Willis Towers Watson

CPS Energy

January 1, 2017 Actuarial Valuation Report for the CPS Energy Pension Plan

For the Plan Year Beginning January 1, 2017 and Fiscal Year Beginning February 1, 2018

July 30, 2018

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Non-Reliance Notice

NOTICE

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Introduction

This report describes the results of an actuarial valuation of the CPS Energy Pension Plan. CPS Energy retained Willis Towers Watson to perform this actuarial valuation for the purposes of determining (1) the funding status for the plan year January 1, 2017 through December 31, 2017 and the funding policy contribution amount for the fiscal year February 1, 2018 through January 31, 2019; and (2) financial statement disclosure and reporting information for the plan year ending December 31, 2017 and fiscal year ending January 31, 2019.

The calculations were made as of January 1, 2017. In preparing the results presented in this report, we have relied upon information provided to us regarding plan provisions as of the measurement dates (December 31, 2017 and January 31, 2018), and plan participants as of January 1, 2017 and plan assets as of December 31, 2016, January 31, 2017, December 31, 2017 and January 31, 2018. We have reviewed this information for overall reasonableness and consistency, but have neither audited nor independently verified this information. The accuracy of the results presented in this report is dependent upon the accuracy and completeness of the underlying information.

The actuarial assumptions and the accounting policies and methods employed in this report have been selected by the plan sponsor, with the concurrence of Willis Towers Watson.

This report does not determine liabilities on a plan termination basis, for which a separate extensive analysis would be required.

The funding determination portion of this actuarial valuation has been conducted in accordance with principles of practice prescribed by the Actuarial Standards Board.

The financial statement disclosure portion of this actuarial valuation has been conducted according to our understanding of Statements 67 and 68 of the Governmental Accounting Standards Board. The Governmental Accounting Standards Board requires the use of reasonable assumptions. The actuarial assumptions used are identical to the assumptions used for the funding determination portion of the valuation.

The results shown in this report have been developed based on economic assumptions that are appropriate for the purpose of the measurement, take into account relevant historical and current data, reflect estimates of future experience and have no significant bias, as well as demographic actuarial assumptions that are considered to be reasonable and within the “best-estimate range” as described by the Actuarial Standards of Practice. Other actuarial assumptions could also be considered to be reasonable. Thus, reasonable results differing from those presented in this report could have been developed by selecting different, but still reasonable, assumptions.

The results shown in this report are estimates based on data that may be imperfect and on assumptions about future events that cannot be predicted with any certainty. The effects of certain plan provisions may be approximated, or determined to be insignificant and therefore not valued. Reasonable efforts were made in preparing this valuation to confirm that items that are significant in the context of the actuarial liabilities or costs are treated appropriately, and are not excluded or included inappropriately. The numbers shown in this report are not rounded, but this is for convenience only and should not imply precision, which is not a characteristic of actuarial calculations.

If overall future plan experience produces higher benefit payments or lower investment returns than assumed, the relative level of plan costs or contribution requirements reported in this valuation will likely increase in future valuations (and vice versa). Future actuarial measurements may differ significantly from the current measurements presented in this report due to many factors, including: plan experience differing from that anticipated by the economic or demographic assumptions and changes in plan provisions or applicable law. It is beyond the scope of this valuation to analyze the potential range of future pension contributions, but we can do so upon request.

The information contained in this report was prepared for the internal use of CPS Energy and its auditors in connection with our actuarial valuation of the pension plan. It is neither intended nor necessarily suitable for other purposes. CPS Energy may also distribute this actuarial valuation report to the appropriate authorities who have the legal right to require CPS Energy to provide them this report, in which case CPS Energy will use best efforts to notify Willis Towers Watson in advance of this distribution. Further distribution to, or use by, other parties of all or part of this report is expressly prohibited without Willis Towers Watson's prior written consent.

The undersigned consulting actuaries are members of the Society of Actuaries and meet the "Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States" relating to pension plans. Our objectivity is not impaired by any relationship between CPS Energy and our employer, Towers Watson Delaware Inc.

Lloyd L. Nordstrom, FSA, EA, MAAA

Michael J. Bologna, FSA, EA, MAAA

Willis Towers Watson

Section 1: Management Summary

A. Key Funding Results

The key funding results from the current actuarial valuation, along with comparable figures from the prior valuation, are shown below.

Actuarial Valuation Date			January 1, 2017		January 1, 2016
1. Employer Funding Requirements(1)					
	a. 30-Year Funding Contribution	$	58,656,874	$	46,233,898
	b. 20-Year Funding Contribution	$	63,721,889	$	49,877,053
	c. 15-Year Funding Contribution	$	69,413,591	$	54,001,788
	d. 10-Year Funding Contribution	$	81,501,220	$	62,796,501
	e. 5-Year Funding Contribution	$	119,259,689	$	90,343,191
2. Participant Payroll(1)					
	a. Base rate of pay	$	229,417,603	$	218,703,681
	b. Projected plan year payroll	$	254,241,277	$	242,477,079
3. Employer Funding Requirements as a Percentage of Participant Payroll (base rate of pay/projected payroll)(1)					
	a. 30-Year Funding Contribution		25.6% / 23.1%		21.1% / 19.1%
	b. 20-Year Funding Contribution		27.8% / 25.1%		22.8% / 20.6%
	c. 15-Year Funding Contribution		30.3% / 27.3%		24.7% / 22.3%
	d. 10-Year Funding Contribution		35.5% / 32.1%		28.7% / 25.9%
	e. 5-Year Funding Contribution		52.0% / 46.9%		41.3% / 37.3%

The above results are described in detail in Section 2. Note that the employer contribution amounts shown above are in addition to required employee contributions to the plan at the rate of 5% of salary. Also, the results shown above are for the Pension Plan only and do not include amounts for the Restoration Plan. See subsection 2.D for a complete summary of the combined employer and employee funding requirements.

January 1, 2017 valuation results include the impact of revised actuarial assumptions. Please refer to the Summary of Actuarial Assumptions section for a description of the changes.

[1] Employer contribution assumed to be payable and participant payroll assumed to be earned during fiscal year which commences in the calendar year after the valuation year.

B. Plan Experience and Changes since Last Valuation

The plan provisions have not changed since the prior valuation.

A net actuarial loss for funding purposes of $29.6 million occurred during 2016. This loss was due to the effect of a demographic loss of $5.6 million combined with an asset loss of $24.0 million. The asset loss was due to the partial recognition of an investment gain during 2016 of $34.9 million offset by previously unrecognized asset gains and losses resulting in a return on the actuarial value of assets of 5.8% during 2016. In addition, assumption changes increased liability by $73.4 million as of January 1, 2017.

				Net Pension Liability for funding ($ in 000's)	
1.	January 1, 2016 Net Pension Liability (NPL)			$	260,239
2.	Expected change in NPL				
	a.	Interest on NPL		$	19,518
	b.	Contributions over Normal Cost			(25,490)
	c.	Expected change in NPL		$	(5,972)
3.	Expected January 1, 2017 NPL			$	254,267
4.	Actuarial gains and losses				
	a.	Demographic (gains)/losses			
		i.	Effect of terminations, mortality and data	$	11,578
		ii.	Assumption Changes		73,356
		iii.	New entrants		1,441
		iv.	COLA		(7,459)
		v.	Total demographic (gains)/losses	$	78,916
	b.	Asset (gains)/losses			
		i.	Recognition of (gains)/losses from prior years	$	30,919
		ii.	Effect of (gains)/losses from current year		(6,974)
		iii.	Total asset (gains)/losses	$	23,945
	c.	Total actuarial (gains)/losses		$	102,861
5.	January 1, 2017 NPL			$	357,128

C. Key Financial Statement Results

Financial statement disclosure information under Governmental Accounting Standards Board Statement No. 67 (GASB 67) and Statement No. 68 (GASB 68) has been determined, and is included in Sections 3 and 4. The key financial results from the current actuarial valuation, along with comparable figures from the prior valuation, are shown below.

Actuarial Valuation Date		**January 1, 2017**		**January 1, 2016**
Measurement Date		**January 31, 2018**		**January 31, 2017**
1. Total Pension Liability (TPL)	$	1,940,315,686	$	1,784,837,258
2. Fiduciary Net Position (FNP)	$	1,684,446,726	$	1,472,375,604
3. Net Pension Liability (NPL)	$	255,868,960	$	312,461,654
4. Funded Ratio: (2)/(1)		86.8%		82.5%
5. Covered employees' payroll	$	254,241,277	$	242,477,079
6. Net Pension Liability as a percentage of covered payroll: (3)/(5)		100.6%		128.9%
7. Total Pension Expense	$	27,112,110	$	46,246,570

Section 2: Funding Determination

A. Determination of Contribution Amounts and Funded Status

The current contribution requirements have been determined based on the actuarial assumptions summarized in Appendix D and the actuarial cost method described in Appendix E.

The actuarial assumptions are used to predict the likelihood of various benefits becoming payable from the plan, the size of those benefits, and the estimated value today of those future benefits. Actual experience may deviate from these assumptions, resulting in actuarial gains and losses.

The actuarial cost method is a budgeting technique, used to allocate total estimated plan liabilities over past, current, and future years. Thus, the choice of the cost method does not affect the overall long-term plan costs, but only the incidence of when those costs are reflected. The cost method is designed to allocate plan costs as a relatively level percentage of payroll if characteristics of the participant group do not change significantly.

An actuarial valuation is the process by which the actuarial assumptions and cost method are applied to actual plan provisions, assets, and participant data, to develop a funding level sufficient to provide for future benefit payments, the actual ultimate value of which is not now known. The actuarial valuation also reviews the current funded status of the plan, a comparison of current assets to the value of benefits accrued to date.

As a governmental plan, the CPS Energy Pension Plan is not subject to the minimum and maximum funding levels prescribed by the Employee Retirement Income Security Act (ERISA) and the Internal Revenue Code. The technique used to determine the contribution requirements for the plan is described later in this section.

B. Changes since Last Valuation

The plan provisions have not changed since the prior valuation. January 1, 2017 valuation results include the impact of revised actuarial assumptions. Please refer to the Summary of Actuarial Assumptions section for a description of the changes.

C. Basic Valuation Results

Actuarial Valuation Date		January 1, 2017		January 1, 2016
1. Actuarial Present Value of Total Projected Benefits:				
a. active participants	$	1,127,773,778	$	1,001,009,273
b. inactive participants		1,061,235,596		1,006,835,722
c. total: (a)+(b)	$	2,189,009,374	$	2,007,844,995
2. Pension Liability for Active Participants:				
a. retirement benefits	$	790,550,691	$	699,905,205
b. ancillary benefits		6,082,763		5,331,926
c. total: (a)+(b)	$	796,633,454	$	705,237,131
3. Pension Liability for Inactive Participants:				
a. currently receiving benefits	$	1,040,821,075	$	994,499,158
b. other inactive participants		20,414,521		12,336,564
c. total: (a)+(b)	$	1,061,235,596	$	1,006,835,722
4. Total Pension Liability: (2)(c)+(3)(c)	$	1,857,869,050	$	1,712,072,853
5. Actuarial Value of Plan Assets	$	1,500,740,708	$	1,451,833,752
6. Unfunded Pension Liability : (4)-(5)	$	357,128,342	$	260,239,101
7. Normal Cost[(1)]:				
a. total Normal Cost	$	40,633,510	$	35,373,517
b. expected employee contributions		12,712,064		12,123,854
c. employer Normal Cost: (a)-(b)	$	27,921,446	$	23,249,663
8. Participant payroll[(1)]	$	254,241,277	$	242,477,079
9. Employer Normal Cost as a Percentage of Payroll: (7)(c)÷(8)		11.0%		9.6%

[(1)] Assumed to be payable during the fiscal year which commences in the calendar year after the valuation year.

D. Funding Requirements

Actuarial Valuation Date		January 1, 2017	January 1, 2016
1.	30-Year Funding Contribution[1]:		
	a. Employee	$ 12,712,064	$ 12,123,854
	b. Employer	$ 58,656,874	$ 46,233,898
	c. total: (a)+(b)	$ 71,368,938	$ 58,357,752
2.	20-Year Funding Contribution[1]:		
	a. Employee	$ 12,712,064	$ 12,123,854
	b. Employer	$ 63,721,889	$ 49,877,053
	c. total: (a)+(b)	$ 76,433,953	$ 62,000,907
3.	15-Year Funding Contribution[1]:		
	a. Employee	$ 12,712,064	$ 12,123,854
	b. Employer	$ 69,413,591	$ 54,001,788
	c. total: (a)+(b)	$ 82,125,655	$ 66,125,642
4.	10-Year Funding Contribution[1]:		
	a. Employee	$ 12,712,064	$ 12,123,854
	b. Employer	$ 81,501,220	$ 62,796,501
	c. total: (a)+(b)	$ 94,213,284	$ 74,920,355
5.	5-Year Funding Contribution[1]:		
	a. Employee	$ 12,712,064	$ 12,123,854
	b. Employer	$ 119,259,689	$ 90,343,191
	c. total: (a)+(b)	$ 131,971,753	$ 102,467,045

These contribution figures are the amounts to pay Normal Cost and to amortize the Unfunded Pension Liability over the indicated period of years starting with the valuation year. Employer contribution figures are equal to employer Normal Cost plus the unfunded amortization amount, adjusted to mid-year of the fiscal year commencing in the calendar year after the valuation year to reflect the monthly contribution pattern followed by CPS Energy.

[1] Assumed to be payable during the fiscal year which commences in the calendar year after the valuation year.

E. Funding Policy

CPS Energy's current funding policy is to use each actuarial valuation as the basis for determining monthly employer contributions to the plan during the fiscal year beginning in the calendar year after the valuation year. The January 1, 2017 valuation is the basis for contributions for the fiscal year February 1, 2018 through January 31, 2019.

The amount to be funded is determined each year by CPS Energy, with a general target of funding near the 30-Year Funding Contribution level. At this time, we feel that an employer contribution level at or near that targeted level will be sufficient to properly fund for future benefits.

F. Funded Status

A comparison of the Actuarial Present Value of Accumulated Plan Benefits with the value of plan assets provides a measure of the progress being made toward the funding of benefits being accrued. The figures illustrated here are applicable to the plan as an on-going concern, as opposed to values applicable if the plan were to terminate on the valuation date. Plan termination values could be significantly different from these figures.

The following Actuarial Present Values were determined using the funding determination assumptions summarized in Appendix D and methodology summarized in Appendix E.

Actuarial Valuation Date	**January 1, 2017**	**January 1, 2016**
1. Actuarial Present Value of Accumulated Plan Benefits:		
a. participants currently receiving benefits	$ 1,040,821,075	$ 994,499,158
b. other inactive participants	20,414,521	12,336,564
c. vested benefits for active participants	533,913,433	437,341,482
d. total vested: (a)+(b)+(c)	$ 1,595,149,029	$ 1,444,177,204
e. nonvested benefits	42,266,709	32,442,877
f. total: (d)+(e)	$ 1,637,415,738	$ 1,476,620,081
2. Market Value of Plan Assets (as determined for actuarial valuation purposes)	1,450,150,734	1,349,599,260
3. Unfunded Actuarial Present Value/(Surplus): (1)(f)-(2)	$ 187,265,004	$ 127,020,821
4. Funded Percentage: (2)÷(1)(f)	88.6%	91.4%

G. Plan Experience

A net actuarial loss of approximately $29.6 million occurred during the 2016 plan year. There was a loss due to non-investment sources of $5.6 million and an investment loss of $24.0 million. Historical gains and losses have been as follows:

Plan Year	Net Actuarial Gains (Losses)
1990	$ (1.7 million)
1991	$ 0.5 million
1992	$ 13.2 million
1993	$ 4.1 million
1994	$ (0.3 million)
1995	$ 11.8 million
1996	$ 18.2 million
1997	$ 18.6 million
1998	$ 13.6 million
1999	$ 39.2 million
2000	$ 34.7 million
2001	$ (0.1 million)
2002	$ (30.3 million)
2003	$ 11.3 million
2004	$ 21.5 million
2005	$ (14.3 million)
2006	$ 10.5 million
2007	$ (6.3 million)
2008	$ (89.4 million)
2009	$ (6.0 million)
2010	$ (4.6 million)
2011	$ (47.5 million)
2012	$ 2.7 million
2013	$ 40.7 million
2014	$ (16.2 million)
2015	$ (5.4 million)
2016	$ (29.6 million)

The approximate rate of investment return on plan assets for recent years has been as follows. The valuation investment return assumption was changed from 7.50% at January 1, 2016 to 7.25% at January 1, 2017.

	Approximate Rate of Investment Return (Net of Expenses)	
Plan Year	**Actuarial Value Basis**	**Market Value Basis**
1990	8.3%	4.9%
1991	12.1%	27.0%
1992	11.2%	8.9%
1993	10.6%	8.7%
1994	7.7%	(2.9%)
1995	11.8%	28.8%
1996	12.2%	13.4%
1997	12.1%	11.9%
1998	11.7%	10.4%
1999	16.7%	33.6%
2000	12.8%	1.2%
2001	9.6%	(1.3%)
2002	6.1%	(7.3%)
2003	10.0%	27.7%
2004	10.3%	13.2%
2005	9.1%	4.6%
2006	9.2%	9.4%
2007	8.5%	5.8%
2008	1.8%	(24.3%)
2009	5.0%	24.2%
2010	6.3%	13.4%
2011	4.9%	(0.9%)
2012	5.8%	10.4%
2013	8.2%	18.6%
2014	7.8%	5.9%
2015	5.9%	(1.5%)
2016	5.8%	10.2%

The average increase in Reported Earnings in recent years, compared to the expected average increase based on valuation assumptions, has been as follows:

Plan Year	Average Increase in Reported Earnings (for individuals who remained active participants)		
	Actual Increase		Expected Increase
	Base Rate	With Incentive	
1990	7.94%[1]		7.76%
1991	8.02%		7.51%
1992	3.62%[2]		7.49%
1993	5.67%		7.40%
1994	5.38%		6.38%
1995	6.12%[3]		6.30%
1996	4.89%		6.16%
1997	5.56%		6.12%
1998	6.16%		6.04%
1999	4.80%	7.93%	6.00%
2000	5.28%	5.94%	5.97%
2001	8.06%	9.03%	5.98%
2002	8.31%	8.16%	6.04%
2003	4.93%	5.75%	6.18%[4]
2004	4.74%	3.73%	5.39%
2005	5.78%	8.92%	5.43%
2006	5.21%	8.28%	5.31%[4]
2007	12.20%	8.06%	5.50%
2008	6.93%	6.24%	5.49%
2009	1.13%	3.57%	5.80%[4]
2010	4.79%	-0.16%	5.18%
2011	5.02%	8.65%	5.07%
2012	4.39%	6.92%	5.03%
2013	4.33%	4.51%	5.01%[4]
2014	5.50%	3.20%	4.78%
2015	4.94%	4.88%	4.66%
2016	4.99%	6.30%	4.91%

(1) Annualized figure, based on experience for nine month period July 1, 1989 to April 1, 1990.
(2) Annualized figure, based on experience for fifteen month period April 1, 1991 to July 1, 1992.
(3) Annualized figure, based on experience for eleven month period July 1, 1994 to June 1, 1995.
(4) Expected experience is based on prior year's actuarial assumptions, not the new assumptions adopted for that year's actuarial valuation.

Section 3: Information for Plan Financial Statements

A. Disclosure of Pension Information

This valuation reflects GASB Statements 67 and 68. These statements require the use of the Entry Age Normal actuarial cost method for purposes of determining the employer's Net Pension Liability and Expense. In addition, assets are reported at Fair Market Value (referred to as "Fiduciary Net Position" under the Statements.)

Beginning with the plan year ending December 31, 2013, CPS Energy has elected to prepare the plan's financial statements in accordance with GASB 67, which supersedes GASB 25 for the plan's financial reporting.

B. Schedule of Funding Progress

Actuarial Valuation Date	**January 1, 2017**	**January 1, 2016**
Measurement Date	**December 31, 2017**	**December 31, 2016**
1. Fiduciary Net Position	$ 1,627,840,308	$ 1,450,150,734
2. Total Pension Liability	$ 1,933,840,120	$ 1,778,953,451
3. Net Pension Liability: (2)-(1)	$ 305,999,812	$ 328,802,717
4. Funded Ratio: (1)÷(2)	84.2%	81.5%
5. Covered Payroll	$ 240,763,422	$ 229,622,866
6. Net Pension Liability as a Percentage of Covered Payroll: (3)÷(5)	127.1%	143.2%

C. Change in Net Pension Liability

Actuarial Valuation Date		**January 1, 2017**		**January 1, 2016**
Measurement Date		**December 31, 2017**		**December 31, 2016**
1. Total Pension Liability – Beginning of Measurement Period:	$	1,778,953,451	$	1,730,187,192
a. Service Cost		32,474,269		31,454,539
b. Interest		132,424,147		127,102,000
c. Plan amendments		0		0
d. Demographic (gains) / losses		5,976,795		(18,114,339)
e. Assumption changes		77,241,754		0
f. Benefit payments	$	(93,230,296)	$	(91,675,941)
g. Net change in Total Pension Liability		154,886,669		48,766,259
h. Total Pension Liability – End of Measurement Period	$	1,933,840,120	$	1,778,953,451
2. Fiduciary Net Position – Beginning of Measurement Period	$	1,450,150,734	$	1,349,599,260
a. Employer contributions		46,058,333		44,625,000
b. Employee contributions		12,961,211		12,101,360
c. Net investment income		212,290,871		136,022,187
d. Expenses		(390,545)		(521,132)
e. Benefit payments		(93,230,296)		(91,675,941)
f. Net change in Fiduciary Net Position	$	177,689,574	$	100,551,474
g. Fiduciary Net Position – End of Measurement Period	$	1,627,840,308	$	1,450,150,734
3. Net Pension Liability (NPL):	$	305,999,812	$	328,802,717
4. Funded Ratio: (2)(g) / (1)(h)		84.2%		81.5%
5. Covered employees' payroll	$	240,763,422	$	229,622,868
6. Net Pension Liability as a percentage of covered payroll: (3)/(5)		127.1%		143.2%
7. Sensitivity of NPL at Measurement Date				
a. 1% increase in Discount Rate	$	88,889,023	$	142,779,740
b. 1% decrease in Discount Rate	$	529,380,290	$	549,267,748

D. Notes to Required Schedules

		Plan Year Ended December 31, 2017	Plan Year Ended December 31, 2016
1.	Actuarial Valuation Date	January 1, 2017	January 1, 2016
2.	Measurement Date	December 31, 2017	December 31, 2016
3.	Actuarial Cost Method	Entry Age Normal	Entry Age Normal
4.	Asset Valuation Method	Fair Market Value	Fair Market Value
5.	Actuarial Assumptions:		
	a. Investment Rate of Return	7.25%	7.50%
	b. Projected Salary Increases (Average)[1]	4.72%	4.66%
	[1] Includes inflation at	3.00%	3.00%
	c. Cost-of-Living Increases	1.50%	1.50%
6.	Employer contribution for the fiscal year based on a 30-year amortization of the Net Pension Liability	$ 46,233,898	$ 44,532,433
7.	Employer contribution made	$ 46,058,333	$ 44,500,000
8.	Contribution shortfall	$ 175,565	$ 32,433
9.	Covered payroll[2]	$254,241,277	$242,477,079
10.	Employer contribution as a percentage of payroll[2]	18.1%	18.4%
11.	Money-weighted rate of return on pension assets	14.8%	10.2%
12.	Factors that significantly affect the identification of trends (e.g., changes in benefits, actuarial methods or assumptions, etc.)	December 31, 2017 results include the impact of revised actuarial assumptions. Please refer to the Summary of Actuarial Assumptions section for a description of the changes.	None

2 Employer contribution assumed to be payable and participant payroll assumed to be earned during fiscal year which commences in the calendar year after the valuation year.

Section 4: Information for Employer Financial Statements

A. Disclosure of Pension Information

Actuarial calculations under Statement No. 68 of the Governmental Accounting Standards Board (GASB 68) are made for purposes of providing the required supplementary information and the notes to the financial statement of CPS Energy. The calculations and disclosures reported in this section have been made on a basis consistent with our understanding of GASB 68.

Effective with the fiscal year ending January 31, 2014, CPS Energy has elected to prepare financial statements in accordance with GASB 68, which supersedes GASB 27 for the employer's financial reporting.

B. Schedule of Funding Progress

		Measurement Date	
		January 31, 2018	**January 31, 2017**
1.	Fiduciary Net Position	$ 1,684,446,726	$ 1,472,375,604
2.	Total Pension Liability	$ 1,940,315,686	$ 1,784,837,258
3.	Net Pension Liability	$ 255,868,960	$ 312,461,654
4.	Funded Ratio: (1)÷(2)	86.8%	82.5%
5.	Covered Payroll	$ 254,241,277	$ 242,477,079
6.	Net Pension Liability as a Percentage of Covered Payroll: (3)÷(5)	100.6%	128.9%

C. Change in Net Pension Liability

Fiscal Year Ending		January 31, 2019		January 31, 2018
Measurement Date (MD)		**January 31, 2018**		**January 31, 2017**
1. TPL – Beginning of Measurement Period:	$	1,784,837,258	$	1,734,177,049
a. Service Cost		32,568,986		31,546,281
b. Interest		132,860,748		128,991,402
c. Plan amendments		0		0
d. Demographic (gains) / losses		6,025,217		(18,647,847)
e. Assumption changes		77,573,932		0
f. Benefit payments		(93,550,455)		(91,229,627)
g. Net change in Total Pension Liability	$	155,478,428	$	50,660,209
h. Total Pension Liability – End of Measurement Period	$	1,940,315,686	$	1,784,837,258
2. Fiduciary Net Position – Beginning of Measurement Period	$	1,472,375,604	$	1,299,765,582
a. Employer contributions		46,200,000		44,500,000
b. Employee contributions		13,039,091		12,143,536
c. Net investment income		246,771,635		207,196,113
d. Benefit payments		(93,550,455)		(91,229,627)
e. Expenses		(389,149)		N/A
f. Net change in Fiduciary Net Position		212,071,122		172,610,022
g. Fiduciary Net Position – End of Measurement Period	$	1,684,446,726	$	1,472,375,604
3. Net Pension Liability (NPL):		255,868,960		312,461,654
4. Funded Ratio: (2)(f) / (1)(h)		86.8%		82.5%
5. Covered employees' payroll	$	254,241,277	$	242,477,079
6. NPL as a percentage of covered payroll: (3)/(5)		100.6%		128.9%
7. Sensitivity of NPL at Measurement Date				
a. 1% increase in Discount Rate	$	52,972,533	$	125,823,415
b. 1% decrease in Discount Rate	$	496,331,552	$	533,655,863

D. Pension Expense and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

Components of the FY 2019 Pension Expense are shown below. Note that Interest on the Total Pension Liability, Employee contributions, Projected earnings on pension plan investments, Differences between projected and actual earnings on plan investments and Total expense are estimates at this time and will be changed when the final assets at January 31, 2018 are known.

Service Cost	$	32,568,986
Interest on the Total Pension Liability		132,860,748
Differences between expected and actual experience		(5,914,195)
Administrative expenses		389,149
Changes of assumptions		16,552,898
Employee contributions		(13,039,091)
Projected earnings on pension plan investments		(109,150,426)
Differences between projected and actual earnings on plan investments		(27,155,959)
Total pension expense		27,112,110

At January 31, 2019, CPS Energy will report deferred outflows of resources and deferred inflows of resources related to pensions. Preliminary amounts and balances are as follows:

	Deferred Outflows of Resources	**Deferred Inflows of Resources**
Differences between expected and actual experience	20,010,416	(35,566,056)
Changes of assumptions	82,904,666	0
Net difference between projected and actual earnings on plan investments	64,631,338	(176,860,579)
Total	167,546,420	(212,426,635)

Preliminary amounts reported as deferred outflows of resources and deferred inflows of resources will be recognized in pension expense as follows:

Year ended January 31	**Deferred Outflows of Resources**	**Deferred Inflows of Resources**
2020	57,376,333	(61,020,507)
2021	51,302,261	(61,020,509)
2022	20,226,630	(57,533,421)
2023	14,755,722	(30,188,219)
2024	11,942,735	(2,663,979)
Thereafter	11,942,739	0

E. Notes to Required Schedules

		Fiscal Year Ended January 31, 2019	Fiscal Year Ended January 31, 2018
1.	Actuarial Valuation Date	January 1, 2017	January 1, 2016
2.	Actuarial Cost Method	Entry Age Normal	Entry Age Normal
3.	Asset Valuation Method	Fair Market Value	Fair Market Value
4.	Actuarial Assumptions:		
	a. Investment Rate of Return(1)	7.25%	7.50%
	b. Projected Salary Increases (Average)(1)	4.72%	4.66%
	(1) Includes inflation at	3.00%	3.00%
	c. Cost-of-Living Increases	1.50%	1.50%
5.	Factors that significantly affect the identification of trends (e.g., changes in benefits, actuarial methods or assumptions, etc.)	January 31, 2018 results include the impact of revised actuarial assumptions. Please refer to the Summary of Actuarial Assumptions section for a description of the changes.	None

Appendix A: Summary of plan provisions

A. Plan Provisions as of December 31, 2017 (and January 31, 2018)

1. Effective Dates:	Pension Plan restated effective January 1, 2016.
2. Eligibility Employees:	All employees
3. Participation Date:	Date when the following three conditions are satisfied: ■ attainment of age 21; ■ completion of 12 months continuous employment; and ■ completion of one year of Vesting Service.
4. Definitions:	
■ Previous Plan:	Plan in effect prior to amendment and restatement on September 29, 1982.
■ Vesting Service:	For service prior to Effective Date, Vesting Service under Prior Plan, measured from date of employment. For service after Effective Date, last period of uninterrupted active employment.
■ Benefit Service:	For service prior to Effective Date, Benefit Service under Prior Plan, with possible adjustment to give credit from earlier of (a) age 21 and one year of Vesting Service, or (b) three years of Vesting Service. For service after Effective Date, last period of uninterrupted participation in the plan. Maximum 44 years of Benefit Service.
■ Contribution Accumulation:	Employee contributions to and vested cash values under the Previous Plan accumulated to the Effective Date of this plan, plus contributions to this plan, accumulated at 5% interest from the Effective Date of this plan or date of contribution to December 31, 1998, 8.5% interest from January 1, 1999 to December 31, 2004, 8.0% interest from January 1, 2005 to December 31, 2011, 5.75% interest from January 1, 2012 to December 31, 2014, 5.5% interest from January 1, 2015 to December 31, 2017 and 5.25% after December 31, 2017.

- Compensation: For pay periods beginning prior to January 1, 1991, base compensation excluding overtime pay, bonuses, call duty pay, longevity pay, shift differential pay, pay differential between employee's base rate of pay and the rate of pay assigned to a position relief, or any extraordinary severance payments, such as accrued vacation or sick pay.

  For pay periods beginning after January 1, 1991, total cash remuneration including salary deferrals, but excluding group life imputed income, auto allowances or commuting expenses, uniform allowance, tuition reimbursement, suggestion awards, or moving expenses.

  Benefits otherwise limited by the compensation limit of Code Section 401(a)(17) are payable under the Section 401(a)(17) Restoration Plan.

- Average Monthly Compensation: Average of Compensation during highest paid 36 consecutive calendar months (78 consecutive bi-weekly pay periods) within last 120 complete calendar months of employment.

- Primary Social Security Benefit: Estimated old-age insurance benefit payable at age 65, based on Social Security Act in effect on determination date (calculated assuming constant earnings to age 65 if determination is prior to age 65).

- Normal Retirement Date: First of month coincident with or next following 65th birthday.

- Early Retirement Date: First of any month following completion of 25 years of Benefit Service; or the attainment of age 55 and 10 years of Benefit Service.

5. Benefits

- Normal Retirement Benefit: Monthly benefit equal to:

  i. 2-1/4% of Average Monthly Compensation times years of Benefit Service; minus

  ii. 1-1/4% of Primary Social Security Benefit times years of Benefit Service (maximum 40 years).

- Early Retirement Benefit:

Monthly benefit, payable at Normal Retirement Date, equal to:

a. projected benefit at Normal Retirement Date assuming continued employment, based on Average Monthly Compensation and Primary Social Security Benefit at termination date; times

b. the ratio of Benefit Service at termination date to projected Benefit Service at Normal Retirement Date.

Payment of benefits can commence prior to Normal Retirement Date, with the following adjustments to the amount calculated above:

a. With 25 or more Years of Benefit Service:

   i. the base portion of the benefit (2-1/4% of salary times service) is reduced by 6% for each year that benefit commencement precedes age 55 (no reduction for commencement at age 55 or later);

   ii. the offset portion of the benefit (1-1/4% of primary Social Security Benefit times service) is reduced by 1/15 for each of the first 5 years, 1/30 for each of the next 5 years, and actuarial reduction for each additional year that benefit commencement precedes Normal Retirement Date.

b. With less than 25 years of Benefit Service:

   i. the base portion of the benefit (2-1/4%, of salary times service) is reduced by 1/15 for each of the first 5 years and 1/30 for each additional year that benefit commencement precedes age 62 (no reduction for commencement at age 62 or later);

   ii. the offset portion of the benefit (1-1/4% of primary Social Security Benefit times service) is reduced by 1/15 for each of the first 5 years and 1/30 for each additional year that benefit commencement precedes Normal Retirement Date.

c. Minimum early retirement benefit, equal to greater of (i) and (ii):

   i. benefit calculated using Average Monthly Compensation, Primary Social Security Benefit and Benefit Service as of December 31, 1990, and using 2-1/4% per year reduction to base portion of benefit.

ii. benefit calculated using Average Monthly Compensation, Primary Social Security Benefit and Benefit Service as of January 31, 1994, and using 4% per year reduction to base portion of benefit.

- Late Retirement Benefit: Benefit calculated at Late Retirement Date, using Average Monthly Compensation and Benefit Service at Late Retirement Date.

- Deferred Vested Retirement Benefit: Monthly benefit earned at date of termination (determined in same manner as Early Retirement Benefit) times vesting percent, payable at Normal Retirement Date.

  Benefits can commence on the first of any month after the earlier of attainment of age 62 or the date employee would have had 25 years of Benefit Service had employment continued, and are reduced for commencement prior to the Normal Retirement Date. The reduction for early commencement is equal to 1/15 for each of the first 5 years, 1/30 for each of the next 5 years, and actuarially thereafter. The value of benefit can be paid out in a lump sum at termination in lieu of a deferred monthly benefit.

  Vesting percent determined according to the following schedule:

Years of Vesting Service	**Vesting Percent**
less than 3	0%
3	20%
4	40%
5	60%
6	80%
7 or more	100%

  In addition, all employees are fully vested at age 40.

  All other participants are due a return of Contribution Accumulations upon termination.

- Disability Benefit: No disability benefits are payable from the plan. However, if Early Retirement is due to disability (participant qualifies for Federal Social Security Act disability payments), the reduction for early commencement of Early Retirement Benefits is modified: for those with 25 or more Years of Benefit Service, the reduction of 6% per year commencement precedes age 55 will not apply; for those with less than 25 Years of Benefit Service, the standard early retirement reduction (1/15 for first five years, 1/30 for additional years that commencement precedes age 62) will be lowered by 10% for each year of Benefit Service in excess of 15 years.

- Minimum Benefits:

Retirement and termination benefits are subject to minimum amounts, equal to (a) plus (b) below:

a. for Benefit Service prior to Effective Date of this plan (if any):

   i. Contribution Accumulation as of the Effective Date (accumulated Previous Plan employee contributions plus any additional vested cash values), plus interest to date of determination, converted to monthly annuity; plus

   ii. additional benefit for those age 60-1/2 or older on the Effective Date (called Special Arrangements Payroll Benefit).

b. for Benefit Service after the Effective Date of this plan, the greater of (i) or (ii) plus (iii) below:

   i. 2-1/4% of Average Monthly Compensation times years of Benefit Service after the Effective Date, minus 1-1/4% of Primary Social Security Benefit times years of Benefit Service after the Effective Date (maximum 40 years); or

   ii. Contribution Accumulation after the Effective Date (current plan employee contributions plus interest), converted to monthly annuity; plus

   iii. total amount of current plan employee contributions (without interest), times vesting percent, converted to monthly annuity.

- Death Benefits:
  - Active Employee With 25 Or More Years Of Benefit Service:

Benefits payable to beneficiary equal to:

a. monthly benefit for 120 months, equal in actuarial value to survivor benefit that would have been payable had retirement occurred on date of death under the Joint and 50% Survivor Pension with 120 monthly payments guaranteed (benefit can be converted by a spouse to a life annuity; beneficiary can cash out this benefit based on lump sum value of termination benefit at date of death); plus

b. $5,000 lump sum payment.

  - Active Employee With Less Than 25 Years of Benefit Service:

Lump sum payment to beneficiary equal to the lump sum value of the termination benefit at date of death, plus $5,000.

■ After Retirement But Before Benefit Commencement:	Monthly benefits to beneficiary, as if payments to participant had started on date of death and based on annuity form elected by participant (normal form if no election made).
■ After Retirement Payments Have Commenced:	Depends on annuity form chosen at retirement.
■ Adjustment of Benefits After Retirement:	Payments to retirees are adjusted each January 1, equal to 50% of CPI-U increase or decrease measured as of prior September 30. Pro-rata adjustment for retirements in effect less than 12 months. Maximum adjustment 5% each year. No reduction below initial benefit level.
6. Forms of Payment	Normal form is life annuity with 120 monthly payments guaranteed. Optional forms available on actuarially equivalent basis.
7. Maximum Benefits	Benefits are limited by Internal Revenue Code Sections 401(a)(17) and 415. Benefits paid under the restoration plans are not included in this report.
8. Contributions	Participants contribute 5% of Compensation from date of participation until earlier of 44 years of Benefit Service or termination. Employer pays balance of cost of plan.

B. Changes in Plan Provisions since Prior Actuarial Valuation

The plan provisions have not changed since the prior valuation.

Appendix B: Summary of Assets

A. Source of Information

Willis Towers Watson used the plan asset data provided and includes asset balance sheet and income statement prepared by CPS Energy staff.

We have not been made aware of any significant nonbenefit liabilities of the plan, such as outstanding expenses or fees payable from plan assets.

The following figures include only the amounts in the qualified plan trust; payments under the restoration plans portion of the program are excluded.

B. Values

		January 1, 2017	January 1, 2016
1.	Market Value of Plan Assets	$ 1,450,150,734	$ 1,349,599,260
2.	Actuarial Value of Plan Assets	$ 1,500,740,708	$ 1,451,833,752

C. Summary of Assets by Investment Class

Category	December 31, 2016 Market Value
Money Market Fund	$ 0
U.S. Government Securities	107,346,169
Corporate Bonds	121,073,179
Global Fixed Income	56,932,629
Common Stock	714,913,413
Global Equity	123,115,938
Specialized Funds	57,172,267
Alternative Investments	56,019,090
Real Estate	136,875,823
Investment in Partnership	65,483,451
Cash & Short-term Investments & Receivables	148,715,569
Total Assets	$ 1,587,647,528
Less Liabilities	137,496,794
Total Net Assets	$ 1,450,150,734

D. Change in Asset Value

Shown below is a reconciliation of the market and actuarial values of assets as of January 1, 2017.

		Market Value	Actuarial Value
1.	Asset Value as of January 1, 2016	$ 1,349,599,260	$ 1,451,833,752
2.	Contributions from January 1, 2016 to December 31, 2016:		
	a. Employee	12,101,360	12,101,360
	b. Employer	44,818,953	44,818,953
	c. total: (a)+(b)	$ 56,920,313	$ 56,920,313
3.	Benefit Disbursements	91,675,941	91,675,941
4.	Net Investment Return	135,307,102	83,083,929
5.	Asset Value as of January 1, 2017: (1)+(2)(c)-(3)+(4)	$ 1,450,150,734	$ 1,500,162,053
6.	Approximate Rate of Investment Return	10.2%	5.8%

E. Development of Actuarial Value of Plan Assets

Calendar Year Beginning					January 1, 2017
1	**Preliminary Actuarial Value of Assets before Corridor as of January 1, 2017**				
	a Market value of assets as of January 1, 2017				$ 1,450,150,734
	b Deferred investment gains/(losses) for prior periods				
		Plan Year Beginning	**Gain/(Loss)**	**Percent Deferred**	**Deferred Amount**
		i 01/01/2016	35,592,681	80.00%	28,474,144
		ii 01/01/2015	(125,568,145)	60.00%	(75,340,887)
		iii 01/01/2014	(22,545,881)	40.00%	(9,018,352)
		iv 01/01/2013	29,368,882	20.00%	5,873,776
		v Total			$ (50,011,319)
	c Preliminary actuarial value of assets before application of corridor				$ 1,500,162,053
2	**Lower Bound of Corridor**				$ 1,160,120,587
3	**Upper Bound of Corridor**				$ 1,740,180,881
4	**Actuarial Value of Assets after Corridor as of January 1, 2017**				$ 1,500,162,053

Appendix C: Summary of Participant Data

A. Participant Data as of January 1, 2017

The employee data provided to Willis Towers Watson by CPS Energy was reviewed for reasonableness but no attempt was made to audit the data. All actuarial computations performed by Willis Towers Watson are directly dependent on the accuracy and completeness of the information provided.

Participant data was collected as of January 1, 2017. Table C contains a summary of active participant data used in the current valuation. The active participant summary is based on age at last birthday and completed years of Benefit Service as of January 1, 2017, and Reported Earnings (the figure provided by CPS Energy identified as the rate of pay on January 1, 2017).

Table D contains a summary of inactive participant data used in the current valuation. The inactive participant summary is based on annual benefits reported as of January 1, 2016, and age on last birthday as of January 1, 2017.

In addition to the 2,348 participants receiving benefits as of January 1, 2017, as summarized in Table D, 218 other inactive participants were reported. A liability is included in the valuation for these 218 individuals, equal to their accumulated benefits (employee contributions and insured plan cash values) as reported by CPS Energy. As of January 1, 2016 there were 151 such individuals.

B. Comparison with Prior Year

A comparison of the participant data for the current and prior years is as follows:

			January 1, 2017	January 1, 2016
1.	Active Participants:			
	a.	number:		
		i. fully vested	2,524	2,544
		ii. partially vested	188	204
		iii. nonvested	174	112
		iv. total: (i)+(ii)+(iii)	2,886	2,860
		v. temporary disableds	0	0
	b.	average age	45.8 years	45.4 years
	c.	average service:		
		i. employment service	16.6 years	16.3 years
		ii. benefit service	15.5 years	15.2 years
	d.	average reported earnings (base rate of pay)	$ 75,322	$ 72,416
	e.	total accumulated employee contributions	$234,733,559	$220,087,864
2.	Participants Entitled to Deferred Benefits:			
	a.	number	218	151
3.	Participants Currently Receiving Benefits:			
	a.	number	2,348	2,360
	b.	average age	69.5 years	69.0 years
	c.	average annual benefit	$ 37,686	$ 36,826

C. Analysis of Participant Data as of January 1, 2017 — Active Participant Distribution by Age and Complete Years of Service

		Completed Years of Service								
Age		0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	Over 34	Total
15 to 24	Count	38	5							43
	Total Base Pay	1,738,057	281,420							2,019,477
	Avg Base Pay	45,738	56,284							46,965
25 to 29	Count	84	64	5						153
	Total Base Pay	4,368,502	3,648,841	345,459						8,362,802
	Avg Base Pay	52,006	57,013	69,092						54,659
30 to 34	Count	80	92	67	16					255
	Total Base Pay	4,961,523	6,210,207	4,434,067	1,045,942					16,651,739
	Avg Base Pay	62,019	67,502	66,180	65,371					65,301
35 to 39	Count	50	69	98	147	4				368
	Total Base Pay	3,536,156	5,392,503	7,025,984	10,644,132	340,234				26,939,009
	Avg Base Pay	70,723	78,152	71,694	72,409	85,059				73,204
40 to 44	Count	43	61	62	188	69				423
	Total Base Pay	3,403,776	4,799,687	4,897,538	14,184,066	5,205,491				32,490,558
	Avg Base Pay	79,158	78,683	78,993	75,447	75,442				76,810
45 to 49	Count	30	61	69	174	115	92	7		548
	Total Base Pay	2,443,451	4,689,576	5,415,394	13,165,369	9,705,669	7,676,430	511,054		43,606,943
	Avg Base Pay	81,448	76,878	78,484	75,663	84,397	83,439	73,008		79,575
50 to 54	Count	26	27	52	141	65	131	166	6	614
	Total Base Pay	1,880,937	2,601,184	4,149,511	10,438,054	4,954,992	11,086,990	13,548,768	509,388	49,169,824
	Avg Base Pay	72,344	96,340	79,798	74,029	76,231	84,634	81,619	84,898	80,081
55 to 59	Count	18	26	28	71	31	71	71	22	338
	Total Base Pay	1,654,042	1,884,320	2,675,141	4,913,169	2,530,462	5,630,655	5,830,218	1,954,090	27,072,097
	Avg Base Pay	91,891	72,474	95,541	69,200	81,628	79,305	82,116	88,822	80,095
60 to 64	Count	6	11	21	33	13	15	19	3	121
	Total Base Pay	774,271	882,318	1,605,613	2,259,905	898,553	975,259	1,316,848	295,934	9,008,701
	Avg Base Pay	129,045	80,211	76,458	68,482	69,119	65,017	69,308	98,645	74,452
65 to 69	Count	1	3	4	5	2	1	3	1	20
	Total Base Pay	123,600	294,448	667,206	348,022	173,822	30,567	167,575	62,624	1,867,864
	Avg Base Pay	123,600	98,149	166,801	69,604	86,911	30,567	55,858	62,624	93,393
Over 69	Count			1	1			1		3
	Total Base Pay			87,897	42,698			59,695		190,290
	Avg Base Pay			87,897	42,698			59,695		63,430
Total	Count	376	419	407	776	299	310	267	32	2886
	Total Base Pay	24,884,315	30,684,504	31,303,810	57,041,357	23,809,223	25,399,901	21,434,158	2,822,036	217,379,304
	Avg Base Pay	66,182	73,233	76,914	73,507	79,630	81,935	80,278	88,189	75,322

D. Analysis of Participant Data as Of January 1, 2017

Inactive Participant Data by Age and Status

	Retired Participants and Beneficiaries Currently Receiving Benefits		
		Annual Benefits	
Age Last Birthday	**Number**	**Total**	**Average**
Under 54	51	1,340,792	26,290
55-59	306	14,890,708	48,662
60-64	446	18,704,684	41,939
65-69	494	20,006,531	40,499
70-74	407	14,116,128	34,683
75-79	304	9,774,030	32,151
80-84	193	5,555,881	28,787
Over 84	147	4,098,464	27,881
Total	2,348	88,487,218	37,686
Average Age		69.5 Years	

Appendix D: Summary of Actuarial Assumptions

A. Actuarial Assumptions

- Investment Return:
  - Contribution Requirement Calculations: 7.25% per year, compounded annually
  - Actuarial Present Value of Accumulated Benefit Calculations: 7.25% per year, compounded annually

The return on assets shown above is net of investment expenses assumed to be paid from the trust. Under GASB 67 and 68, the discount rate is based on the assumed long term expected return on assets to the extent that projected assets are sufficient to pay expected future benefits and a 20-year municipal bond rate is used to discount expected benefit payments where assets are projected to be insufficient. Based on our understanding of the funding policy of the plans, assets are projected to be sufficient to cover all expected future benefit payments. For purposes of projecting assets and benefit payments, the current funding policy is expected to continue for all future periods.

- Salary Increases:
  - Base Pay: Base rate of pay assumed to increase based on age, according to a graded table. See sample rates.
  - Overtime Pay: Annual overtime/shift differential/relief, etc. assumed to equal a percentage of base pay (percentage varies by age; see sample rates) for current non-exempt participants; no overtime assumed for exempt participants. Current exempt/non-exempt status for each participant assumed to continue in future years.
  - Incentive Pay: Annual incentive pay targets assumed as follows:

Category	Incentive Target Percentage of Base Pay
Senior Executive	35.0%
Sr. Director, Director	25.0%
Sr. Manager	18.0%
Level 2	12.0%
Level 1 (Exempt)	9.0%
Level 1 (Non-Exempt)	7.0%
Wage Scale	0.0%

Current category for each participant assumed to continue in future years.

- Incentive Pay (continued): Percentage of target bonuses paid assumed as follows:

Percentage of Employees	Percentage of Target
20%	100%
20%	66%
50%	33%
5%	0%
5%	0%

Current category for each participant assumed to continue in future years.

- Accrued Vacation Pay: Accrued vacation pay at termination/retirement assumed to increase Average Monthly Compensation by 3.0%.

- Cost-of-Living Increases: 1.5% per year, compounded annually.
- Mortality
  - Active Lives: RP-2016 Combined Healthy, with No Collar Adjustment, male and female tables; with MP-2016 Mortality Improvement scale.
  - Retired Lives: RP-2016 Combined Healthy, with No Collar Adjustment, male and female tables; with MP-2016 Mortality Improvement scale.
  - Disabled Lives: 1987 Commissioners Group Disabled Life Mortality Table.
- Disablement: 1987 Commissioners Group Disability Table, incidence rates reduced by 50%.
- Termination of Employment: Graded table based on service during the first 5 years of service and based on age thereafter; see sample rates.
- Retirement: Graded table based on experience; see sample rates.
- Credited Service: Assumed one year earned in each future year employed.
- Marital Status of Nonretired Participant:
  - Percentage Married: 80% of male participants married, 55% of female participants married.
  - Age Difference: Males assumed to be 2 years older than female spouses.
- Social Security:

- Taxable Wage Base: Legislated values through 2016, thereafter increasing by 3.5% per year, compounded annually.
- CPI Increases: 3.0% per year, compounded annually.

- Retiree Spouse Age: Males assumed to be 2 years older than female spouses.
- Expenses: $500,000 or actual administrative expenses, if known.
- Missing Data: Reported data assumed to be complete.
- Form of Payment: Retirees are assumed to elect optional forms as follows: Life only – 20%, Ten-year certain and life – 12%, Joint & 100% Survivor – 28%, Joint & 75% Survivor – 22%, Joint and 50% Survivor – 18%
- Maximum Benefit: Internal Revenue Code Section 401(a)(17) and Section 415 limits are assumed to increase 3.0% per year, compounded annually.

B. Sample Rates

- Annual Rates of Mortality:

	Active and Retired Mortality (%)		Disabled Mortality (%)
Age	Males	Females	
25	0.04%	0.02%	4.41%
30	0.04%	0.02%	4.41%
35	0.07%	0.04%	4.41%
40	0.10%	0.07%	4.41%
45	0.14%	0.11%	4.48%
50	0.20%	0.16%	4.86%
55	0.34%	0.25%	5.92%
60	0.59%	0.41%	7.25%
65	1.00%	0.76%	8.67%
70	1.64%	1.32%	10.36%
75	2.80%	2.21%	12.63%

- Annual Rates of Decrement:

Service	Termination (%) First 5 Years of Service
1-2	9.0%
2-3	9.0%
3-4	9.0%
4-5	7.0%

	Disablement (%)		Termination (%) After 5 Years of Service
Age	Male	Female	
25	0.03%	0.03%	6.1%
30	0.03%	0.05%	4.5%
35	0.04%	0.07%	3.2%
40	0.07%	0.10%	2.4%
45	0.13%	0.16%	1.8%
50	0.25%	0.27%	1.7%
55	0.48%	0.42%	1.7%
60	0.74%	0.55%	1.7%

- Annual Rates of Retirement:

Age	Under 25 Years of Benefit Service	25 or more Years of Benefit Service
50-53	N/A	2%
54	N/A	4%
55-60	5%	20%
61	10%	20%
62	15%	35%
63-67	20%	35%
68-69	35%	35%
70	100%	100%

- Annual Rates of Base Salary Increase:

Age	Annual Base Salary Increase	Additional Pay for Nonexempt Employees
25	11.6%	14.0%
30	7.9%	14.0%
35	5.8%	14.0%
40	4.8%	14.0%
45	4.3%	14.0%
50	3.8%	13.5%
55	3.6%	11.0%
60	3.3%	8.5%
65	3.1%	6.0%

C. Changes in assumptions

The assumptions used for the January 1, 2017 valuation were changed from the prior year. Assumptions used for the January 1, 2016 valuation that were different from those used for the current valuation are as follows:

- Investment Return:
  - Contribution Requirement Calculations: 7.50% per year, compounded annually

- Actuarial Present Value of Accumulated Benefit Calculations: 7.50% per year, compounded annually

- Mortality
  - Active Lives: RP-2000 Combined Healthy, with No Collar Adjustment, Projected to 2020 using Scale BB, male and female tables.
  - Retired Lives: RP-2000 Combined Healthy, with No Collar Adjustment, Projected to 2020 using Scale BB, male and female tables.
- Accrued Vacation Pay: Accrued vacation pay at termination/retirement assumed to increase Average Monthly Compensation by 2.0%.
- Expenses: None assumed
- Form of Payment: Retirees are assumed to elect optional forms as follows: Life only – 15%, Ten-year certain and life – 10%, Joint & 100% Survivor – 34%, Joint & 75% Survivor – 32%, Joint and 50% Survivor – 9%
- Annual Rates of Base Salary Increase:

Age	Annual Base Salary Increase	Additional Pay for Nonexempt Employees
25	9.5%	14.0%
30	7.0%	14.0%
35	5.7%	14.0%
40	4.9%	14.0%
45	4.5%	14.0%
50	4.3%	13.5%
55	4.1%	11.0%
60	4.1%	8.5%
65	4.0%	6.0%

For detail on how these assumptions were determined, reference the 2017 Experience Study Report dated June 9, 2017.

Appendix E: Description of Actuarial Methods and Procedures

A. Actuarial Cost Methods and Procedures

Calculation of Normal Cost and Pension Liability

The method used to determine the Normal Cost and Pension Liability is the Entry Age Normal Cost Method, described below.

Entry Age Normal Cost Method

- The Projected Benefits at retirement or termination are determined for each individual included in the actuarial valuation. These Projected Benefits are then prorated, on the basis of service and benefit formula attribution, and allocated to:
  - all valuation years preceding the actuarial valuation date;
  - the current valuation year; and
  - all subsequent valuation years.

For purposes of this calculation, the actuarial valuation date is January 1 and asset and demographic data is collected as of that date.

- The sum of the Actuarial Present Values of all benefits allocated to the current valuation year determined above for all individuals is the Normal Cost for the valuation year. The employer Normal Cost is determined as the total Normal Cost less anticipated employee contributions for the year.
- The sum of the Actuarial Present Values of all benefits allocated to all valuation years preceding the actuarial valuation date determined above is the Pension Liability. The excess of the Total Pension Liability over the Actuarial Value of Plan Assets is the Unfunded Pension Liability.
- The actuarial gain (loss) is a measure of the difference between actual experience and that expected based upon the actuarial assumptions between two actuarial valuation dates. Under this actuarial cost method, the actuarial gains (losses) are directly calculated and reduce (increase) the Unfunded Pension Liability.
- Adjustments to the Unfunded Pension Liability can result from changes in actuarial assumptions and plan provisions. Such adjustments are determined by calculating, as of the actuarial valuation date, the increase or decrease in the Unfunded Pension Liability resulting from the change.

Calculation of Actuarial Value of Plan Assets

The Actuarial Value of Plan Assets is determined under an adjusted market value method, as follows:

- For calendar years 2014 and later, gains and losses on the market value of assets are recognized over five years.
- For calendar years 2013 and earlier, an "expected value" is determined on each valuation date, equal to the Actuarial Value of Plan Assets on the prior valuation date, plus contributions during the prior year, less benefit disbursements during the prior year, all accumulated with the valuation rate of interest to the current valuation date. The initial expected value as of January 1, 1988 was developed from the market value of plan assets as of December 31, 1986, as reported in the trust audit report.

  The difference between the current market value and the expected value is added to the market value. The net difference at January 1, 2014 is spread over five years.

Calculation Procedures for Actuarial Present Value of Accumulated Plan Benefits

An Accumulated Plan Benefit was determined for each participant based upon his benefit service, final average earnings, primary Social Security benefit and Social Security wage base on the actuarial valuation date. For the calculation of final average earnings, the current Valuation Earnings amount was discounted in accordance with the salary increase assumption shown in Appendix D.

The Actuarial Present Value of the Accumulated Plan Benefits was then calculated using the investment return assumption and decrements described in Appendix D.

The Actuarial Present Value of vested accumulated benefits was similarly calculated, recognizing only those benefits which were nonforfeitable (that is, payable even if the participant terminated his employment on the actuarial valuation date).

Benefits payable under all circumstances are included in this determination, to the extent that they are deemed to have accumulated as of the valuation date.

Other Actuarial Valuation Procedures

- The benefit obligations are based on census data collected as of 1/1/2017. For expense purposes the measurement date is 1/31/2018. We have projected the benefit obligations forward to 1/31/2018, adjusting for expected benefit payments and the expected growth in the benefit obligations. We are not aware of any significant changes in the plan demographics since the census date. In addition, there were no assumed gains or losses from other changes such as salary growth, preretirement terminations, retirements or other demographic sources.
- No actuarial liability is accrued for nonvested terminated employees, even if a break in service had not occurred as of the actuarial valuation date. An actuarial liability is accrued for all other terminated employees, even if a claim for benefits has not been made.
- Valuation Earnings (earnings applied to the current valuation year) is equal to Reported Earnings, increased for one year according to the salary increase assumption shown in Appendix D, and increased by the overtime and accrued vacation assumption shown in Appendix D.

- All benefits summarized in Appendix A were valued, with the exception of the Special Arrangements Payroll Benefit (under Minimum Benefits). This potential additional minimum benefit has been ignored since it would have an insignificant impact on valuation results.

Changes in Actuarial Methods and Procedures

The actuarial methods and procedures are the same as those used for the prior year.

Appendix F: Glossary

Pension Terminology

The following terms are defined in accordance with standard pension terminology adopted by the actuarial profession.

Accumulated Plan Benefit

The amount of an individual's benefit (whether or not vested) as of a specified date, determined in accordance with the terms of a pension plan and based on compensation (if applicable) and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation and Social Security benefits; rates of investment earnings and asset appreciation or depreciation; and other relevant items.

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gain (Loss)

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Value of Plan Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Pension Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Pension Liability.

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unfunded Pension Liability

The Excess of the Pension Liability over the Actuarial Value of Assets.

Accounting Terminology

The following terms are defined in accordance with accounting profession terminology.

Annual Pension Cost

A measure of the periodic cost of an employer’s participation in a defined benefit pension plan.

Discount Rate

The rate used to adjust a series of future payments to reflect the time value of money.

Expected Return on Assets

The long-term expected rate of return on pension plan investments, determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation.

Level Dollar Amortization Method

The amount to be amortized is divided into equal dollar amounts to be paid over a given number of years; part of each payment is interest and part is principal (similar to a mortgage payment on a building). Because payroll can be expected to increase as a result of inflation, level dollar payments generally represent a decreasing percentage of payroll; in dollars adjusted for inflation, the payments can be expected to decrease over time.

Market Related Value of Plan Assets

A term used with reference to the actuarial value of assets. A market-related value may be market value (or estimated market value) or a calculated value that recognizes changes in market value over a period of, for example, three to five years.

Measurement Date

The date as of which plan assets and obligations are measured.

Open Group/Closed Group

Terms used to distinguish between two classes of Actuarial Cost Methods. Under an Open Group Actuarial Cost Method, Actuarial Present Values associated with expected future entrants are considered; under a Closed Group Actuarial Cost Method, Actuarial Present Values associated with future entrants are not considered.

Parameters

The set of requirements for calculating actuarially determined pension information included in financial reports.

Prepaid Pension Cost

Cumulative employer contributions in excess of accrued net pension cost.

Unfunded Accrued Pension Cost

Cumulative net pension cost accrued in excess of the employer's contributions.