

Des Moines Water Works
Pension Plan
4-49122

Actuarial valuation report

for the plan year beginning 01/01/2019
and ending 12/31/2019

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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.

What's new?

Risk assessment and history

The Actuarial Standards Board adopted the Actuarial Standards of Practice (ASOP) 51 regarding the disclosure of risk associated with measuring pension obligations and determining pension plan contributions. ASOP 51 is effective for measurement dates 11/01/2018 and later.

We've added additional information in the [Risk assessment and historical information](#) to help you understand and assess some of the risks the plan may face. We suggest you review this section annually and consider the goals of the defined benefit plan and organization.

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
\$1,377,486

- 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 (ADC) increased from \$1,236,796 in 2018 to \$1,377,486 for 2019. This increase is primarily due to less than assumed return on the actuarial value of assets. A portion of investment gains from prior years was spread with the current year investment loss to determine the actuarial value of assets. This four-year smoothing of investment gains and losses helped limit the increase in the ADC.

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

Contact your pension actuarial analyst, Amy Dinwiddie, at

- Dinwiddie.Amy@principal.com
- 888-245-5998 extension 3040
- 913-491-4700 extension 3040

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 01/01/2019 market value of assets (the solid line) to 01/01/2019 plan liabilities measured using the assumptions we have made about future events. The liabilities assume:

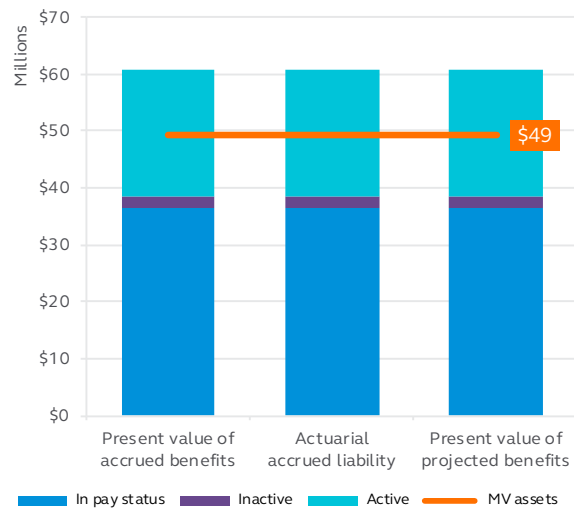
- No one will enter the plan after the valuation date.
- Your asset allocation will remain the same with a return of 6.00% each year into the future.
- Plan participants will retire, die, terminate, and become disabled based on our assumptions.

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.

Since your plan is frozen, all liabilities are equal.



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.

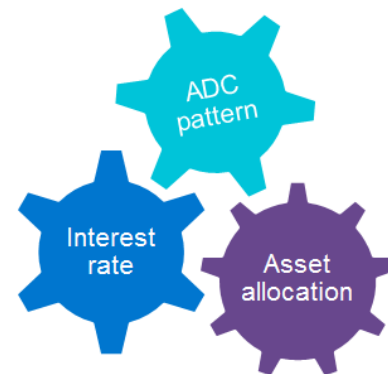
Understanding how your assets compare to your present value of accrued benefits is important. At a minimum you want to have enough assets in the plan to cover the present value of the benefits accrued to date.

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.

Understanding your plan's funded status

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.

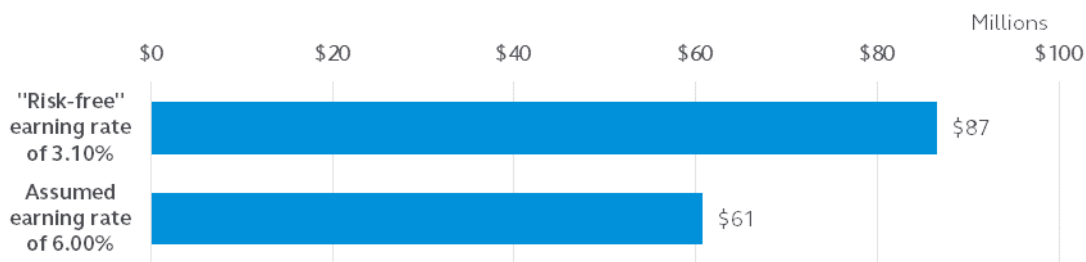
Asset allocations and interest rates

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 (6.00%) and risk-free basis (3.10%) are referred to as “risk premium”. The \$25,816,718 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.

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 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.

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

As you move along your path to termination, we can assist you with developing a timeline with a funding strategy and by providing monitoring tools to track your progress.

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 2018 plan year is \$1,236,796.
- No cash contributions have been received yet for the current plan year.

Paid or date due	Plan year beginning 2018	Plan year beginning 2019	Plan year beginning 2020
04/02/2018	\$300,000		
07/09/2018	\$312,265		
09/24/2018	\$312,265		
12/19/2018	\$312,266		
12/31/2019		\$1,377,486	
12/31/2020			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	\$34,000
Plus amortization amounts	1,265,515
Plus valuation interest to the end of the plan year	77,971

Your actuarially determined contribution (ADC) is **\$1,377,486**

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	34,000
Total normal cost	\$34,000

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	\$22,315,237
Inactive participants	1,979,837
Participants and beneficiaries in pay status	36,501,845
Actuarial accrued liability	\$60,796,919

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		
01/01/2018 unfunded actuarial accrued liability (UAAL)	\$8,890,357	
01/01/2018 employer normal cost	33,500	
Interest on the above items	535,431	
Total expected UAAL without contributions		\$9,459,288
Employer contributions	\$1,236,796	
Interest on employer contributions	27,935	
Total contributions with interest		\$1,264,731
Expected 01/01/2019 unfunded actuarial accrued liability		\$8,194,557
Total expected UAAL less contributions with interest		
Actual unfunded actuarial accrued liability (before changes)		
Actuarial accrued liability	\$60,957,242	
Less actuarial value of assets	51,542,840	
Preliminary 01/01/2019 unfunded actuarial accrued liability		\$9,414,402
Experience (gain) or loss		
Actual unfunded actuarial accrued liability	\$9,414,402	
Less expected unfunded actuarial accrued liability	8,194,557	
(Gain)loss		\$1,219,845
2018 actuarially determined contribution	\$1,236,796	
Less total contributions with interest	1,264,731	
Additional (gain)/loss from (excess) shortage of contributions		\$(27,935)
Total experience (gain) or loss		\$1,191,910
Final unfunded actuarial accrued liability (after changes)		
Actuarial accrued liability after assumption changes	\$60,796,919	
Less actuarial value of assets	51,542,840	
01/01/2019 unfunded actuarial accrued liability after changes		\$9,254,079
Change in unfunded actuarial accrued liability due to:		(Gain)/loss
Change in assumptions		\$(160,323)

Your 01/01/2019 unfunded actuarial accrued liability is **\$9,254,079**

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
01/01/2019	Assumption	(160,323)	10	(160,323)	(20,550)
01/01/2019	Experience (gain)/loss	1,191,910	10	1,191,910	152,776
01/01/2018	Experience (Gain)/Loss	212,718	9	196,579	27,266
01/01/2018	Assumption	1,333,359	9	1,232,200	170,906
01/01/2017	Experience (Gain)/Loss	789,424	8	666,686	101,283
01/01/2017	Assumption	978,132	8	826,053	125,495
01/01/2016	Experience (Gain)/Loss	(186,503)	7	(141,865)	(23,975)
01/01/2016	Assumption	(637,308)	7	(484,774)	(81,925)
01/01/2015	Experience (Gain)/Loss	(528,764)	6	(354,993)	(68,106)
01/01/2015	Assumption	562,069	6	377,353	72,396
01/01/2014	Experience (Gain)/Loss	(1,228,910)	5	(650,568)	(145,701)
01/01/2014	Benefit Freeze	(5,777,832)	10	(4,405,273)	(564,656)
01/01/2013	Initial Unfunded Liability	15,527,955	9	10,961,094	1,520,306
Total				9,254,079	1,265,515

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 2019 plan year are not included.

Both market value and actuarial value for the 2019 plan year are shown below.

Market value of assets

Investments held by Principal	\$49,298,553
2018 contributions received on or after 01/01/2019	0
Total market value of assets	\$49,298,553

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	\$51,542,840
2018 contributions received on or after 01/01/2019	0
Total actuarial value	\$51,542,840

The actuarial value of plan assets is **\$51,542,840**

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 2018	\$53,886,381
Contributions/transfers	1,236,796
Benefit payments	(3,255,624)
Expenses	(33,974)
Expected 6.00% interest on above items	3,156,033
Expected value of assets as of 01/01/2019	\$54,989,612
Market value as of 01/01/2019	\$49,298,553
Current year excess appreciation/(shortfall)	(5,691,059)
25% of current year excess appreciation/(shortfall)	(1,422,765)

2 Allocate deferred appreciation/(shortfall)

Allocation year	Plan year			
	2016	2017	2018	2019
2016	\$(955,786)			
2017	(955,786)	\$63,710		
2018	(955,786)	63,710	\$980,150	
2019	(955,785)	63,710	980,149	\$(1,422,765)
2020		63,709	980,149	(1,422,765)
2021			980,149	(1,422,765)
2022				(1,422,764)
Total	\$(3,823,143)	\$254,839	\$3,920,597	\$(5,691,059)
Deferred	\$0	\$63,709	\$1,960,298	\$(4,268,294)
Adjustment to market value (sum of deferred amounts)				\$(2,244,287)

3 Adjust market value for deferred amounts

Market value as of 01/01/2019	\$49,298,553
Adjustment to market value (sum of deferred amounts)	(2,244,287)
Adjusted value of investments	\$51,542,840

Data and assumptions

Census characteristics

	01/01/2018	01/01/2019	Change
Number of covered participants			
Actives	127	122	-5
Terminated vested	49	48	+1
Disabled	5	5	-
Retirees	172	174	+2
Total	353	349	-4
Average age			
Actives	51.7	52.2	+0.5
Terminated vested	53.5	54.3	+0.8
Disabled	58.7	59.7	+1.0
Retirees	70.2	70.6	+0.4
All	61.0	61.8	+0.8
Monthly accrued retirement benefits			
Actives	\$286,664	\$273,824	-4.5%
Terminated vested	28,918	25,876	-10.5%
Disabled	5,618	5,618	-
Retirees	259,415	266,946	+2.9%

The monthly accrued retirement benefit 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 5 non-participating spouses who are eligible for a benefit under a Qualified Domestic Relations Order (QDRO). However, the entire monthly pension benefits (for the participants and QDRO spouses) are included.

Data and assumptions

Benefit cash flows

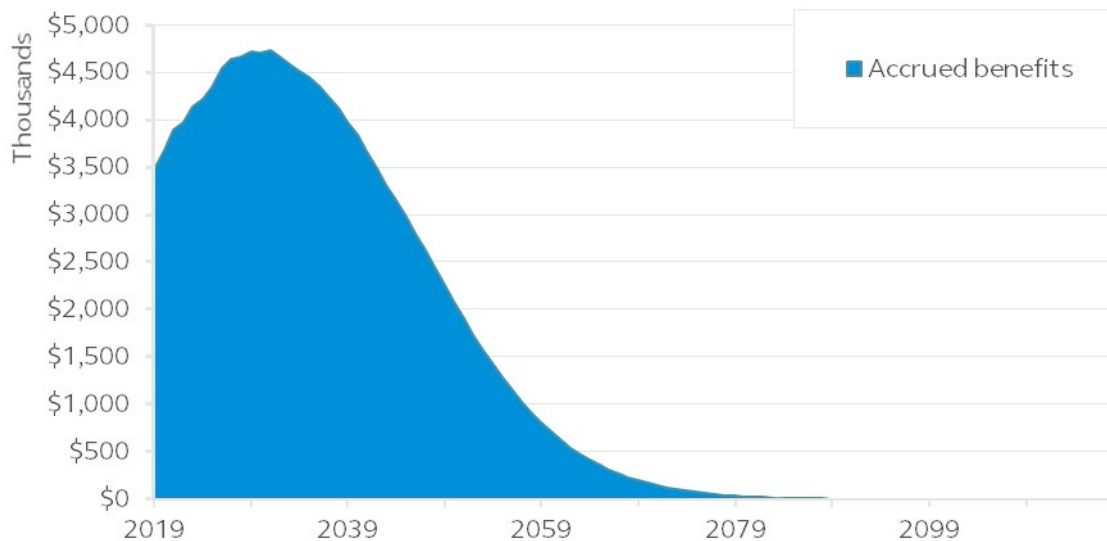
Benefit cash flows are the benefit payments expected to be paid from your plan assets. We provide cash flows to help you calculate and understand your plan obligations and the future liquidity needs of the plan.

You can compare your cash flows to the 01/01/2019 market value of assets, \$49,298,553, 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, including the 5.5% future accrual increases (if applicable) until the assumed retirement age. 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
2019	3,467,989	2052	1,731,023	2085	7,348
2020	3,680,595	2053	1,571,461	2086	5,421
2021	3,897,070	2054	1,419,116	2087	3,932
2022	3,977,392	2055	1,277,376	2088	2,803
2023	4,141,022	2056	1,143,900	2089	1,963
2024	4,222,487	2057	1,020,215	2090	1,352
2025	4,344,548	2058	906,251	2091	916
2026	4,542,234	2059	801,839	2092	612
2027	4,635,643	2060	706,729	2093	402
2028	4,672,645	2061	620,567	2094	261
2029	4,720,602	2062	542,923	2095	168
2030	4,710,608	2063	473,298	2096	107
2031	4,728,524	2064	411,248	2097	67
2032	4,668,914	2065	356,262	2098	41
2033	4,590,854	2066	307,777	2099	24
2034	4,519,316	2067	265,204	2100	14
2035	4,449,644	2068	227,931	2101	8
2036	4,355,019	2069	195,370	2102	4
2037	4,251,794	2070	166,986	2103	2
2038	4,120,708	2071	142,267	2104	1
2039	3,970,821	2072	120,752	2105	1
2040	3,835,901	2073	102,060	2106	0
2041	3,670,623	2074	85,867	2107	0
2042	3,493,132	2075	71,872	2108	0
2043	3,312,061	2076	59,811	2109	0
2044	3,151,488	2077	49,449	2110	0
2045	2,971,213	2078	40,569	2111	0
2046	2,798,791	2079	32,996	2112	0
2047	2,620,506	2080	26,558	2113	0
2048	2,446,178	2081	21,130	2114	0
2049	2,258,541	2082	16,589	2115	0
2050	2,076,133	2083	12,843	2116	0
2051	1,899,946	2084	9,794	2117	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	<p>The average of monthly compensation received for the 60 consecutive calendar months out of the latest 120 months which gives the highest average.</p> <p>The monthly compensation for December 2013 includes sick leave, vacation, and personal time accrued but not used as of 12/31/2013.</p> <p>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).</p>
Optional forms of benefit payments	<p>The optional forms of benefit payments are:</p> <ul style="list-style-type: none">• 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 <p>The optional form conversion basis is 7.5% interest and the mortality table in Revenue Ruling 95-6 for payments other than lump sums.</p>

Data and assumptions

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) 2018. 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 Market Assumptions 2018](#) for additional information.

Changes since last year

Assumption changes

The mortality assumption has been updated to reflect the annual historical U.S. mortality data to 2016 and the inflation rate has been increased from 2.00% to 2.25%.

Net effect of assumption changes

The net effect of the assumption changes is to decrease 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 6.00%
	Before benefit payment period 6.00%
	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	6.00% for the current plan year. See liability interest rate for how this rate was determined.
Inflation	2.25% increase per year. See Long-Term Capital Market Assumptions link.

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	25%	61	5%
56	15%	62	20%
57	5%	63	5%
58	5%	64	10%
59	5%	65	100%
60	5%		

Inactive participants are assumed to retire at age 65.

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.

MortalityRates

Adjusted RP-2014 mortality (baseline mortality table as of 2006 based on experience study data for private pension plans underlying RP-2014).

Mortality improvement (MI)

MP-2018

During benefit payment period

Above table with generational MI, annuitant, male and female

Before benefit payment period

Above table with generational MI, non-annuitant, male and female

The Society of Actuaries is an actuarial organization that periodically reviews mortality data and publishes mortality tables and improvement scales. This table and improvement scale are based on the most current data available published by the SOA in October 2018.

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.

Data and assumptions

Withdrawal

2003 Society of Actuaries Small Plan Age Table, multiplied by 0.45.

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 0.45 is applied to this table to reflect the results of the most recent experience analysis and anticipated future experience.

Marriage

75% married; husbands are 3 years older than wives.

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.

Form of benefit

Participants are assumed to receive their benefits on the normal form at the assumed retirement age.

Methods selected by plan sponsor

Actuarial value of plan assets

The market value of the Principal accounts is adjusted by spreading the expected value minus the actual value over four years.

Contributions received in the current plan year but applied to the prior plan year are added to the actuarial value of the Principal accounts.

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. Since plan benefits were frozen at 12/31/2013, the accrual period ended at 12/31/2013, and all benefits are now considered fully accrued. Therefore, future normal costs for benefit accruals are \$0.

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. Because the plan is frozen, the actuarial accrued liability (AAL) is the present value of all future benefits payable, including potential actuarial increases for deferral as all benefits are fully accrued at 12/31/2013.

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.

Data and assumptions

Methods selected by actuary

Retirees	Assets and liabilities for current and future retirees are included.
Vested benefits	<p>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.</p> <p>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.</p>

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 2018 plan year.
- information for any retirees, beneficiaries, and alternate payees being paid by Principal Life Insurance Co as of the last day of the 2018 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 2018 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.

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.

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.



03/21/2019

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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.

	01/01/2019	01/01/2018
Present value of vested benefits		
Participants in pay status	\$36,501,845	\$35,852,110
Inactive participants	1,979,837	2,119,387
Active participants	16,892,468	16,921,512
Total	\$55,374,150	\$54,893,009
Present value of nonvested benefits		
Participants in pay status	\$0	\$0
Inactive participants (not in pay status)	0	0
Active participants	5,422,769	5,771,648
Total	\$5,422,769	\$5,771,648
Total present value of accumulated plan benefits	\$60,796,919	\$60,664,657
Value of future service and compensation	0	0
Total present value of projected plan benefits	\$60,796,919	\$60,664,657

Change in present value of accumulated plan benefits

Present value of accumulated plan benefits as of 01/01/2018	\$60,664,657
Increase (decrease) during the year due to:	
Increase for interest due to decrease in the discount period	3,543,633
Benefits paid	(3,255,624)
Plan experience	4,576
Change in assumptions	(160,323)
Present value of accumulated plan benefits as of 01/01/2019	\$60,796,919

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. For example, if more participants defer benefits past their rule of 85 date than expected, benefits paid (actual plan costs) may be greater than assumed.

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 information](#) 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 six 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.

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 65%.

In pay status PV accrued benefits as a percentage of total is 60%.

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.

In general, these measures have been increasing. Since the plan does not allow for new hires to enter the plan, those that leave are not replaced. Thus, the number of active participants and average future service continue to decline, creating an increased reliance on active employees to absorb adverse experience.

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	6.00%	3.10%¹
Standard deviation	9.00%	---
Normal cost ²	\$0	\$0
Actuarial accrued liability	\$60,796,919	\$86,613,637
Market value of assets	N/A	\$49,298,553
Actuarial value of assets	\$51,542,840	N/A
Unfunded actuarial accrued liability	\$9,254,079	\$37,315,084
Present value of accrued benefits	\$60,796,919	\$86,613,637

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 -3.00% to 15.00% (6.00% +/- 9.00%)

¹ The 30-year Treasury rate at 12/31/2018 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
Funded status of accrued benefits			
Present value of accrued benefits (PVAB)	\$54,728,852	\$56,352,197	\$56,765,770
Market value of assets (MVA)	49,788,262	50,674,441	48,124,260
Under (over) funded PVAB	\$4,940,590	\$5,677,756	\$8,641,510
Accrued benefit funded percentage	91%	90%	85%
Funded status of actuarial accrued liability			
Actuarial accrued liability (AAL)	\$54,728,852	\$56,352,197	\$56,765,770
Actuarial value of assets	46,749,763	48,701,079	50,325,690
Unfunded actuarial accrued liability	\$7,979,089	\$7,651,118	\$6,440,080
Funded percentage	85%	86%	89%
Actuarially determined contribution (ADC)			
Employer normal cost	\$25,000	\$25,000	\$25,000
Amortization of unfunded AAL	826,213	830,563	722,961
Interest	55,329	55,612	48,617
Expected employer ADC	\$906,542	\$911,175	\$796,578
Actual contributions			
Actual employer contributions	\$906,542	\$911,175	\$796,578
Percentage of employer's ADC paid	100%	100%	100%
Census at beginning of year			
Number of active participants	160	154	142
Number of terminated vested participants	60	58	59
Number of disabled participants	5	6	5
Number of retirees	144	148	157
Total participants	369	366	363
Plan maturity measures			
Non-active employees as a percentage of total	57%	58%	61%
In pay status PV accrued benefits as a percentage of total	51%	54%	56%
Achievement of economic assumptions			
Expected rate of return	6.50%	6.50%	6.50%
Actual market value rate of return	5.56%	-1.23%	7.05%
Liability interest rate	6.50%	6.50%	6.50%

Risk assessment and historical information

	2017	2018	2019
Funded status of accrued benefits			
Present value of accrued benefits (PVAB)	\$58,870,176	\$60,664,657	\$60,796,919
Market value of assets (MVA)	49,179,011	53,886,381	49,298,553
Under (over) funded PVAB	\$9,691,165	\$6,778,276	\$11,498,366
Accrued benefit funded percentage	84%	89%	81%
Funded status of actuarial accrued liability			
Actuarial accrued liability (AAL)	\$58,870,176	\$60,664,657	\$60,796,919
Actuarial value of assets	51,013,888	51,774,300	51,542,840
Unfunded actuarial accrued liability	\$7,856,288	\$8,890,357	\$9,254,079
Funded percentage	87%	85%	85%
Actuarially determined contribution (ADC)			
Employer normal cost	\$25,000	\$33,500	\$34,000
Amortization of unfunded AAL	944,025	1,133,289	1,265,515
Interest	60,564	70,007	77,971
Expected employer ADC	\$1,029,589	\$1,236,796	\$1,377,486
Actual contributions			
Actual employer contributions	\$1,029,589	\$1,236,796	--
Percentage of employer's ADC paid	100%	100%	--
Census at beginning of year			
Number of active participants	134	127	122
Number of terminated vested participants	52	49	48
Number of disabled participants	6	5	5
Number of retirees	166	172	174
Total participants	358	353	349
Plan maturity measures			
Non-active employees as a percentage of total	63%	64%	65%
In pay status PV accrued benefits as a percentage of total	58%	58%	60%
Achievement of economic assumptions			
Expected rate of return	6.25%	6.00%	6.00%
Actual market value rate of return	14.45%	-4.82%	--
Liability interest rate	6.25%	6.00%	6.00%

Risk assessment and historical information



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