

Des Moines Water Works
Pension Plan
4-49122

Actuarial valuation report

for the plan year beginning 01/01/2022
and ending 12/31/2022

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This report is for the defined benefit retirement plan named on the report cover. It may only be provided to other parties in its entirety and should not be altered. Employee data and other information you provide, along with benefits described in your plan document are used for the basis of this report. This report includes your actuarial determined contribution. Amounts in this report are not meant for your financial statements or to terminate your plan. Upon request, we will prepare other reports for these purposes.

Summary of results

Current year plan costs

The following is a synopsis of your plan costs for the current year, including the actuarially determined contribution (ADC). For a complete schedule of the cash due and received by the plan, see the [Contribution schedule](#).

The actuarially
determined
contribution is
\$1,293,349

- See [Funding calculations](#) for details.
- We have not received any contributions yet for the current plan year.
- Contributing less than the actuarially determined contribution amount will increase your next year's amount.

Factors impacting current year costs

While completing this valuation, we reviewed the actuarial assumptions. The assumption changes we made are disclosed in the [Assumptions and methods](#) section of this report.

Your actuarially determined contribution decreased from \$1,483,159 in 2021 to \$1,293,349 for 2022. This is due to asset returns that were greater than expected.

During the last year, your plan experienced an actuarial gain of \$(1,557,204). This gain was due to return on assets that was greater than assumed.

You can compare your contributions to the actuarially determined contribution for each year in the Historical results section at the back of this report.

Contact your pension actuarial analyst, Amy Dinwiddie, at

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- 515-878-1441

Understanding your plan's funded status

While it is important to know the actuarially determined contribution level, it is also important to understand your plan's funded status. The funded status determines contribution levels and can help you make informed decisions about plan funding, investment policies and benefit changes.

Measures of plan funded status

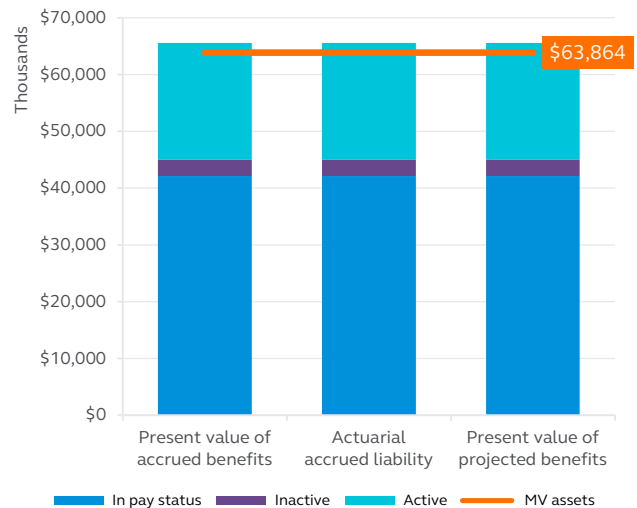
The table below compares the plan's 01/01/2022 market value of assets (the solid line) to 01/01/2022 plan liabilities measured using the assumptions we have made about future events. The liabilities assume:

- No one will enter the plan after the valuation date.
- Your asset allocation will remain the same with a return of 5.60% each year into the future.
- Plan participants will retire, die, terminate, and become disabled based on our assumptions.

Three liability measures are shown:

1. **Present value of accrued benefits** - benefits already earned through the valuation date.
2. **Actuarial accrued liability (AAL)** - represents the targeted asset level under your plan's cost method.
3. **Present value of projected benefits** - all benefits expected to be earned through assumed retirement date.

Compare your plan's assets to each of the three liability measures to determine the funded status.



Considerations

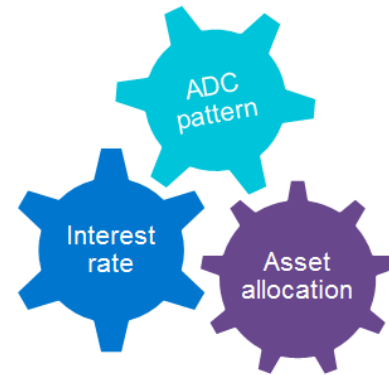
These funded status measurements should be evaluated when making decisions about your plan. The goal of the plan's cost method is to accumulate assets equal to the AAL. As long as your AAL is fully funded, you will only need to contribute the plan's normal cost each year. Otherwise, you'll also need to contribute amortization payments toward funding this liability.

Understanding how your assets compare to your present value of accrued benefits is important. At a minimum you want to have enough assets in the plan to cover the present value of the benefits accrued to date.

Funding in excess of the present value of projected benefits may not be the best use of your organization's funds. However, having excess assets may provide funding and plan design flexibility.

Asset allocation, interest rates and actuarially determined contribution (ADC)

Three key factors are linked in the determination of the pattern and level of the ADC for your plan: your asset allocation, the assumed funding interest rate and the pattern of your ADC. This section discusses how these three factors are related, illustrates the impact of interest rates on measures of benefit liability, and provides information to consider as you review your funding and asset allocation decisions.



The liability measures shown on the previous page and used to calculate your actuarially determined contribution (ADC) reflect assumptions about future investment returns and on your asset allocation. However, future investment returns are not guaranteed, and will fluctuate. To make informed decisions about funding policy, benefit design, and asset allocations, you need to understand the effect of the [liability interest rate assumption](#).

The only sources of funding for your benefits are your cash contributions and asset earnings. The present value of benefits (liability measure) is less than the benefits payable because it is reduced for assumed future asset earnings. When asset earnings fall below expectations, additional cash will be needed to allow payment of all your benefits. Your cost method is used to budget the expected total cost of your plan, and determines the ADC for each plan year.

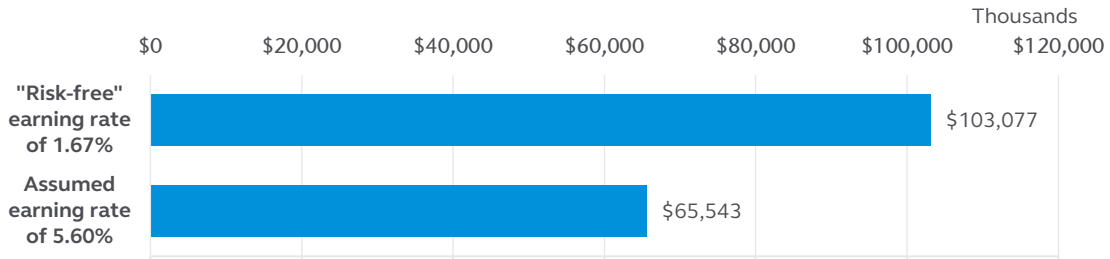
Asset allocations and interest rates

To help understand how the level of ADC can change over time, a best practice is to evaluate the benefit liability ignoring the plan's asset allocation. A recommended approach is to use a conservative "risk-free" interest rate such as U.S. Treasury instruments.

	Diversified asset allocation	"Risk free" return
Expected future returns (interest rates) based on	Your plan's asset allocation	Conservative interest rates such as U.S. Treasury instruments (<u>not</u> your plan's investment allocation)
Current effect	Lower ADC	Higher ADC
Later effect	Potentially higher ADC if returns fall below that assumed	Potentially lower ADC if greater returns are earned

The chart below shows your plan’s Actuarial Accrued Liability used in the ADC calculation compared to the liability determined using a “risk-free” interest rate. This chart indicates how much impact asset earnings can have on the cash required to fund benefits over the life of the plan.

Actuarial accrued liability



As you can see above, higher expected returns generate a lower benefit liability. The additional assumed returns between funding basis (5.60%) and risk-free basis (1.67%) are referred to as “risk premium”. The \$37,534,159 difference in the two liability amounts is the assumed risk premium to be earned over the life of the plan.

The [Risk-free results](#) section later in this report shows additional liability comparisons.

Asset allocation and ADC

The interest return assumption we use to measure benefit liabilities for funding is [based on your asset allocation](#). As a result, your asset allocation choices impact your ADC:

- More volatile asset classes may reduce the current ADC for your plan, but will cause both future ADC and funded status to fluctuate more. There is the potential for severe declines in funded status and increases in ADC when markets perform poorly.
- More conservative asset classes may result in a higher ADC, but provide a more stable basis for planning and budgeting.

The more volatile the value of your asset classes, the greater the range of the potential ADC. You can evaluate the potential impact of alternative asset allocations - and how you could balance your long-term cost and the volatility of your annual ADC - through forecasting studies.

Benefit changes and risk-free interest rates

A decision to change plan benefits can have long-term funding implications. Plan sponsors should be cautious about spending what appears to be excess assets in a given plan year on benefit increases. Working with your actuary to request a plan design study can help with your decision.

Recognizing the volatility of the ADC (discussed in the paragraph above), you will want to include the value of the proposed benefit change on a more conservative rate (ex. a risk-free rate) and/or a forecast of long-term funding levels. Discussing the study with your plan actuary can help you decide what, if any, benefit changes you can afford over the long term.

Understanding your plan’s funded status

Forecasting: a best practice

Industry experts agree that it is a prudent best practice to review the long-term trends of your plan. We provide historical information at the back of this report. But that is like driving using just your rear view mirror: you only see part of the picture.

Short-term

Neither this year's ADC nor funded status is a good estimate of future amounts because they are volatile from year to year. These measures depend on your plan's assets and benefit liability:

- **Plan asset values** increase or decrease with market returns on investments, contributions made, benefit payments and expenses. Using an asset smoothing method also affects the upcoming year asset values.
- **Benefit liability** is impacted by benefit payments, salary experience, census or demographic changes, and assumption changes.

If you need to budget for next year or explore the potential volatility of results over the next few years, consider requesting a short-term forecast.

Long-term

A 10- or 20-year forecast of your plan's ADC and funded status under both expected and adverse economic scenarios is an excellent planning tool and can be a good investment.

- Comparing the results from your current asset allocation to alternative investment options can provide valuable insights to guide asset allocations. Comparing different funding policies can help evaluate whether your policy will meet your goals and fit in your budget.
- Stress-testing based on economic conditions can help you assess plan risk, and to set funding and investment policies.
- Projecting salary experience, census or demographic changes, and the benefits offered can help identify long-term trends.

If you want to explore the potential volatility of results over an extended time period, consider requesting a long-term forecast.

Keep us informed



Please make us aware of any upcoming plan design or significant participant group changes (such as layoffs, increases in staff, or large retirements). Knowing about possible changes gives us the chance to advise you whether further analysis of the cost impact should be considered.

Options for your frozen plan

Even though your plan is frozen, you can choose to maintain the pension plan or plan for a future termination date. Either way, you must continue to fund the benefits already earned and the expenses paid from your plan assets.

If your intent is to terminate, we can provide a termination liability estimate for your specific situation based on current market conditions.

Knowing the potential shortfall can help you develop a contribution timeline that fits your situation. The simplest first step may be to increase your annual contribution. We can also help you develop a more detailed funding plan – keying to either your timeline or your annual contribution budget.

As you move along your path to termination, we can help you develop a timeline with a funding strategy.

Knowing the potential shortfall can help you develop a contribution timeline that fits your situation.

Contribution schedule

The table below shows the contributions received and payments that are due to meet the Actuarially Determined Contribution (ADC) for this year. You can fund more than this schedule.

- The total cash contributions made for the 2021 plan year is \$1,483,159.
- No cash contributions have been received yet for the current plan year.

Paid or date due	Plan year beginning 2021	Plan year beginning 2022	Plan year beginning 2023
03/29/2021	\$370,790		
07/01/2021	370,790		
09/27/2021	370,790		
12/22/2021	370,789		
12/31/2022		\$1,293,349	
12/31/2023			To be determined

Blue shading shows employer contribution due for current plan year.

Funding calculations

Actuarially determined contribution

The actuarially determined contribution (ADC) consists of three parts:

- 1** Normal cost - the cost attributed to the current year (due to the continued accrual of plan benefits for active employees) and plan expenses.
- 2** Amortization of any unfunded accumulated past costs (unfunded actuarial accrued liability).
- 3** Interest on 1 and 2 above to the end of the plan year.



Total normal cost	\$37,200
Plus amortization amounts	1,187,562
Plus valuation interest to the end of the plan year	68,587

Your actuarially determined contribution (ADC) is **\$1,293,349**

Development of total normal cost

Normal cost is the portion of cost assigned to each year based on the [cost method](#) and [assumptions](#) shown in this report.

Normal cost	\$0
Plus estimated expenses	37,200
Total normal cost	\$37,200

Actuarial accrued liability

The actuarial accrued liability (AAL) is the targeted asset level for the plan and is used in the calculation of the unfunded actuarial accrued liability on the following page. The AAL below is the amount after any assumption or plan changes.

Active participants	\$20,512,701
Inactive participants	2,890,644
Participants and beneficiaries in pay status	42,139,794
Actuarial accrued liability	\$65,543,139

Unfunded actuarial accrued liability

Each year the unfunded actuarial accrued liability (UAAL) is calculated and equals the actuarial accrued liability less the actuarial value of assets. An experience gain or loss occurs when actual plan experience differs from what was assumed. The gain or loss is calculated separately and amortized as a charge (for a loss) or a credit (for a gain). The UAAL is then adjusted for amendments, assumption changes, or method changes and a liability base is created.

Expected unfunded actuarial accrued liability

01/01/2021 unfunded actuarial accrued liability (UAAL)	\$8,515,928	
01/01/2021 employer normal cost	35,300	
Interest on the above items	478,869	
Total expected UAAL without contributions		\$9,030,097
Employer contributions	\$1,483,159	
Interest on employer contributions	31,944	
Total contributions with interest		\$1,515,103
Expected 01/01/2022 unfunded actuarial accrued liability		\$7,514,994
Total expected UAAL less contributions with interest		

Actual unfunded actuarial accrued liability (before changes)

Actuarial accrued liability	\$65,424,870	
Less actuarial value of assets	59,435,136	
Preliminary 01/01/2022 unfunded actuarial accrued liability		\$5,989,734

Experience (gain) or loss

Actual unfunded actuarial accrued liability	\$5,989,734	
Less expected unfunded actuarial accrued liability	7,514,994	
(Gain)loss		\$(1,525,260)
2021 actuarially determined contribution	\$1,483,159	
Less total contributions with interest	1,515,103	
Additional (gain)/loss from (excess) shortage of contributions		\$(31,944)
Total experience (gain) or loss		\$(1,557,204)

Final unfunded actuarial accrued liability (after changes)

Actuarial accrued liability after assumption changes	\$65,543,139	
Less actuarial value of assets	59,435,136	
01/01/2022 unfunded actuarial accrued liability after changes		\$6,108,003

Change in unfunded actuarial accrued liability due to:		(Gain)/loss
Change in assumptions		\$118,269

Your 01/01/2022 unfunded actuarial accrued liability is \$6,108,003

Funding calculations

Schedule of amortization bases

Your cost method allocates a portion of plan funding to be amortized in equal annual installments, rather than to be paid through future normal costs. The following amortization periods will be applied consistently to any amortization bases created.

- Initial unfunded actuarial accrued liability: 15 years
- Experience gains/losses: 10 years.
- Amendments: 15 years
- Assumption changes: 10 years

Date created	Reason	Initial balance	Remaining years	Outstanding balance	Annual amortization
01/01/2022	Assumption	118,269	10	118,269	14,930
01/01/2022	Experience (gain)/loss	(1,557,204)	10	(1,557,204)	(196,575)
01/01/2021	Experience (Gain)/Loss	(2,082,082)	9	(1,921,127)	(262,833)
01/01/2021	Assumption	2,407,114	9	2,221,032	303,864
01/01/2020	Experience (Gain)/Loss	(726,294)	8	(611,809)	(91,827)
01/01/2020	Assumption	1,328,364	8	1,118,976	167,948
01/01/2019	Experience (Gain)/Loss	1,191,910	7	902,555	150,936
01/01/2019	Assumption	(160,323)	7	(121,402)	(20,302)
01/01/2018	Experience (Gain)/Loss	212,718	6	141,881	26,981
01/01/2018	Assumption	1,333,359	6	889,349	169,123
01/01/2017	Experience (Gain)/Loss	789,424	5	451,476	100,393
01/01/2017	Assumption	978,132	5	559,396	124,391
01/01/2016	Experience (Gain)/Loss	(186,503)	4	(87,905)	(23,804)
01/01/2016	Assumption	(637,308)	4	(300,389)	(81,342)
01/01/2015	Experience (Gain)/Loss	(528,764)	3	(192,630)	(67,739)
01/01/2015	Assumption	562,069	3	204,763	72,005
01/01/2014	Experience (Gain)/Loss	(1,228,910)	2	(282,643)	(145,171)
01/01/2014	Benefit Freeze	(5,777,832)	7	(3,335,827)	(557,855)
01/01/2013	Initial Unfunded Liability	15,527,955	6	7,911,242	1,504,439
Total				6,108,003	1,187,562

Funding calculations

Data and assumptions

Plan assets

We measure your plan's assets at the beginning of each plan year. Plan assets reflect all contributions made for prior plan years. Contributions you may have already made for the 2022 plan year are not included.

Both market value and actuarial value for the 2022 plan year are shown below.

Market value of assets

Investments held by Principal	\$63,863,603
2021 contributions received on or after 01/01/2022	0
Total market value of assets	\$63,863,603

Actuarial value of assets

Your plan uses an asset smoothing method for the actuarial value instead of the market value. Using this method allows you to soften the volatility of assets from year to year. The actuarial value of assets is used to calculate your actuarially determined contribution (ADC).

The actuarial value of assets held by Principal is determined on a combined basis. See the following page for the development of this value.

Adjusted market value of investments held by Principal	\$59,435,136
2021 contributions received on or after 01/01/2022	0
Total actuarial value	\$59,435,136

The actuarial value of plan assets is **\$59,435,136**

Calculation of adjusted market value

To determine the actuarial value of Investments held by Principal, we adjusted the market value by:

- Subtracting any remaining deferred appreciation in excess of expected investment earnings.
- Adding any remaining deferred appreciation short of expected investment earnings (shortfall).

Of the total excess appreciation or shortfall for any one plan year, 25% is allocated to the current plan year and each of the next three plan years.

1 Determine excess appreciation/(shortfall)

Compare actual to expected assets

Market value of assets as of 2021	\$61,058,128
Contributions/transfers	1,483,159
Benefit payments	(3,612,256)
Expenses	(41,685)
Expected 5.60% interest on above items	3,342,270
Expected value of assets as of 01/01/2022	\$62,229,616
Market value as of 01/01/2022	\$63,683,603
Current year excess appreciation/(shortfall)	1,633,987
25% of current year excess appreciation/(shortfall)	408,497

2 Allocate deferred appreciation/(shortfall)

Allocation year	Plan year			
	2019	2020	2021	2022
2019	\$(1,422,765)			
2020	(1,422,765)	\$1,446,603		
2021	(1,422,765)	1,446,602	\$878,188	
2022	(1,422,764)	1,446,602	878,188	\$408,497
2023		1,446,602	878,188	\$408,497
2024			878,187	\$408,496
2025				\$408,497
Total	\$(5,691,059)	\$5,786,409	\$3,512,751	\$1,633,987
Deferred	0	1,446,602	1,756,375	1,225,490
Adjustment to market value (sum of deferred amounts)				\$4,428,467

3 Adjust market value for deferred amounts

Market value as of 01/01/2022	\$63,863,603
Adjustment to market value (sum of deferred amounts)	4,428,467
Adjusted value of investments	\$59,435,136

Data and assumptions

Census characteristics

	01/01/2021	01/01/2022	Change
Number of covered participants			
Actives	116	100	-16
Terminated vested	43	42	-1
Disabled	4	4	+0
Retirees	179	193	+14
Total	342	339	-3
Average age			
Actives	54.0	53.8	-0.2
Terminated vested	55.4	56.3	+0.9
Disabled	60.6	61.6	+1.0
Retirees	71.6	71.4	-0.2
All	63.5	64.2	+0.7
Average years of service			
Actives	16	15	-6.3%
Monthly accrued retirement benefits			
Actives	\$263,885	\$213,322	-19.2%
Terminated vested	23,502	23,622	+0.5%
Disabled	4,969	4,969	+0.0%
Retirees	358,578	401,404	+11.9%

The monthly accrued retirement for active participants is the 12/31/2013 frozen benefit payable at age 65, including the annual 5.50% increase (if applicable) to age 65.

This census data does not include the non-participating spouse who is eligible for a benefit under a qualified domestic relations order (QDRO). However, the entire monthly pension benefit (for the participant and QDRO spouse) is included.

Data and assumptions

Benefit cash flows

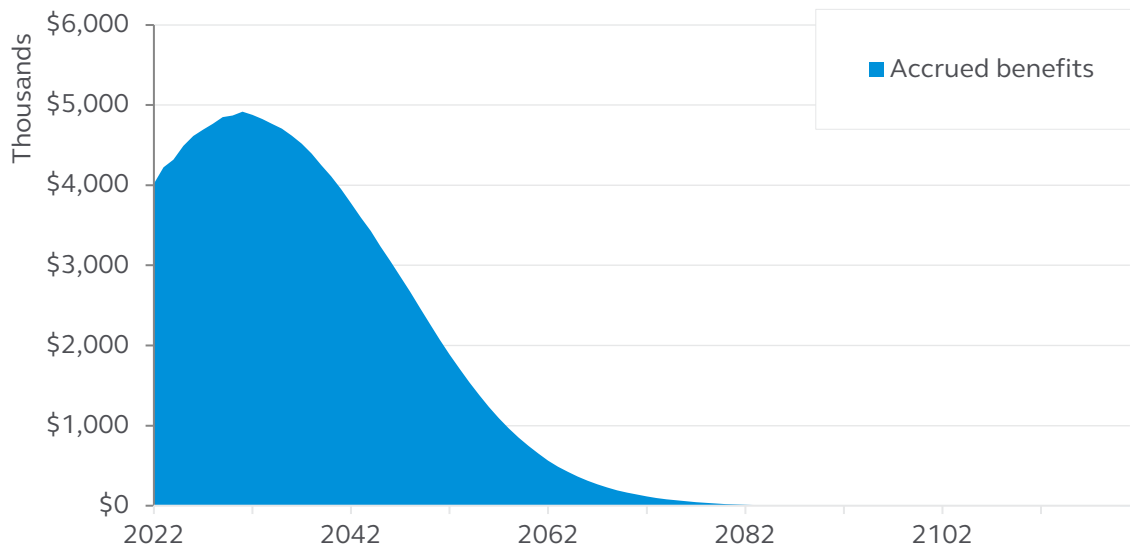
Benefit cash flows are the benefit payments expected to be paid from your plan assets. We provide cash flows to help you calculate and understand your plan obligations and the future liquidity needs of the plan.

You can compare your cash flows to the 01/01/2022 market value of assets, \$63,863,603, to evaluate your asset liquidity needs, and whether cash contributions in excess of the actuarially determined contribution may be needed in the short term.

Benefit cash flows can be based on either the current plan participants (“closed group”) or a group that assumes future new entrants (“open group”). The benefit payments could be based on the accrued benefits or the projected plan benefits (reflecting future service).

In this report, we are showing you the benefit cash flows for a closed group. Since plan benefits are frozen, the cash flows are based on accrued benefits. The graph below shows the total benefits expected to be paid to current participants (closed group) each plan year.

Accrued benefit payments - closed group



The table on the next page provides the details of this graph, showing the accrued benefits expected to be paid, by plan year. All benefit cash flows shown on these two pages are based on the demographic assumptions (retirement and withdrawal rates, mortality and form of benefit) as outlined in the [Assumptions and methods](#), but do not reflect an interest discount.

Data and assumptions

Benefit cash flow detail

Year	Accrued benefit cash flow	Year	Accrued benefit cash flow	Year	Accrued benefit cash flow
2022	4,019,659	2055	1,383,644	2088	1,871
2023	4,223,130	2056	1,234,502	2089	1,272
2024	4,319,265	2057	1,096,101	2090	852
2025	4,490,755	2058	968,640	2091	563
2026	4,613,617	2059	852,097	2092	367
2027	4,694,492	2060	746,302	2093	236
2028	4,765,923	2061	650,955	2094	149
2029	4,850,903	2062	565,603	2095	93
2030	4,870,191	2063	489,720	2096	57
2031	4,915,148	2064	422,686	2097	35
2032	4,878,453	2065	363,771	2098	20
2033	4,824,806	2066	312,254	2099	12
2034	4,764,778	2067	267,382	2100	6
2035	4,705,608	2068	228,395	2101	3
2036	4,617,896	2069	194,580	2102	2
2037	4,519,110	2070	165,268	2103	1
2038	4,393,727	2071	139,855	2104	0
2039	4,249,805	2072	117,831	2105	0
2040	4,111,943	2073	98,746	2106	0
2041	3,952,769	2074	82,232	2107	0
2042	3,777,197	2075	67,978	2108	0
2043	3,595,764	2076	55,732	2109	0
2044	3,427,669	2077	45,267	2110	0
2045	3,237,768	2078	36,391	2111	0
2046	3,053,415	2079	28,921	2112	0
2047	2,861,446	2080	22,703	2113	0
2048	2,670,067	2081	17,580	2114	0
2049	2,467,034	2082	13,414	2115	0
2050	2,268,176	2083	10,076	2116	0
2051	2,074,847	2084	7,441	2117	0
2052	1,888,472	2085	5,405	2118	0
2053	1,711,332	2086	3,858	2119	0
2054	1,542,003	2087	2,708	2120	0

Data and assumptions

Plan provisions

This report reflects the maximum benefit limits under Internal Revenue Code (IRC) Section 415 and maximum compensation limits under IRC Section 401 in effect on the first day of each plan year.

The following is a summary of plan provisions and does not alter the intent or meanings of the provisions contained in the contract or plan document. This report reflects the provisions of the December 31, 2013 plan restatement signed 09/24/2013 and plan amendment #1 signed 12/15/2015.

Plan eligibility

Class	Any full-time employee or any employee who works at least 1,040 hours in a calendar year or works during two consecutive calendar quarters.
Plan entry	Entry into the plan is frozen September 26, 2012. After that date no employee or former employee will become an active participant, and no inactive participant or former participant will again become an active participant.

Normal retirement benefit

Age	Attained age 65.
Form	Monthly annuity payable for life (optional forms may be elected in advance of retirement).
Amount (accrued benefit)	<p>1.5% of Average Compensation times service. The accrued benefit shall not be less than the accrued benefit as of December 31, 1988.</p> <p>The accrued benefit is frozen effective 12/31/2013 and will not increase due to any changes in average compensation or continuous service after this date.</p> <p>An Active participant's retirement benefit on his retirement date will be increased 5.5% per year from the later of (a) or (b) below:</p> <ul style="list-style-type: none">a) December 31, 2013b) The earlier of Normal Retirement Date or the date a participant attains age 55 and the sum of age and service is equal to 85 (or more).

Data and assumptions

Early retirement benefit

Age	Attained age 55.
Service	Completed 5 years of service.
Form	Same as normal retirement benefit.
Amount	If the sum of age and service is at least 85 (rule of 85), a participant will receive his accrued benefit unreduced for early retirement on his early retirement date. If the sum of age and service is less than 85, the benefit will be the accrued benefit reduced by 3% for each year his early retirement date precedes his normal retirement date.

Late retirement benefit

Age	No maximum age.
Form	Same as normal retirement benefit.
Amount	Accrued benefit on late retirement date, increased by 5.5% for each year after the later of 12/31/2013, or the earlier of Normal Retirement Date and the date attained both rule of 85 and age 55.

Termination benefit

Vesting percentage	100% after 5 years of vesting service.
Form	Same as normal retirement benefit with income deferred until normal retirement date.
Amount	Accrued benefit on date of termination multiplied by the vesting percentage.

Disability benefit

Eligibility	Qualified for disability benefits under the Title II of the Federal Social Security Act.
Service	Ten years of vesting service.
Form	Monthly income payable until normal retirement, death, or recovery and a deferred annuity payable at the Normal Retirement Date.
Amount	Accrued Benefit on date of disability.

Data and assumptions

Pre-retirement death benefit

Greater of A or B below for an active participant.

A. Survivor annuity death benefit (a vested benefit if termination occurs on or after 55)

Eligibility	Attained age 55, 5 years of vesting service, and survived by a spouse on date of death.
Form	Monthly annuity payable to spouse.
Amount	The amount that would have been received had the participant elected a joint and 66 2/3% survivorship benefit option and early retired the day before death.

B. Lump sum death benefit (a nonvested benefit)

Service	Five years of service.
Form	Lump sum payable to beneficiary.
Amount	\$5,000 for the first year of service plus \$1,000 for each additional year of service.

Postretirement death benefit

Eligibility	Participant who was active at time of retirement.
Form	Lump sum payable to beneficiary.
Amount	\$10,000.

Definitions

Average compensation

The average of monthly compensation received for the 60 consecutive calendar months out of the latest 120 months which gives the highest average.

The monthly compensation for December 2013 includes sick leave, vacation, and personal time accrued but not used as of 12/31/2013.

The December, 2013 monthly compensation will not include unused sick leave if a participant terminates prior to the earlier of meeting the requirements for early retirement (age 55 with 5 years of service) or normal retirement (age 65).

Optional forms of benefit payments

The optional forms of benefit payments are:

- Monthly annuity payable for life, or 5, 10, or 15 years certain and life
- Monthly annuity payable as a survivorship life annuity with survivorship percentages of 50, 66 2/3, 75 or 100

The optional form conversion basis is 7.5% interest and the mortality table in Revenue Ruling 95-6 for payments other than lump sums.

Assumptions and methods

The following assumptions and methods are used in this year's valuation report. The rationale for each non-prescribed economic and demographic assumption is also included.

Some economic assumptions rely on the Principal RAS Long-Term Capital Market Assumptions (CMA) May 2021. These assumptions are developed focusing on forward-looking market indicators and valuation models, as well as utilizing the analysis of historical data and trends, the outlook and forecasts from credible economic studies, and investment expert opinions. See [Long-Term Capital Markets Assumptions May 2021](#) for additional information.

Changes since last year

Assumption changes

We recently did a comprehensive review of the economic and demographic assumptions used in the valuation. As a result, we changed the following assumptions for your plan:

- We updated the mortality improvement scale to reflect historical U.S. mortality data to 2019 (MP-2021).

Net effect of assumption changes

The net effect of the assumption changes is to increase the actuarially determined contribution.

Method changes

No methods affecting the comparability of results were changed since the last valuation report was completed.

Assumptions selected by actuary

Liability interest	During benefit payment period 5.60%
	Before benefit payment period 5.60%
	The interest rate is developed as a long-term expected geometric return on plan assets. Arithmetic expected return is calculated as the weighted average of broad asset classes' arithmetic returns of the plan's target asset allocation, and then converted to the geometric under lognormal distribution assumption. For details, see Long-Term Capital Market Assumptions link.
Asset return	5.60% for the current plan year. See liability interest rate for how this rate was determined.

Data and assumptions

Expected expense

The expected expense included in normal cost is an estimate based on prior year expenses paid from plan assets.
This is the best estimate available of upcoming year's expenses.

Retirement

Active participants

Age	Probability of retirement	Age	Probability of retirement
55	5%	61	20%
56	5%	62	25%
57	5%	63	10%
58	10%	64	5%
59	10%	65	remaining participants
60	15%		

Inactive participants

Age	Probability of retirement	Age	Probability of retirement
55	10%	61	10%
56	10%	62	20%
57	10%	63	15%
58	10%	64	15%
59	10%	65	remaining participants
60	10%		

This assumption is based on the results of recent experience analysis and anticipated future experience. Some participants retire early since the plan provides an early retirement subsidy beginning at age 55.

Inflation

2.25% increase per year.
See Long-Term Capital Market Assumptions link.

Data and assumptions

Mortality

Based on PubG-2010 General base rate mortality table projected to future years with historical and assumed mortality improvement (MI) rates using the MP-2021 mortality improvement scale.

Base rates

Before Benefit Payment Period

- PubG-2010 Employee, male and female

During Benefit Payment Period

- Retirees- PubG -2010 Healthy Retiree base table, male and female,
- Contingent Survivor – same as Retirees above (Pub 2010 “Approach 1”, see rationale below).
- Disabled Retiree - PubG2010 Disabled Retiree base table, male and female. Participants in pay status who cannot be identified as disabled use the same table as retirees.

The Society of Actuaries is an actuarial organization that periodically reviews mortality data and publishes mortality tables and improvement scales. PubG-2010 is the baseline mortality rate table underlying the SOA Pub-2010 experience study published in January 2020.

Pub-2010 section 12.4.2 provided three approaches for designated beneficiaries in the calculation of joint-and-survivor annuities. We believe “Approach 1” is reasonable for this plan and has been selected due to data limitations in identifying contingent survivors. In addition, we believe beneficiary mortality isn’t materially different while both participants are alive.

Mortality improvement (MI)

MP-2021 is the most recent improvement scale published by the SOA in October 2021.

Disability

1987 Commissioner’s Group Disability Table, six month elimination period, male and female.

We rely on a publicly published table due to the limited size of the plan. The 1987 CGDT was recommended by the Society of Actuaries for pension valuation purposes.

Withdrawal	<p>2003 Society of Actuaries Small Plan Age Table, multiplied by 0.30.</p> <p>We rely on a publicly published table due to the limited size of the plan. The SOA Small Plan Age Table is the most recent withdrawal experience table published by the Society of Actuaries. A multiplier of 0.30 is applied to this table to reflect the results of the most recent experience analysis and anticipated future experience.</p>
Marriage	<p>75% married; husbands are 3 years older than wives.</p> <p>This assumption does not have material impact on the results of this report and has been selected based on our best estimate of active workforce.</p>
Form of benefit	<p>Participants are assumed to receive their benefits on the normal form at the assumed retirement age.</p>

Methods selected by plan sponsor

Actuarial value of plan assets	<p>The market value of the Principal accounts is adjusted by spreading the expected value minus the actual value over four years.</p> <p>Contributions received in the current plan year but applied to the prior plan year are added to the actuarial value of the Principal accounts.</p>
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Actuarial cost method

The **entry age normal (EAN)** cost method is used for this valuation.

The value in today's dollars for all projected plan benefits (reflecting service and pay increases through a member's assumed retirement age) is called the present value of benefits (**PVB**). The EAN method allocates each participant's PVB on a level basis over earnings or service between the participant's entry age and assumed retirement age.

The portion of the PVB allocated to each valuation year is the normal cost (NC). The individual normal costs are totaled to become the plan's **normal cost**. The plan's normal cost as a percentage of pay (pay related plan) or a dollar amount (non-pay related plan) should remain fairly stable, but may vary over time as your plan's population changes.

The **actuarial accrued liability (AAL)** is the portion of PVB attributable to past normal costs for all participants, and represents the targeted asset level for the plan.

The **unfunded actuarial accrued liability (UAAL)** is determined on each valuation date based on updated assets and data and compared to the expected UAAL based on the prior year's assumptions. Gains and losses (experience different than what was assumed) will increase or decrease the funding shortfall and create new liability bases to be funded. New bases are also created with plan amendments, assumption changes, or method changes.

The initial unfunded actuarial accrued liability, adjustments for benefit or assumption changes, and actuarial gain or loss are amortized as described on the [Schedule of amortization bases](#) page.

Methods selected by actuary

Retirees

Assets and liabilities for current and future retirees are included.

Vested benefits

A benefit is included in vested benefits when the participant will meet age and service eligibility requirements at the valuation date. The benefit is multiplied by the participant's vesting percentage applicable to each benefit on the valuation date.

The following ancillary benefits are always treated as nonvested: disability benefits payable to retirement age unless in pay status, and pre-retirement death benefits in excess of the survivor annuity death benefit except as noted in the Plan provisions.

Data and assumptions

Actuary statement

This report was prepared at the request of the sponsor of the plan named on the cover of this report. It provides information needed for plan funding. It is not to be used for plan termination estimates, accounting information, or other purposes. If these or other measures of liabilities are needed, please contact me.

In preparing this report, I have relied on:

- reports of participants, salary, and service provided by the plan sponsor as of the last day of the 2021 plan year.
- information for any retirees, beneficiaries, and alternate payees being paid by Principal Life Insurance Co as of the last day of the 2021 plan year, as reported by Principal Life Insurance Company.
- benefit, contribution, and expense transaction information for the preceding plan year, and the market value of assets reported as of the last day of the 2021 plan year by Principal and the plan sponsor.
- plan documents on file with Principal Life Insurance Company, including changes as noted on the Summary of plan provisions page of this report.
- various models, internal and external, which were used for their intended purposes. Underlying data, assumptions, methodologies, model inputs and resulting outputs have been reviewed and are reasonable. There are no known weaknesses or material inconsistencies.

Appropriate tests of reasonableness and accuracy have been made and reviewed. The information provided is adequate to support the results in this report.

I confirm that as the actuary for this pension plan, I am completely independent of the plan sponsor and any of its officers or key personnel. Neither I nor anyone closely associated with me has any relationship known to me which would impair my independence.

In my opinion, each assumption and method chosen by the actuary is reasonable (taking into account the experience of the plan and reasonable expectations). Each material economic assumption is consistent with other economic assumptions selected by the actuary for this measurement period. Note that several different assumptions may be reasonable for a given measurement, and different actuaries will apply different professional judgment and may choose different reasonable assumptions. Demographic assumptions are not expected to produce significant cumulative actuarial gains or losses over the measurement period, and the combined effect of the assumptions is reasonable.

Data and assumptions

I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. To the best of my knowledge, this report is complete and accurate, and complies with all relevant pension actuarial standards and legal requirements.

Gregory C. Shane

03/15/2022

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Data and assumptions

Present value of accrued plan benefits

The current year present value of vested and nonvested accrued benefits are based on the assumptions and methods shown earlier in this report. The present value of non-vested benefits includes future 5.5% annual increases for benefits for which a participant is not yet eligible. For purposes of this report, these increases are considered to be already accrued, but not yet vested since a participant must continue employment to receive them.

All retiree liability is included below except for purchased annuities. These amounts below should not be used for other purposes such as estimating plan termination sufficiency.

The prior year present value of vested and nonvested accrued benefits are based on the assumptions shown in that year's valuation report.

	01/01/2022	01/01/2021
Present value of vested benefits		
Participants in pay status	\$42,139,794	\$36,885,186
Inactive participants	2,890,644	2,776,391
Active participants	16,369,136	21,137,225
Total	\$61,399,574	\$60,798,802
Present value of nonvested benefits		
Participants in pay status	\$0	\$0
Inactive participants (not in pay status)	0	0
Active participants	4,143,565	4,670,251
Total	\$4,143,565	\$4,670,251
Total present value of accumulated plan benefits	\$65,543,139	\$65,469,053
Value of future service and compensation	0	0
Total present value of projected plan benefits	\$65,543,139	\$65,469,053

Change in present value of accumulated plan benefits

Present value of accumulated plan benefits as of 01/01/2021	\$65,469,053
Increase (decrease) during the year due to:	
Increase for interest due to decrease in the discount period	3,566,501
Benefits paid	(3,612,256)
Benefits accumulated and plan experience	119,841
Present value of accumulated plan benefits as of 01/01/2022	\$65,543,139

The annual update to mortality is included in the plan experience above. See Assumptions and methods for details. If this mortality was also used to determine the present value of accumulated plan benefits as of 01/01/2021, the liability would have been \$65,586,086.

Present value of accrued plan benefits

Risk assessment and historical information

Risk assessment

All defined benefit plans are exposed to risk. While some risks are within the control of the plan sponsor, others are influenced by outside economic and demographic conditions. Below are descriptions of some risk factors and consequences. It's not intended to be a comprehensive summary, but highlights issues many plan sponsors face. If you'd like to understand these risks more fully or are interested in additional analysis, please contact us.

Potential risks

Investment risk

Lower than expected investment returns could increase future actuarially determined contributions (ADC) and the ability to pay benefits. See [Risk-free results](#) where we also explain risk premium and how standard deviation is a way to measure potential volatility risk.

Interest rate risk

The interest rate used to discount plan benefits is a significant driver in the projection of plan liabilities. When interest rates decrease or increase, liabilities move in the opposite direction. See [Risk-free results](#) for alternative results using a different interest rate.

Asset/liability mismatch

Plan liabilities will fluctuate due to changes in assumed interest rates while asset values will change based on actual market returns and the plan's asset allocation. Liabilities and assets could potentially move in different directions or magnitudes due to risks associated with interest rates and investments. This mismatch could lead to significant changes in ADC and funded status. Studies such as Asset Liability Modeling on current and alternative liability driven investing strategies can assist with quantifying this mismatch risk.

Longevity and other demographic risks

Plan liabilities are based on several demographic assumptions as disclosed in the [Assumptions and methods](#). When actual plan experience differs from these expectations, the resulting gains and losses will impact future liability.

Contribution risk

Every pension plan should have a strategy for determining annual pension contributions. Contributing the ADC may or may not allow a plan sponsor to achieve their goals. For example, funding to 100% of obligations for benefits (using assumptions consistent with median expectations about future economic conditions) might require contributions in excess of the ADC. A specific contribution strategy should be implemented and reassessed periodically.

Intergenerational equity risk

Intergenerational equity refers to the desire for the full cost of pensions be paid by those receiving the benefits. Fully funding pension benefits over the average future service period reasonably aligns the cost with those who benefit from those services.

As a result, the amortization of future gains/losses due to experience, assumptions, and benefit changes should consider the average working life time of current employees. See [Schedule of amortization bases](#) for amortization periods for the plan.

Risk considerations

Below are some aspects of the plan as you consider plan risk.

Assumptions

We use [assumptions](#) to estimate the future experience of your plan. To the extent actual experience differs from these assumptions, plan results (such as ADC or funded ratio) may be impacted. Some examples include:

Assumed interest rates. Your ADC is determined using interest rates selected based on long-term geometric return on plan assets. If these returns are not realized, the ADC may increase in future years.

Demographic assumptions (such as mortality, withdrawal, retirement, and disability rates). Your plan's experience relative to the demographic assumptions could impact the cost of the plan.

Plan expenses for the upcoming year.

Plan assets

Asset values are reflected as of the valuation date. Future results will be impacted by actual market return on investments.

The actuarial value of assets is smoothed by spreading the expected market value minus the actual market value over four years.

Contributions

Typically, the plan sponsor contributes the ADC. This contribution policy may not be enough to cover future benefit obligations.

Key measures

Please see the [historical results](#) section of this report for key measures. We suggest you review these measures annually to ensure they meet the goals of the defined benefit plan and organization.

The ADC has gradually increased over the past seven years, reflecting a decline in the interest rate used to measure plan liabilities and recognition of recently published mortality tables (reflecting current mortality improvement).

The four-year smoothing of investment gains and losses has added stability to the ADC.

Achievement of economic assumptions

If the **actual market value rate of return** on plan assets differs than the **expected return**, the ADC will increase or decrease.

The actual return on assets has been volatile; the return for some years exceeded the expectation and at other times the return was less than expected. The return for the 2021 year was 8.33% compared to an expected return of 5.60%. The four-year smoothing of investment gains and losses has added some stability to the ADC.

Percentage of employer's ADC paid

This percentage is a measure of the extent to which the amount required to ensure funding goals (based on the plan's assumptions and methods) has been paid.

Over the years, the plan sponsor has been contributing the ADC.

Plan maturity

Plan maturity measures assess the changing maturity profile of the plan and can indicate the level of reliance on active employees to absorb adverse experience.

Non-active employees as a percentage of total for the current year is 66%.

In pay status PV accrued benefits as a percentage of total is 67%.

A higher ratio is indicative of a more mature plan, typically resulting in:

- less sensitivity to liability interest rate changes
- greater volatility due to actual mortality experience

Annuity purchases could help alleviate risk associated with the retired portion of your plan liability. If you are considering an annuity purchase, please contact us to discuss potential costs and savings.

Risk-free results

In the [Asset allocation, interest rates and actuarially determined contributions](#), we explained the difference between long term and risk-free returns. The table below shows your plan's liabilities and assets on both the funding and risk-free interest rate basis.

Risk premium	Assets	Results
The difference in the liability amounts on a funding basis versus a risk-free basis represents the additional assumed returns to be earned over the life of the plan; this is also referred to as the "risk premium".	The assets in the funding basis column reflect the asset method used to determine your plan's ADC; the assets in the risk-free basis column are on a mark-to-market basis consistent with the risk-free liabilities.	The unfunded actuarial accrued liability and normal cost on the funding basis are used to calculate your ADC. Those same measures on a risk-free basis show you more conservative results.

If plan's investment returns fall short of the funding basis interest rate, **additional contributions will likely be needed.**

	Funding basis (ADC)	Risk-free basis
Interest rate	5.60%	1.67%¹
Standard deviation	8.8%	---
Normal cost ²	\$0	\$0
Actuarial accrued liability	\$65,543,139	\$103,077,298
Market value of assets	N/A	\$63,863,603
Actuarial value of assets	\$59,435,136	N/A
Unfunded actuarial accrued liability	\$6,108,003	\$39,213,695
Present value of accrued benefits	\$65,543,139	\$62,693,567

Standard deviation is one way to measure the potential volatility risk in the current asset portfolio. For example, a standard deviation close to 0% would represent a portfolio with minimal volatility risk. For this plan, about two-thirds of your actual annual returns are likely to fall within a range of -3.20% to 14.40% (5.60% +/- 8.8%)

¹ The 30-year Treasury rate at 12/31/2021 was chosen as the risk-free interest rate. To isolate the impact of the interest rate, all other assumptions are the same. See the Assumptions and methods for other assumptions.

² The normal cost does not include any expense estimate.

Historical results

	2014	2015	2016	2017	2018
Funded status of accrued benefits					
Present value of accrued benefits (PVAB)	\$54,728,852	\$56,352,197	\$56,765,770	\$58,870,176	\$60,664,657
Market value of assets (MVA)	49,788,262	50,674,441	48,124,260	49,179,011	53,886,381
Under (over) funded PVAB	\$4,940,590	\$5,677,756	\$8,641,510	\$9,691,165	\$6,778,276
Accrued benefit funded percentage	91%	90%	85%	84%	89%
Funded status of actuarial accrued liability					
Actuarial accrued liability (AAL)	\$54,728,852	\$56,352,197	\$56,765,770	\$58,870,176	\$60,664,657
Actuarial value of assets	46,749,763	48,701,079	50,325,690	51,013,888	51,774,300
Unfunded actuarial accrued liability	\$7,979,089	\$7,651,118	\$6,440,080	\$7,856,288	\$8,890,357
Funded percentage	85%	86%	89%	87%	85%
Actuarially determined contribution (ADC)					
Employer normal cost	\$25,000	\$25,000	\$25,000	\$25,000	\$33,500
Amortization of unfunded AAL	826,213	830,563	722,961	944,025	1,133,289
Interest	55,329	55,612	48,617	60,564	70,007
Expected employer ADC	\$906,542	\$911,175	\$796,578	\$1,029,589	\$1,236,796
Actual contributions					
Actual employer contributions	\$906,542	\$911,175	\$796,578	\$1,029,589	\$1,236,796
Percentage of employer's ADC paid	100%	100%	100%	100%	100%
Liability Interest Rate	6.50%	6.50%	6.50%	6.25%	6.00%

	2019	2020	2021	2022
Funded status of accrued benefits				
Present value of accrued benefits (PVAB)	\$60,796,919	\$62,676,158	\$65,469,053	\$65,543,139
Market value of assets (MVA)	49,298,553	56,080,636	61,058,128	63,863,603
Under (over) funded PVAB	\$11,498,366	\$6,595,522	\$4,410,925	\$1,679,536
Accrued benefit funded percentage	81%	89%	93%	97%
Funded status of actuarial accrued liability				
Actuarial accrued liability (AAL)	\$60,796,919	\$62,676,158	\$65,469,053	\$65,543,139
Actuarial value of assets	51,542,840	53,606,210	56,953,125	59,435,136
Unfunded actuarial accrued liability	\$9,254,079	\$9,069,948	\$8,515,928	\$6,108,003
Funded percentage	85%	86%	87%	91%
Actuarially determined contribution (ADC)				
Employer normal cost	\$34,000	\$32,700	\$35,300	\$37,200
Amortization of unfunded AAL	1,265,515	1,342,687	1,369,207	1,187,562
Interest	77,971	82,523	78,652	68,587
Expected Employer ADC	\$1,377,486	\$1,457,910	\$1,483,159	\$1,293,349
Actual contributions				
Actual employer contributions	\$1,377,486	\$1,457,910	\$1,483,159	--
Percentage of employer's ADC paid	100%	100%	100%	--
Liability interest rate	6.00%	6.00%	5.60%	5.60%

	2014	2015	2016	2017	2018
Census at beginning of year					
Number of active participants	160	154	142	134	127
Number of terminated vested participants	60	58	59	52	49
Number of disabled participants	5	6	5	6	5
Number of retirees	144	148	157	166	172
Total participants	369	366	363	358	353
Plan maturity measures					
Non-active employees as a percentage of total	57%	58%	61%	63%	64%
In pay status PV accrued benefits as a percentage of total	51%	54%	56%	58%	59%
Achievement of economic assumptions					
Expected rate of return	6.50%	6.50%	6.50%	6.25%	6.00%
Actual market value rate of return	5.56%	-1.23%	7.05%	14.45%	-4.82%
Liability interest rate	6.50%	6.50%	6.50%	6.25%	6.00%

	2019	2020	2021	2022
Census at beginning of year				
Number of active participants	122	119	116	100
Number of terminated vested participants	48	46	43	42
Number of disabled participants	5	5	4	4
Number of retirees	174	176	179	193
Total participants	349	346	342	339
Plan maturity measures				
Non-active employees as a percentage of total	65%	66%	66%	71%
In pay status PV accrued benefits as a percentage of total	60%	57%	56%	64%
Achievement of economic assumptions				
Expected rate of return	6.00%	6.00%	5.60%	5.60%
Actual market value rate of return	17.98%	12.40%	8.33%	--
Liability interest rate	6.00%	6.00%	5.60%	5.60%



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