	782	7.4	118.2	3,095	267	8.6	103.9	88,705	6,957	7.8	118.3
3	11,425	616	5.4	134.8	3,526	220	6.2	99.0	83,833	5,041	6.0	136.5
4	11,410	529	4.6	132.5	3,685	189	5.1	96.8	72,782	3,696	5.1	137.1
5	11,898	515	4.3	139.6	3,518	187	5.3	115.6	66,761	2,932	4.4	133.0
6	12,701	460	3.6	124.9	3,769	186	4.9	120.4	63,815	2,607	4.1	135.2
7	13,693	422	3.1	118.5	4,125	203	4.9	140.6	61,550	2,121	3.4	124.9
8	13,944	378	2.7	113.0	4,449	177	4.0	128.3	57,966	1,716	3.0	116.9
9	15,584	428	2.7	130.8	5,048	168	3.3	118.9	60,044	1,609	2.7	118.6
10	16,434	406	2.5	123.5	5,566	155	2.8	116.0	59,318	1,531	2.6	125.5
11	15,999	363	2.3	126.0	5,858	161	2.7	130.9	54,413	1,294	2.4	127.6
12	15,299	281	1.8	114.8	5,796	132	2.3	113.9	48,643	1,006	2.1	123.9
13	14,571	294	2.0	134.5	5,794	122	2.1	117.0	43,306	865	2.0	129.7
14	13,764	215	1.6	111.6	5,626	111	2.0	123.3	38,373	652	1.7	118.9
15	13,979	212	1.5	116.7	5,659	84	1.5	99.0	36,646	560	1.5	114.8
16	14,707	180	1.2	94.1	5,928	100	1.7	112.5	35,994	526	1.5	117.1
17	14,817	202	1.4	123.9	5,979	116	1.9	138.6	34,390	491	1.4	123.9
18	15,324	237	1.5	154.7	6,279	83	1.3	94.4	33,541	453	1.4	125.6
19	15,677	193	1.2	123.1	6,458	103	1.6	122.7	32,175	413	1.3	124.7
20	14,930	143	1.0	106.4	6,251	111	1.8	136.6	28,891	343	1.2	123.7
21	12,780	114	0.9	99.1	5,444	85	1.6	120.1	23,210	256	1.1	113.4
22	11,546	103	0.9	111.5	5,051	67	1.3	102.0	19,798	182	0.9	102.7
23	11,112	97	0.9	109.1	5,034	68	1.4	122.8	18,220	178	1.0	113.6
24	10,368	73	0.7	117.3	5,056	59	1.2	106.1	16,581	138	0.8	111.6
25	9,049	55	0.6	101.3	4,939	55	1.1	111.4	14,432	110	0.8	103.9
26	7,885	60	0.8	126.8	4,885	65	1.3	147.8	12,856	125	1.0	136.3
27	6,619	39	0.6	98.2	4,981	61	1.2	153.1	11,602	100	0.9	125.7
28	5,552	29	0.5	104.5	5,267	27	0.5	102.5	10,820	56	0.5	103.5
29	4,460	16	0.4	71.7	5,487	31	0.6	141.2	9,947	47	0.5	106.2
30 & over	13,872	165	1.2	226.6	82,087	1,367	1.7	163.9	95,959	1,532	1.6	168.9
All years	379,766	11,108	2.9	114.4%	230,133	5,660	2.5	118.1%	1,430,877	69,067	4.8	118.7%

[a] Service as of beginning of calendar year of exposure rounded up to next highest whole year.

[b] Age attained in calendar year of exposure.

[c] Withdrawals less re-entrants.

[d] Expected based on 29th valuation withdrawal rates.

[e] Less than 10 actual net withdrawals.

EMPLOYEE AND BENEFICIARY CENSUSES, FAMILY COMPOSITION, AND MISCELLANEOUS STATISTICS

Age and service distributions of active and inactive employees are shown in Tables S-37a and S-38. A distribution including estimated tier 2 benefits by age and completed years of service for active employees is shown in Table S-37b. A comparison between 2019 and 2022 active censuses is shown in Table S-39.

Tables S-40 and S-41 provide a census of beneficiaries on December 31, 2022. Also included are their tier 1, tier 2 and vested dual benefit amounts.

Table S-42 shows the average number of service months in a year for calendar years 2018-2020 by attained age group and years of service. The number of service months credited to an employee for a given year is equal to the employee's total creditable tier 2 earnings in the year, divided by one-twelfth of the tier 2 earnings base for the year, with a maximum of 12 and a minimum of the number of months in which the individual had service.

The average creditable earnings per service month during 2022 are shown in Table S-43. Because of the difference in the maximum creditable earnings for tier 1 and tier 2 benefits, separate salary scales were constructed.

The age distribution of new entrants during calendar years 2018-2021 is shown in Table S-44, as is the distribution for 2015-2018.

Table S-45 presents family characteristics of railroad employees who died in the period 2018-2021 with a current connection.

Table S-46 provides selected employment and benefit statistics for 2019 and 2022.

Table S-37a. Distribution of 2022 active employees[a] by age and completed years of service

Age in 2022	Completed years of service											
	Total	0	1	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & over
Total	196,806	17,744	7,187	16,755	35,648	36,826	37,033	22,063	15,695	5,551	1,328	976
Under 20	671	612	57	2	0	0	0	0	0	0	0	0
20-24	6,021	3,552	1,304	1,069	96	0	0	0	0	0	0	0
25-29	11,861	3,679	1,614	3,511	2,943	114	0	0	0	0	0	0
30-34	21,032	3,251	1,380	3,888	8,455	3,930	128	0	0	0	0	0
35-39	27,580	2,336	1,023	2,999	8,209	8,534	4,397	82	0	0	0	0
40-44	30,546	1,680	719	2,104	6,080	8,021	9,141	2,696	105	0	0	0
45-49	29,717	1,124	440	1,296	3,901	5,918	8,191	5,922	2,856	69	0	0
50-54	30,017	782	314	902	2,863	4,850	6,831	6,031	5,509	1,888	47	0
55-59	23,165	493	185	570	1,798	3,189	4,869	4,234	4,209	2,787	789	42
60-64	12,512	190	109	305	1,012	1,827	2,797	2,465	2,437	594	367	409
65-69	3,092	31	29	83	242	393	602	558	519	172	98	365
70 & over	592	14	13	26	49	50	77	75	60	41	27	160

[a] Employees alive and not retired at the end of 2022 with some railroad service in 2022.

Table S-37b. Distribution of Tier 2 benefits for 2022 active employees [a] by age and completed years of service

Age in 2022	Total	Completed years of service
		0	1	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 & over
Total number	196,806	17,744	7,187	16,755	35,648	36,826	37,033	22,063	15,695	5,551	1,328	976
Avg monthly T2 pay[b]	7,500	5,100	6,000	6,900	7,500	7,700	7,900	8,000	8,100	8,100	8,000	8,300
Avg monthly T2 ben[d]	858	e	e	e	366	615	901	1,203	1,463	1,716	1,947	2,428
Under 0	671	612	57	2	0	0	0	0	0	0	0	0
	4,200	4,100	4,800	c	0	0	0	0	0	0	0	0
	e	e	e	e	0	0	0	0	0	0	0	0
20-24	6,021	3,552	1,304	1,069	96	0	0	0	0	0	0	0
	5,400	4,600	5,500	6,300	6,500	0	0	0	0	0	0	0
	209	e	e	e	209	0	0	0	0	0	0	0
25-29	11,861	3,679	1,614	3,511	2,943	114	0	0	0	0	0	0
	6,500	4,900	5,900	6,800	7,300	7,400	0	0	0	0	0	0
	319	e	e	e	312	504	0	0	0	0	0	0
30-34	21,032	3,251	1,380	3,888	8,455	3,930	128	0	0	0	0	0
	7,100	5,100	6,000	7,000	7,400	7,700	7,500	0	0	0	0	0
	432	e	e	e	361	574	757	0	0	0	0	0
35-39	27,580	2,336	1,023	2,999	8,209	8,534	4,397	82	0	0	0	0
	7,500	5,300	6,300	7,000	7,500	7,800	7,900	8,000	0	0	0	0
	576	e	e	e	374	617	866	1,065	0	0	0	0
40-44	30,546	1,680	719	2,104	6,080	8,021	9,141	2,696	105	0	0	0
	7,600	5,400	6,400	7,200	7,500	7,700	7,900	8,100	8,000	0	0	0
	726	e	e	e	375	622	908	1,182	1,356	0	0	0
45-49	29,717	1,124	440	1,296	3,901	5,918	8,191	5,922	2,856	69	0	0
	7,800	5,600	6,200	7,100	7,500	7,700	7,900	8,100	8,200	8,300	0	0
	898	e	e	e	377	622	912	1,221	1,457	1,669	0	0
50-54	30,017	782	314	902	2,863	4,850	6,831	6,031	5,509	1,888	47	0
	7,900	5,600	6,300	7,200	7,500	7,700	7,900	8,000	8,200	8,200	8,200	0
	1,041	e	e	e	378	624	907	1,217	1,484	1,724	1,911	0
55-59	23,165	493	185	570	1,798	3,189	4,869	4,234	4,209	2,787	789	42
	7,800	5,900	6,300	7,100	7,500	7,600	7,800	8,000	8,100	8,100	8,000	7,900
	1,128	e	e	e	377	623	899	1,199	1,466	1,725	1,934	2,115
60-64	12,512	190	109	305	1,012	1,827	2,797	2,465	2,437	594	367	409
	7,700	5,900	6,700	7,000	7,400	7,400	7,700	7,800	7,800	7,900	8,000	8,300
	1,097	e	e	e	370	609	895	1,177	1,434	1,680	1,988	2,325
65-69	3,092	31	29	83	242	393	602	558	519	172	98	365
	7,700	5,500	6,400	7,200	7,100	7,400	7,700	7,700	7,800	7,900	7,900	8,400
	1,229	e	e	e	368	613	893	1,145	1,415	1,649	1,951	2,481
70 & over	592	14	13	26	49	50	77	75	60	41	27	160
	7,300	c	3,800	3,400	5,800	7,400	7,400	7,400	7,800	7,500	7,600	8,400
	1,526	e	e	e	302	615	862	1,085	1,386	1,601	1,850	2,652

[a] Employees alive and not retired at the end of 2022 with some railroad service in 2022.

[b] Rounded to nearest 100.

[c] Less than 10 active employees in the age and service bracket for Tier 2 pay.

[d] Tier 2 benefits are not adjusted for age reductions for retirement prior to full age retirement.

[e] Less than 10 active employees in the age and service bracket for those that have accrued a Tier 2 benefit.

Table S-38. Census of vested[a] inactive employees[b] in 2022 by age and
completed years of service

Age in 2019	Completed years of service						
	Total	5-9	10-14	15-19	20-24	25-29	30 & over
Total	60,365	31,065	17,426	6,984	2,929	931	1,030
Under 35	5,156	4,666	487	3	0	0	0
35-39	7,820	5,510	1,983	326	1	0	0
40-44	9,011	5,400	2,578	900	131	2	0
45-49	9,224	5,109	2,436	1,182	435	62	0
50-54	9,770	4,687	2,857	1,332	644	187	63
55-59	9,073	3,194	2,720	1,345	725	292	797
60-64	7,398	2,048	2,864	1,322	744	298	122
65 & over	2,913	451	1,501	574	249	90	48

[a] Employees with at least 10 years of total service, or 5 years of service after 1995.

[b] Employees alive and not retired at the end of 2022 with no railroad work in 2022.

Table S-39. Comparison between 2022 and 2019 of selected characteristics of active[a] railroad employees

	2022	2019	Change from 2019 to 2022	
			Number	Percent
Number alive and not retired	196,806	208,588	-11,782	-5.6%
Percent with 5 or more years of service	78.8%	80.1%	b	b
Number age 60 or over	16,196	16,260	-64	-0.4%
Number age 65 or over	3,684	3,682	2	0.1%
Number age 60-64 with 30 or more years of service	1,370	2,565	-1,195	-46.6%
Average age on December 31	44.9	44.4	0.5	b
Median age on December 31	45.1	44.3	0.8	b
Average years of service				
All employees	13.4	13.0	0.4	b
Employees under age 45	8.3	8.3	0.0	b
Employees age 45-49	15.7	15.1	0.6	b
Employees age 60 or over	21.0	22.6	-1.6	b
Employees age 65 or over	23.3	25.0	-1.7	b

[a] Active employees were those with some railroad service during the year.

[b] Not applicable.

Table S-40. Census of employees and spouse annuitants on December 31, 2022[a]

Age[c]	Number	Monthly benefits[b]			
		Tier1	Tier 2	Vested dual	Supplemental
1. Employee age annuitants					
60-64	12,744	$ 35,302,115	$ 19,629,658	$ -	$ 207,800
65-69	41,005	105,428,140	53,665,844	-	795,208
70-74	49,300	117,625,055	56,323,752	-	974,836
75-79	35,179	81,568,145	35,391,022	7,332	724,691
80-84	19,357	41,968,255	17,222,342	73,283	407,593
85-89	11,727	20,890,417	8,871,232	181,828	226,227
90-94	6,310	10,280,561	3,990,526	172,378	116,055
95 & over	2,555	3,716,641	1,307,133	107,311	47,306
Total	178,177	$ 416,779,330	$ 196,401,508	$ 542,132	$ 3,499,717
2. Employee disability annuitants					
Under 40	126	$ 320,085	$ 23,663	$ -	$ -
40-44	396	985,117	164,825	-	-
45-49	1,037	2,703,948	667,899	-	-
50-54	2,251	5,803,540	1,629,261	-	-
55-59	3,456	8,782,126	2,727,808	-	-
60-64	7,236	18,154,181	6,229,202	-	34,362
65-69	14,826	36,012,843	12,527,406	-	187,623
70-74	16,699	39,535,638	13,206,835	-	254,553
75-79	11,319	25,559,087	8,165,707	3,780	180,760
80-84	5,210	10,918,513	3,502,240	26,820	90,112
85-89	2,133	4,148,827	1,284,147	38,092	43,103
90-94	787	1,425,346	397,998	23,564	17,105
95 & over	197	310,784	66,153	10,066	3,826
Total	65,673	$ 154,660,034	$ 50,593,144	$ 102,322	$ 811,443
3. Spouse annuitants					
Under 40	48	$ 60,505	$ 27,080	$ -	
40-44	71	88,212	34,837	-	
45-49	100	132,876	59,323	-	
50-54	161	214,966	99,363	-	
55-59	287	376,375	188,641	-	
60-64	17,733	20,714,373	12,080,996	-	
65-69	39,734	32,429,545	22,120,712	-	
70-74	39,974	24,931,530	20,610,330	-	
75-79	25,261	14,647,219	11,861,380	-	
80-84	11,763	5,986,970	4,807,959	-	
85-89	4,630	2,251,156	1,702,198	-	
90-94	1,296	594,429	418,791	-	
95 & over	188	76,641	55,561	-	
Total	141,246	$ 102,504,797	$ 74,067,171	$ -	

[a] Includes annuities which were in withheld status as of December 31, 2022. Therefore, these figures
 may disagree with other published data.

[b] Amounts shown reflect benefits paid in January 2023. Totals may not add due to rounding.

[c] Age attained in 2022.

Table S-41. Census of survivor annuitants on December 31, 2022[a]

Age[c]	Number	Monthly benefits[b]		
		Tier 1	Tier 2	Vested dual
1. Aged widows and widowers[d]				
60-64	3,259	$ 6,484,470	$ 1,624,074	$ -
65-69	8,636	16,454,595	4,112,709	-
70-74	13,277	22,943,112	6,152,101	-
75-79	15,712	25,929,296	6,730,899	-
80-84	15,409	22,744,720	6,045,847	155
85-89	13,829	19,121,916	4,948,997	-
90-94	10,880	15,154,901	3,355,728	-
95 & over	5,410	7,262,044	1,296,606	579
Total	86,412	$ 136,095,054	$ 34,266,961	$ 734
2. Other survivors[e]				
0-4	62	$ 101,213	$ 5,514	$ -
5-9	287	465,102	30,567	-
10-14	723	1,222,953	85,580	-
15-19	910	1,601,668	137,437	-
20-24	65	112,024	10,426	-
25-29	129	231,027	23,619	-
30-34	212	338,627	43,603	-
35-39	314	499,121	67,130	-
40-44	434	683,283	100,564	-
45-49	498	761,947	124,590	-
50-54	719	992,465	169,394	-
55-59	1,079	1,394,459	246,994	-
60-64	1,512	1,872,231	322,960	-
65-69	1,610	1,977,713	303,607	-
70-74	1,296	1,584,645	217,224	-
75-79	932	1,052,924	137,165	-
80-84	546	572,228	75,179	-
85-89	248	256,865	26,965	-
90-94	112	101,615	12,146	344
95 & over	30	24,114	3,439	92
Total	11,718	$ 15,846,224	$ 2,144,103	$ 436

[a] Includes annuities which were in withheld status as of December 31, 2022. Therefore, these figures may disagree with other published data.

[b] Amounts shown reflect benefits paid in January 2023. Totals may not add due to rounding.

[c] Age attained in 2022.

[d] Includes divorced and remarried aged widows and widowers, and parents.

[e] Includes disabled widows and widowers, remarried and divorced disabled widows and widowers, widowed mothers and fathers, remarried and divorced widowed mothers and fathers, minor children, student children and disabled children.

Table S-42 Comparison of service months of railroad employees during calendar years 2018-2020 with schedule used in the 29th valuation
(For employees not separated in the year)

Years of service[a]	Service months by attained age						Service months by calendar year				29th valuation assumption
	Under 25	25-34	35-44	45-54	55 & over	Total	2018	2019	2020	Total[b]	
0	6.3	6.7	6.6	6.6	6.7	6.6	6.3	7.0	6.9	6.5	6.5
1	10.9	11.3	11.4	11.5	11.5	11.3	11.6	11.3	10.7	11.4	11.3
2	10.9	11.1	11.1	11.3	11.4	11.1	11.6	11.6	10.4	11.3	11.4
3	11.4	11.4	11.5	11.6	11.6	11.5	11.7	11.7	10.9	11.6	11.6
4	11.7	11.6	11.6	11.6	11.7	11.6	11.8	11.7	11.0	11.6	11.6
5	11.5	11.6	11.6	11.6	11.6	11.6	11.8	11.8	11.2	11.7	11.7
6	11.8	11.6	11.6	11.6	11.6	11.6	11.8	11.8	11.3	11.7	11.7
7		11.7	11.7	11.7	11.7	11.7	11.8	11.8	11.4	11.7	11.7
8		11.7	11.7	11.7	11.6	11.7	11.8	11.8	11.5	11.8	11.7
9		11.8	11.7	11.7	11.7	11.7	11.7	11.8	11.6	11.7	11.7
10		11.8	11.8	11.7	11.7	11.8	11.8	11.8	11.7	11.8	11.8
11		11.8	11.8	11.7	11.7	11.8	11.8	11.8	11.6	11.8	11.8
12		11.8	11.8	11.7	11.7	11.8	11.8	11.8	11.6	11.8	11.8
13		11.8	11.8	11.7	11.6	11.7	11.8	11.8	11.6	11.8	11.8
14		11.9	11.8	11.7	11.7	11.8	11.8	11.8	11.7	11.8	11.8
15		11.9	11.8	11.8	11.7	11.8	11.8	11.8	11.7	11.8	11.8
16		11.8	11.8	11.8	11.7	11.8	11.8	11.8	11.7	11.8	11.8
17			11.8	11.8	11.7	11.8	11.8	11.8	11.7	11.8	11.8
18			11.8	11.8	11.8	11.8	11.8	11.8	11.7	11.8	11.8
19			11.9	11.8	11.7	11.8	11.8	11.8	11.7	11.8	11.8
20			11.8	11.8	11.7	11.8	11.8	11.8	11.7	11.8	11.8
21			11.9	11.8	11.7	11.8	11.9	11.8	11.7	11.8	11.8
22			11.9	11.8	11.7	11.8	11.8	11.8	11.8	11.8	11.8
23			11.9	11.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8
24			11.9	11.9	11.8	11.8	11.9	11.8	11.8	11.9	11.9
25			11.9	11.9	11.7	11.8	11.8	11.8	11.8	11.8	11.9
26			11.8	11.9	11.8	11.8	11.8	11.9	11.8	11.9	11.9
27				11.9	11.8	11.8	11.9	11.8	11.8	11.8	11.9
28				11.9	11.8	11.8	11.9	11.8	11.8	11.8	11.9
29				11.9	11.8	11.9	11.9	11.9	11.8	11.9	11.9
30 & over				11.9	11.8	11.8	11.8	11.8	11.7	11.8	11.9

[a] Rounded up to nearest whole year.

[b] The amounts for 2020 are weighted by 50% for the determination of the Total service months.

Table S-43. Average creditable[a] compensation per service month during 2022

Years of service[b]	Tier 1	Tier 2
0	$4,863	$4,821
1	6,078	5,900
2	6,792	6,500
3	7,195	6,857
4	7,532	7,150
5	7,820	7,320
6	7,810	7,321
7	7,839	7,376
8	8,030	7,539
9	8,118	7,566
10	8,097	7,570
11	8,217	7,706
12	8,300	7,704
13	8,329	7,680
14	8,352	7,699
15	8,379	7,748
16	8,480	7,825
17	8,420	7,794
18	8,612	7,943
19	8,777	7,968
20	8,763	7,926
21	8,737	7,882
22	8,809	7,939
23	8,978	8,055
24	9,045	8,127
25	9,047	8,088
26	9,063	8,076
27	9,137	8,168
28	9,190	8,158
29	8,972	7,987
30	8,994	7,999

[a] Maximum creditable annual compensation during 2022 was $147,000 and $109,200 for tier 1 and tier 2, respectively.

[b] Completed service at beginning of year rounded up to nearest whole year.

Table S-44. Age distribution of new entrants during calendar years 2018-2021
and comparison with assumptions of the 28th valuation

Age at entry[a]	Year of entry					28th Val.
	2018	2019	2020	2021	2018-21[b]	2015-18
All ages						
Number	21,008	10,159	4,160	10,398	45,725	60,489
Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Under 20	2.5%	2.8%	3.5%	3.7%	2.9%	2.4%
20-24	20.7	21.8	21.9	22.0	21.3	21.7
25-29	24.7	22.9	20.8	20.8	23.1	24.2
30-34	18.6	17.5	17.4	17.6	18.0	17.7
35-39	13.1	13.1	12.0	12.6	12.9	12.8
40-44	8.6	8.4	8.2	9.2	8.7	8.4
45-49	5.9	5.6	6.0	5.6	5.8	6.1
50-54	3.4	4.3	4.8	4.2	3.9	3.8
55 & over	2.5	3.6	5.4	4.3	3.4	2.9
Average age at entry	32.1	32.4	33.0	32.6	32.4	32.2
Median age at entry	30.0	30.2	30.4	30.4	30.2	29.9

[a] Age attained in the year of entry (year of entry minus year of birth).

[b] Used in 29th valuation.

Table S-45 Family characteristics of railroad employees who died in 2018-2021 with a current connection

Age of employee[a]	Number of deaths[b]	Percent married							Percent with eligible child	
						Widow under 60 with eligible child			eligible child	
		Total	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Minor child	Disabled child
Under 35	57	62.8	-	-	62.8	48.8	-	-	74.5	-
35 - 39	120	68.9	-	-	68.9	56.2	1.9	-	86.3	0.9
40 - 44	163	69.3	-	-	69.3	53.2	5.4	-	84.1	0.8
45 - 49	335	74.3	0.6	1.6	72.1	40.0	7.3	0.4	66.7	0.4
50 - 54	384	72.0	1.7	3.0	67.3	20.9	8.9	1.7	41.7	2.1
55 - 59	608	68.4	8.7	5.3	54.4	9.1	4.0	1.0	17.9	2.5
60 - 64	1,636	64.5	26.6	14.5	23.4	1.4	0.9	0.4	4.6	1.6
65 - 69	3,597	64.4	51.0	5.7	7.7	0.5	0.4	0.2	1.7	1.1
70 - 74	5,517	67.2	61.8	2.0	3.4	0.2	0.1	0.1	0.7	0.7
75 - 79	5,865	65.7	63.3	0.8	1.6	0.2	-	-	0.4	0.7
80 - 84	5,845	60.9	59.8	0.5	0.6	-	-	-	0.3	0.6
85 - 89	6,626	51.0	50.7	0.1	0.2	-	-	-	0.1	0.4
90 & over	10,551	33.6	33.4	-	0.2	-	-	-	-	-

Age of employee[a]	Average ages of widows						Average ages of children			Average number of minor children[d]
			Widow under 60 with eligible child							
	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Youngest child under 16[c]	All minor children	All disabled children	
Under 35	e	e	30.7	30.0	e	e	3.0	5.1	e	1.7
35 - 39	e	e	35.8	35.6	e	e	6.5	7.9	e	2.1
40 - 44	e	e	40.7	40.0	e	e	7.6	9.9	e	2.0
45 - 49	e	e	46.0	45.4	45.8	e	10.8	11.2	e	1.7
50 - 54	e	e	50.8	47.6	52.1	e	11.4	12.9	e	1.4
55 - 59	65.0	60.9	54.0	50.8	51.2	e	12.9	13.0	25.2	1.4
60 - 64	65.4	61.0	56.1	49.0	55.1	e	11.2	13.8	29.4	1.2
65 - 69	66.8	61.0	56.2	49.0	53.4	e	10.3	11.8	33.2	1.2
70 - 74	70.1	61.0	56.3	52.0	e	e	11.4	12.2	37.0	1.4
75 - 79	73.9	61.0	55.2	45.1	e	e	10.6	12.4	45.1	1.3
80 - 84	78.3	61.1	56.2	e	e	e	e	13.6	48.6	1.2
85 - 89	82.5	e	53.7	e	e	e	e	12.0	52.0	1.4
90 & over	87.2	e	56.1	e	e	e	e	e	e	e

[a] Age nearest birthday at time of death.

[b] Includes employees with 120 or more service months and employees with 60 or more service months after 1995.

[c] Includes families with widows under 60 and children under 16 only.

[d] Includes families with minor children only.

[e] Insufficient data.

Table S-46. Selected employment and benefit[a] statistics for 2022 and 2019

	2022	2019	Percentage change from 2019 to 2022
1. Membership (thousands of employees)			
Average employment for the year	190.1	217.3	-12.5%
Active census, Dec. 31	196.8	208.6	-5.7
Retired, Dec. 31	243.9	259.7	-6.1
Nonretired employees with vested rights[b], total	215.5	221.3	-2.6
Active census, Dec. 31	155.1	167.0	-7.1
Inactive census, Dec. 31	60.4	54.3	+11.2
Employees in active census with			
30 or more years of service	7.9	10.0	-21.0
2. Number of beneficiaries (thousands), Dec. 31, total[c]	475.7	505.2	-5.8
Retired employees	243.9	259.7	-6.1
Spouses	141.2	148.6	-5.0
Survivors	98.1	106.6	-8.0
3. Average monthly benefits paid in December			
Retired employees	$3,358.94	$2,892.76	+16.1
Spouses	1,250.10	1,104.36	+13.2
Survivors	1,919.43	1,665.67	+15.2
4. Miscellaneous information			
Tier 1 taxable payroll as a percentage of total payroll	95.5%	95.0%	
Benefit payments in year as a percentage of tier 1 taxable payroll	72.6%	67.9%	
Number of beneficiaries per 100 full-time employees	250	232	
Percentage distribution of amount of monthly benefit payments in year			
Retired employees	69.0	69.0	
Spouses	14.8	14.6	
Survivors	16.2	16.4	

[a] Includes tier 1, tier 2 and vested dual benefit payments. Excludes supplemental annuities.

[b] Employees with at least 10 years of total service, or 5 years of service after 1995.

[c] Individuals receiving more than one type of benefit (for example, an employee and a spouse benefit) are counted separately in each category but only once in total.