

November 9, 2016

Board of Trustees  
Teacher Retirement System of Texas  
1000 Red River Street  
Austin, TX 78701

**Subject: GASB 67 Reporting and Disclosure Information for the year ending  
August 31, 2016**

Dear Board of Trustees,

This report provides information required by the Teacher Retirement System of Texas (TRS) in connection with the Governmental Accounting Standards Board (GASB) Statement No. 67 "Financial Reporting for Pension Plans." The information provided herein was prepared for the purpose of assisting TRS to comply with the financial reporting and disclosure requirements of GASB No. 67.

The calculation of the liability associated with the benefits described in this report was performed for the purpose of satisfying the requirements of GASB No. 67 and is not applicable for purposes of funding the plan. A calculation of the plan's liability for other purposes may produce significantly different results. This report may be provided to parties other than TRS only in its entirety and only with the permission of TRS.

The total pension liability, net pension liability, and certain sensitivity information shown in this report are based on an actuarial valuation performed as of August 31, 2016. The total pension liability was determined as of the end of the plan year, August 31, 2016. It is our opinion that the recommended assumptions are internally consistent, reasonable, and comply with the requirements under GASB No. 67.

This report is based upon information, furnished to us by TRS, which include benefit provisions, membership information, and financial data. We did not audit this data and information, but we did apply a number of tests and concluded that it was reasonable and consistent. GRS is not responsible for the accuracy or completeness of the information provided to us by TRS.

The final section of the report titled "Calculation of the Single Discount Rate" is not a required disclosure item for your financial statements. However, it is possible that your auditors will request this information which is why it is included in the report.

Certain tables included in the Required Supplementary Information should include a 10-year history of information. As provided for in GASB No. 67, this historical information is only presented for the years in which the information was measured in conformity with the requirements of GASB No. 67. The historical information in this report begins with the information presented for the fiscal year ending August 31, 2014.

This report compliments the actuarial valuation report that was provided to TRS and should be considered together as a complete report for the plan year ending August 31, 2016. Please see the actuarial valuation report as August 31, 2016 for additional discussion of the nature of actuarial calculations and more information related to participant data, economic and demographic assumptions, and benefit provisions. The actuarial cost method used to determine the GASB No. 67 net pension liability is the Individual Entry Age Normal method as prescribed in GASB No. 67.

The projected cash flows from the employer are based on contributions for the most recent five year period, modified on consideration of subsequent events. Changes in statute in the 2013 legislative session and the subsequent follow through are indicators that the legislature is committed to an increase in funding levels for the pension funds. Considering the above events, projected employer contributions are based on current statutory funding levels.

The actuarial methods and assumptions have been selected by the Board of Trustees of the Teacher Retirement System of Texas based upon GRS analysis and recommendations. The Board of Trustees has sole authority to determine the actuarial assumptions used for the plan. The actuarial methods and assumptions are primarily based on a study of actual experience for the four year period ending August 31, 2014 and were adopted in September 2015. With the exception of the post-retirement mortality rates and the decrease in the assumption for general wage inflation, the changes to overall assumptions and methods had a minor impact on results. Post-Retirement Mortality rates for current and future retirees are prepared in accordance with the Actuarial Standards of Practice No. 35 which advises actuaries to *“adjust mortality rates to reflect mortality improvement prior to the measurement date and to include an assumption as to the expected mortality improvement after the measurement date.”*

To the best of our knowledge, the information contained with this report is accurate and fairly represents the actuarial position of the Teacher Retirement System of Texas. All calculations have been made in conformity with generally accepted actuarial principles and practices as well as with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Mr. Newton is a member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,



Daniel J. White, FSA, EA, MAAA  
Sr. Consultant



Joe Newton, FSA, EA, MAAA  
Sr. Consultant

### **SUMMARY OF POPULATION STATISTICS**

The total pension liability described in this report is based on the plan membership as of August 31, 2016:

Inactive Plan Members or Beneficiaries Currently Receiving Benefits	393,914
Inactive Plan Members Entitled to But Not Yet Receiving Benefits	262,353
Active Plan Members	<u>847,673</u>
Total Plan Members	1,503,940

The Average Expected Remaining Service Life (AERSL) of 6.7724 is based on the membership information as of the beginning of the fiscal year. The AERSL of the active employees was 11.9219 years. This calculates to a total remaining service years of  $11.9219 \times 828,945 = 9,882,599.40$  years. Divided by the total membership of 1,459,243 as of August 31, 2015 yields an AERSL of 6.7724 years.

## Measurement of the Net Pension Liability

The net pension liability is measured as the total pension liability, less the amount of the pension plan's fiduciary net position. In actuarial terms, this will be the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

A single discount rate of 8.000% was used to measure the total pension liability. This single discount rate was based on the expected rate of return on pension plan investments of 8.000%. The projection of cash flows used to determine this single discount rate assumed that plan member contributions, the employer contributions, and the state contributions will be made at the rates set by the legislature during the 2013 legislative session (please see the actuarial valuation report for a description of these rates).

Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

**Actuarial Assumptions** - The total pension liability is determined by an actuarial valuation. The actuarial assumptions used to determine the total pension liability were based on the results of an experience study for the four-year period ending August 31, 2014. The active mortality rates were based on 90% of the RP-2014 Employee Mortality Tables for males and females, with full generational mortality using Scale BB. The post-retirement mortality rates for healthy lives were based on the 2015 TRS of Texas Healthy Pensioner Mortality Tables, with full generational projection using Scale BB.

The following methods and assumptions were applied to this measurement period:

Valuation Date	August 31, 2016
Actuarial Cost Method	Individual Entry Age Normal actuarial cost method as required by GASB 67
Asset Valuation Method	Market Value
Actuarial Assumptions:	
Single Discount Rate	8.00%
Long-term Expected Return	8.00%
Municipal Bond Rate	N/A*
Last year ending August 31 in the 2016 to	
2115 projection period (100 years)	2115
Inflation	2.50%
Salary Increases	3.50% to 9.50% including inflation
Ad hoc post-employment benefit changes	None

\* If a municipal bond rate was to be used, the rate would be 2.84% as of August 2016 (i.e. the weekly rate closest to but not later than the Measurement Date). The source for the rate is the Federal Reserve Statistical Release H.15, citing the Bond Buyer Index of general obligation bonds with 20 years to maturity and an average AA credit rating.

Below is a table providing the sensitivity of the net pension liability to changes in the discount rate. In particular, the table presents the plan's net pension liability, if it were calculated using a single discount rate that is 1-percentage-point lower or 1-percentage-point higher than the single discount rate:

**SENSITIVITY OF THE NET PENSION LIABILITY  
TO THE SINGLE DISCOUNT RATE ASSUMPTION**

<b>Current Single Discount</b>		
<b>1% Decrease</b>	<b>Rate Assumption</b>	<b>1% Increase</b>
<b>7.00%</b>	<b>8.00%</b>	<b>9.00%</b>
\$58,483,888,620	\$37,788,513,014	\$20,234,650,980

**RECONCILIATION OF FIDUCIARY NET POSITION**  
for Year Ended August 31, 2016

	<u>Year Ending August 31, 2016</u>
<b>Additions</b>	
Contributions	
Non-Employer Contributing Entity	\$ 1,675,631,248
Employer	1,483,389,348
Employee	2,943,669,320
Other	<u>61,340,412</u>
Total Contributions	<u>\$ 6,164,030,328</u>
Investment Income	
Net Appreciation in Fair Value of Investments	\$ 9,503,911,257
Interest and Dividends	0
Less Investment Expense	<u>(310,630,697)</u>
Net Investment Income	<u>\$ 9,193,280,560</u>
Other	<u>\$ 1,993,029</u>
<b>Total Additions</b>	<u><b>\$ 15,359,303,917</b></u>
 <b>Deductions</b>	
Benefit payments, including refunds of employee contributions	\$ 9,752,541,417
Pension Plan Administrative Expense	44,402,710
Other	<u>92,428,529</u>
<b>Total Deductions</b>	<u><b>\$ 9,889,372,656</b></u>
 <b>Net Increase (Decrease) in Net Position</b>	 <b>\$ 5,469,931,261</b>
 <b>Net Position Restricted for Pensions</b>	
Beginning of Year	<u>\$ 128,538,706,212</u>
End of Year	<u><u>\$ 134,008,637,473</u></u>

**SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION****Schedule of Changes in the Employer's Net Pension Liability and Related Ratios**

Fiscal year ending August 31,	2016	2015	2014
<b>Total Pension Liability</b>			
Service Cost	\$ 4,392,076,679	\$ 4,225,448,833	\$ 3,965,994,265
Interest on the Total Pension Liability	12,896,571,424	12,555,645,919	11,813,445,940
Benefit Changes	0	0	0
Difference between Expected and Actual Experience	373,668,629	(1,588,618,832)	482,638,639
Assumption Changes	0	(1,474,723,994)	2,028,541,342
Benefit Payments	(9,379,122,730)	(8,935,111,459)	(8,548,642,525)
Refunds	(373,418,687)	(391,341,181)	(410,600,319)
<b>Net Change in Total Pension Liability</b>	<b>\$ 7,909,775,315</b>	<b>\$ 4,391,299,286</b>	<b>\$ 9,331,377,342</b>
<b>Total Pension Liability - Beginning</b>	<b>\$ 163,887,375,172</b>	<b>\$ 159,496,075,886</b>	<b>\$ 150,164,698,544</b>
<b>Total Pension Liability - Ending (a)</b>	<b>\$ 171,797,150,487</b>	<b>\$ 163,887,375,172</b>	<b>\$ 159,496,075,886</b>
<b>Plan Fiduciary Net Position</b>			
Non-Contributing Entity	\$ 1,675,631,248	\$ 1,591,482,988	\$ 1,530,623,829
Employer Contributions	1,483,389,348	1,377,972,653	984,552,391
Employee Contributions	2,943,669,320	2,576,024,311	2,357,686,000
Pension Plan Net Investment Income	9,193,280,560	(412,759,100)	19,434,430,034
Benefit Payments	(9,379,122,730)	(8,935,111,459)	(8,548,642,525)
Refunds	(373,418,687)	(391,341,181)	(410,600,319)
Pension Plan Administrative Expense	(44,402,710)	(35,556,979)	(41,904,190)
Other	(29,095,088)	(11,248,106)	84,954,006
<b>Net Change in Plan Fiduciary Net Position</b>	<b>\$ 5,469,931,261</b>	<b>\$ (4,240,536,873)</b>	<b>\$ 15,391,099,226</b>
<b>Plan Fiduciary Net Position - Beginning</b>	<b>\$ 128,538,706,212</b>	<b>\$ 132,779,243,085</b>	<b>\$ 117,388,143,859</b>
<b>Plan Fiduciary Net Position - Ending (b)</b>	<b>\$ 134,008,637,473</b>	<b>\$ 128,538,706,212</b>	<b>\$ 132,779,243,085</b>
<b>Net Pension Liability - Ending (a) - (b)</b>	<b>\$ 37,788,513,014</b>	<b>\$ 35,348,668,960</b>	<b>\$ 26,716,832,801</b>
<b>Plan Fiduciary Net Position as a Percentage of Total Pension Liability</b>	<b>78.00 %</b>	<b>78.43 %</b>	<b>83.25 %</b>
<b>Covered Employee Payroll</b>	<b>\$ 40,742,826,333</b>	<b>\$ 38,448,124,045</b>	<b>\$ 36,654,290,800</b>
<b>Net Pension Liability as a Percentage of Covered Employee Payroll</b>	<b>92.75 %</b>	<b>91.94 %</b>	<b>72.89 %</b>
<b>Notes to Schedule:</b>			
N/A			

**SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION**  
**Schedule of the Net Pension Liability (Historical)**

**Last 10 Fiscal Years**

<b>FY Ending August 31,</b>	<b>Total Pension Liability</b>	<b>Plan Net Position</b>	<b>Net Pension Liability</b>	<b>Plan Net Position as a % of Total Pension Liability</b>	<b>Covered Payroll</b>	<b>Net Pension Liability as a % of Covered Payroll</b>
2013	\$ 150,164,698,544	\$ 117,388,143,859	\$ 32,776,554,685	78.17%	\$ 35,188,983,344	93.14%
2014	159,496,075,886	132,779,243,085	26,716,832,801	83.25%	36,654,290,800	72.89%
2015	163,887,375,172	128,538,706,212	35,348,668,960	78.43%	38,448,124,045	91.94%
2016	171,797,150,487	134,008,637,473	37,788,513,014	78.00%	40,742,826,333	92.75%



## SCHEDULES OF REQUIRED SUPPLEMENTARY INFORMATION

### Schedule of Contributions

<b>FY Ending August 31,</b>	<b>Actuarially Determined Contribution</b>	<b>Actual Contribution</b>	<b>Contribution Deficiency (Excess)</b>	<b>Covered Payroll</b>	<b>Actual Contribution as a % of Covered Payroll</b>
2014	\$3,177,927,012	\$2,515,176,220	\$ 662,750,792	\$ 36,654,290,800	6.86%
2015	3,171,970,234	2,969,455,641	202,514,593	38,448,124,045	7.72%
2016	3,226,831,846	3,159,020,596	67,811,250	40,742,826,333	7.75%

## NOTES TO SCHEDULE OF CONTRIBUTIONS

**Valuation Date:** August 31, 2015 (to determine contribution rate for fiscal year ending August 31, 2016).

**Notes:** Actuarially determined contribution rates are calculated as of August 31 preceding fiscal year. Members and employers contribute based on statutorily fixed rates.

### Methods and Assumptions Used to Determine Contribution Rates:

Actuarial Cost Method	For funding purposes, the Ultimate Entry Age Normal actuarial cost method is used
Amortization Method	Level Percentage of Payroll, Floating
Remaining Amortization Period	33 years
Asset Valuation Method	5 Year smoothed market
Inflation	2.50%
Salary Increases	3.50% to 9.50% including inflation
Investment Rate of Return	8.00%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2015 valuation pursuant to an experience study of the period September 1, 2010 through August 31, 2014.
Mortality	Active Mortality: 90% of the RP-2014 Employee Mortality Tables for males and females, with full generational mortality using Scale BB. Post-Retirement: The 2015 TRS of Texas Healthy Pensioner Mortality Tables, with full generational projection using Scale BB.

### Other Information:

**Notes** There were no benefit changes during the year.

## CALCULATION OF THE SINGLE DISCOUNT RATE

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the assumed valuation discount rate is used. In years where assets are not projected to be sufficient to meet benefit payments, the use of a municipal bond rate is required, as described in the following paragraph.

The *single discount rate* (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects (1) the long-term expected rate of return on pension plan investments (during the period in which the fiduciary net position is projected to be sufficient to pay benefits) and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating (which is published by the Federal Reserve) as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 8.000%; the municipal bond rate is 2.840%; and the resulting single discount rate is 8.000%.

The source of the municipal bond rate is the Federal Reserve Statistical Release H.15, citing the Bond Buyer Index of general obligation bonds with 20 years to maturity and mixed credit quality. In describing their index, the Bond Buyer notes that the bonds' average credit quality is roughly equivalent to Moody's Investors Service's Aa2 rating and Standard & Poor's Corp.'s AA.

The tables in this section provide background for the development of the single discount rate.

The **Projection of Contributions** table shows the development of expected contributions in future years. Normal Cost contributions for future hires are not included (nor are their liabilities).

The **Projection of Plan Fiduciary Net Position** table shows the development of expected asset levels in future years.

The **Present Values of Projected Benefit Payments** table shows the development of the Single Discount Rate (SDR). It breaks down the benefit payments into present values for funded and unfunded portions and shows the equivalent total at the SDR.

# SINGLE DISCOUNT RATE DEVELOPMENT

## Projection of Contributions Beginning September 1, 2016

	Payroll for	Payroll for Future	Total Employee	Contributions from	Employer	Employer Normal Cost Contributions Related to Payroll	Total
Year	Current Employees	Employees	Payroll	Current Employees	Contributions for All Employees	of Future Employees	Contributions
1	\$ 39,152,003,785	\$ 3,077,205,588	\$ 42,229,209,372	\$ 3,014,704,291	\$ 3,251,649,122	\$ (68,621,685)	\$ 6,197,731,728
2	37,803,072,349	5,481,867,257	43,284,939,607	2,910,836,571	3,332,940,350	(122,245,640)	6,121,531,281
3	36,712,218,825	7,654,844,272	44,367,063,097	2,826,840,850	3,416,263,858	(170,703,027)	6,072,401,681
4	35,716,243,593	9,759,996,081	45,476,239,674	2,750,150,757	3,501,670,455	(217,647,913)	6,034,173,299
5	34,767,990,558	11,845,155,108	46,613,145,666	2,677,135,273	3,589,212,216	(264,146,959)	6,002,200,530
6	33,864,792,378	13,913,681,930	47,778,474,308	2,607,589,013	3,678,942,522	(310,275,107)	5,976,256,428
7	32,986,989,733	15,985,946,433	48,972,936,165	2,539,998,209	3,770,916,085	(356,486,605)	5,954,427,689
8	32,109,322,087	18,087,937,483	50,197,259,570	2,472,417,801	3,865,188,987	(403,361,006)	5,934,245,782
9	31,211,241,399	20,240,949,660	51,452,191,059	2,403,265,588	3,961,818,712	(451,373,177)	5,913,711,123
10	30,279,935,215	22,458,560,620	52,738,495,835	2,331,555,012	4,060,864,179	(500,825,902)	5,891,593,289
11	29,304,477,887	24,752,480,344	54,056,958,231	2,256,444,797	4,162,385,784	(551,980,312)	5,866,850,269
12	28,266,026,176	27,142,356,011	55,408,382,187	2,176,484,016	4,266,445,428	(605,274,539)	5,837,654,905
13	27,167,976,372	29,625,615,370	56,793,591,742	2,091,934,181	4,373,106,564	(660,651,223)	5,804,389,522
14	26,024,680,398	32,188,751,137	58,213,431,535	2,003,900,391	4,482,434,228	(717,809,150)	5,768,525,469
15	24,843,106,707	34,825,660,617	59,668,767,323	1,912,919,216	4,594,495,084	(776,612,232)	5,730,802,068
16	23,628,184,890	37,532,301,617	61,160,486,507	1,819,370,237	4,709,357,461	(836,970,326)	5,691,757,372
17	22,389,740,242	40,299,758,428	62,689,498,669	1,724,009,999	4,827,091,398	(898,684,613)	5,652,416,784
18	21,147,584,314	43,109,151,821	64,256,736,136	1,628,363,992	4,947,768,682	(961,334,086)	5,614,798,588
19	19,928,363,195	45,934,791,345	65,863,154,539	1,534,483,966	5,071,462,900	(1,024,345,847)	5,581,601,019
20	18,748,847,100	48,760,886,303	67,509,733,403	1,443,661,227	5,198,249,472	(1,087,367,765)	5,554,542,934
21	17,624,283,423	51,573,193,314	69,197,476,738	1,357,069,824	5,328,205,709	(1,150,082,211)	5,535,193,322
22	16,560,211,736	54,367,201,920	70,927,413,656	1,275,136,304	5,461,410,852	(1,212,388,603)	5,524,158,553
23	15,541,333,017	57,159,265,980	72,700,598,998	1,196,682,642	5,597,946,123	(1,274,651,631)	5,519,977,134
24	14,567,470,396	59,950,643,577	74,518,113,973	1,121,695,220	5,737,894,776	(1,336,899,352)	5,522,690,644
25	13,624,085,946	62,756,980,876	76,381,066,822	1,049,054,618	5,881,342,145	(1,399,480,674)	5,530,916,089
26	12,694,910,493	65,595,683,000	78,290,593,493	977,508,108	6,028,375,699	(1,462,783,731)	5,543,100,076
27	11,764,936,809	68,482,921,520	80,247,858,330	905,900,134	6,179,085,091	(1,527,169,150)	5,557,816,075
28	10,824,994,405	71,429,060,383	82,254,054,788	833,524,569	6,333,562,219	(1,592,868,047)	5,574,218,741
29	9,863,384,919	74,447,021,239	84,310,406,158	759,480,639	6,491,901,274	(1,660,168,574)	5,591,213,339
30	8,919,227,934	77,498,938,378	86,418,166,312	686,780,551	6,654,198,806	(1,728,226,326)	5,612,753,031
31	8,004,041,137	80,574,579,333	88,578,620,470	616,311,168	6,820,553,776	(1,796,813,119)	5,640,051,825
32	7,121,008,908	83,672,077,073	90,793,085,981	548,317,686	6,991,067,621	(1,865,887,319)	5,673,497,988
33	6,263,953,754	86,798,959,377	93,062,913,131	482,324,439	7,165,844,311	(1,935,616,794)	5,712,551,956
34	5,410,336,858	89,979,149,101	95,389,485,959	416,595,938	7,344,990,419	(2,006,535,025)	5,755,051,332
35	4,572,316,588	93,201,906,521	97,774,223,108	352,068,377	7,528,615,179	(2,078,402,515)	5,802,281,041
36	3,767,641,115	96,450,937,570	100,218,578,686	290,108,366	7,716,830,559	(2,150,855,908)	5,856,083,017
37	3,020,500,629	99,703,542,524	102,724,043,153	232,578,548	7,909,751,323	(2,223,388,998)	5,918,940,873
38	2,360,844,493	102,931,299,739	105,292,144,232	181,785,026	8,107,495,106	(2,295,367,984)	5,993,912,148
39	1,814,928,342	106,109,519,495	107,924,447,838	139,749,482	8,310,182,483	(2,366,242,285)	6,083,689,680
40	1,391,257,945	109,231,301,089	110,622,559,034	107,126,862	8,517,937,046	(2,435,858,014)	6,189,205,894
41	1,068,688,860	112,319,434,150	113,388,123,009	82,289,042	8,730,885,472	(2,504,723,382)	6,308,451,132
42	812,777,475	115,410,048,610	116,222,826,085	62,583,866	8,949,157,609	(2,573,644,084)	6,438,097,391
43	608,728,262	118,519,668,475	119,128,396,737	46,872,076	9,172,886,549	(2,642,988,607)	6,576,770,018
44	448,475,890	121,658,130,765	122,106,606,655	34,532,644	9,402,208,712	(2,712,976,316)	6,723,765,040
45	324,317,703	124,834,954,118	125,159,271,821	24,972,463	9,637,263,930	(2,783,819,477)	6,878,416,916
46	227,276,597	128,060,977,020	128,288,253,617	17,500,298	9,878,195,529	(2,855,759,788)	7,039,936,039
47	152,219,824	131,343,240,134	131,495,459,957	11,720,926	10,125,150,417	(2,928,954,255)	7,207,917,088
48	95,037,698	134,687,808,759	134,782,846,456	7,317,903	10,378,279,177	(3,003,538,135)	7,382,058,945
49	53,366,124	138,099,051,494	138,152,417,618	4,109,192	10,637,736,157	(3,079,608,848)	7,562,236,501
50	25,855,406	141,580,372,652	141,606,228,058	1,990,866	10,903,679,560	(3,157,242,310)	7,748,428,116

## SINGLE DISCOUNT RATE DEVELOPMENT

### Projection of Contributions Beginning September 1, 2016 (continued)

Year	Payroll for Current Employees	Payroll for Future Employees	Total Employee Payroll	Contributions from Current Employees	Employer Contributions for All Employees	Employer Normal Cost Contributions Related to Payroll of Future Employees	Total Contributions
51	10,214,538	145,136,169,222	145,146,383,760	786,519	11,176,271,549	(3,236,536,574)	7,940,521,494
52	3,634,308	148,771,409,046	148,775,043,354	279,842	11,455,678,338	(3,317,602,422)	8,138,355,758
53	1,587,761	152,492,831,677	152,494,419,438	122,258	11,742,070,297	(3,400,590,146)	8,341,602,409
54	597,428	156,306,182,495	156,306,779,923	46,002	12,035,622,054	(3,485,627,870)	8,550,040,186
55	153,167	160,214,296,255	160,214,449,422	11,794	12,336,512,605	(3,572,778,806)	8,763,745,593
56	28,702	164,219,781,955	164,219,810,657	2,210	12,644,925,421	(3,662,101,138)	8,982,826,493
57	1,936	168,325,303,987	168,325,305,924	149	12,961,048,556	(3,753,654,279)	9,207,394,426
58	-	172,533,438,572	172,533,438,572	-	13,285,074,770	(3,847,495,680)	9,437,579,090
59	-	176,846,774,536	176,846,774,536	-	13,617,201,639	(3,943,683,072)	9,673,518,567
60	-	181,267,943,899	181,267,943,899	-	13,957,631,680	(4,042,275,149)	9,915,356,531
61	-	185,799,642,497	185,799,642,497	-	14,306,572,472	(4,143,332,028)	10,163,240,444
62	-	190,444,633,559	190,444,633,559	-	14,664,236,784	(4,246,915,328)	10,417,321,456
63	-	195,205,749,398	195,205,749,398	-	15,030,842,704	(4,353,088,212)	10,677,754,492
64	-	200,085,893,133	200,085,893,133	-	15,406,613,771	(4,461,915,417)	10,944,698,354
65	-	205,088,040,461	205,088,040,461	-	15,791,779,116	(4,573,463,302)	11,218,315,814
66	-	210,215,241,473	210,215,241,473	-	16,186,573,593	(4,687,799,885)	11,498,773,708
67	-	215,470,622,510	215,470,622,510	-	16,591,237,933	(4,804,994,882)	11,786,243,051
68	-	220,857,388,073	220,857,388,073	-	17,006,018,882	(4,925,119,754)	12,080,899,128
69	-	226,378,822,774	226,378,822,774	-	17,431,169,354	(5,048,247,748)	12,382,921,606
70	-	232,038,293,344	232,038,293,344	-	17,866,948,587	(5,174,453,942)	12,692,494,645
71	-	237,839,250,677	237,839,250,677	-	18,313,622,302	(5,303,815,290)	13,009,807,012
72	-	243,785,231,944	243,785,231,944	-	18,771,462,860	(5,436,410,672)	13,335,052,188
73	-	249,879,862,743	249,879,862,743	-	19,240,749,431	(5,572,320,939)	13,668,428,492
74	-	256,126,859,311	256,126,859,311	-	19,721,768,167	(5,711,628,963)	14,010,139,204
75	-	262,530,030,794	262,530,030,794	-	20,214,812,371	(5,854,419,687)	14,360,392,684
76	-	269,093,281,564	269,093,281,564	-	20,720,182,680	(6,000,780,179)	14,719,402,501
77	-	275,820,613,603	275,820,613,603	-	21,238,187,247	(6,150,799,683)	15,087,387,564
78	-	282,716,128,943	282,716,128,943	-	21,769,141,929	(6,304,569,675)	15,464,572,254
79	-	289,784,032,167	289,784,032,167	-	22,313,370,477	(6,462,183,917)	15,851,186,560
80	-	297,028,632,971	297,028,632,971	-	22,871,204,739	(6,623,738,515)	16,247,466,224
81	-	304,454,348,795	304,454,348,795	-	23,442,984,857	(6,789,331,978)	16,653,652,879
82	-	312,065,707,515	312,065,707,515	-	24,029,059,479	(6,959,065,278)	17,069,994,201
83	-	319,867,350,203	319,867,350,203	-	24,629,785,966	(7,133,041,910)	17,496,744,056
84	-	327,864,033,958	327,864,033,958	-	25,245,530,615	(7,311,367,957)	17,934,162,658
85	-	336,060,634,807	336,060,634,807	-	25,876,668,880	(7,494,152,156)	18,382,516,724
86	-	344,462,150,677	344,462,150,677	-	26,523,585,602	(7,681,505,960)	18,842,079,642
87	-	353,073,704,444	353,073,704,444	-	27,186,675,242	(7,873,543,609)	19,313,131,633
88	-	361,900,547,055	361,900,547,055	-	27,866,342,123	(8,070,382,199)	19,795,959,924
89	-	370,948,060,732	370,948,060,732	-	28,563,000,676	(8,272,141,754)	20,290,858,922
90	-	380,221,762,250	380,221,762,250	-	29,277,075,693	(8,478,945,298)	20,798,130,395
91	-	389,727,306,306	389,727,306,306	-	30,009,002,586	(8,690,918,931)	21,318,083,655
92	-	399,470,488,964	399,470,488,964	-	30,759,227,650	(8,908,191,904)	21,851,035,746
93	-	409,457,251,188	409,457,251,188	-	31,528,208,341	(9,130,896,701)	22,397,311,640
94	-	419,693,682,468	419,693,682,468	-	32,316,413,550	(9,359,169,119)	22,957,244,431
95	-	430,186,024,529	430,186,024,529	-	33,124,323,889	(9,593,148,347)	23,531,175,542
96	-	440,940,675,143	440,940,675,143	-	33,952,431,986	(9,832,977,056)	24,119,454,930
97	-	451,964,192,021	451,964,192,021	-	34,801,242,786	(10,078,801,482)	24,722,441,304
98	-	463,263,296,822	463,263,296,822	-	35,671,273,855	(10,330,771,519)	25,340,502,336
99	-	474,844,879,242	474,844,879,242	-	36,563,055,702	(10,589,040,807)	25,974,014,895
100	-	486,716,001,223	486,716,001,223	-	37,477,132,094	(10,853,766,827)	26,623,365,267

## SINGLE DISCOUNT RATE DEVELOPMENT

### Projection of Plan Fiduciary Net Position Beginning September 1, 2016

Year	Projected Beginning Plan Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 8.00%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
1	\$ 134,008,637,473	\$ 6,197,731,728	\$ 12,103,719,224	\$ 45,512,778	\$ 10,487,210,758	\$ 138,544,347,958
2	138,544,347,958	6,121,531,281	10,465,497,101	42,502,091	10,911,464,575	145,069,344,621
3	145,069,344,621	6,072,401,681	11,012,475,290	40,167,761	11,410,170,288	151,499,273,539
4	151,499,273,539	6,034,173,299	11,559,324,793	38,158,119	11,901,690,551	157,837,654,476
5	157,837,654,476	6,002,200,530	12,113,854,148	36,370,468	12,385,822,394	164,075,452,784
6	164,075,452,784	5,976,256,428	12,672,337,711	34,739,963	12,861,982,844	170,206,614,382
7	170,206,614,382	5,954,427,689	13,229,293,074	33,228,329	13,329,829,093	176,228,349,763
8	176,228,349,763	5,934,245,782	13,801,954,054	31,801,258	13,788,366,394	182,117,206,626
9	182,117,206,626	5,913,711,123	14,393,597,095	30,418,457	14,235,513,164	187,842,415,361
10	187,842,415,361	5,891,593,289	15,007,078,603	29,061,413	14,668,648,230	193,366,516,863
11	193,366,516,863	5,866,850,269	15,643,987,094	27,721,060	15,084,672,023	198,646,331,000
12	198,646,331,000	5,837,654,905	16,304,250,469	26,388,172	15,480,061,644	203,633,408,907
13	203,633,408,907	5,804,389,522	16,981,526,780	25,048,543	15,851,205,536	208,282,428,642
14	208,282,428,642	5,768,525,469	17,670,227,293	23,711,464	16,194,754,550	212,551,769,903
15	212,551,769,903	5,730,802,068	18,364,902,113	22,383,177	16,507,621,623	216,402,908,305
16	216,402,908,305	5,691,757,372	19,056,474,651	21,063,422	16,787,102,001	219,804,229,604
17	219,804,229,604	5,652,416,784	19,738,151,615	19,760,615	17,030,972,947	222,729,707,104
18	222,729,707,104	5,614,798,588	20,400,614,112	18,489,544	17,237,596,507	225,162,998,543
19	225,162,998,543	5,581,601,019	21,029,458,479	17,271,755	17,406,335,371	227,104,204,698
20	227,104,204,698	5,554,542,934	21,609,903,695	16,115,370	17,537,844,580	228,570,573,147
21	228,570,573,147	5,535,193,322	22,133,000,587	15,027,629	17,633,916,289	229,591,654,542
22	229,591,654,542	5,524,158,553	22,593,890,506	14,008,876	17,697,128,933	230,205,042,646
23	230,205,042,646	5,519,977,134	23,004,536,607	13,047,269	17,729,963,821	230,437,399,725
24	230,437,399,725	5,522,690,644	23,364,453,188	12,137,674	17,734,574,822	230,318,074,329
25	230,318,074,329	5,530,916,089	23,684,241,939	11,268,223	17,712,840,119	229,866,320,376
26	229,866,320,376	5,543,100,076	23,979,772,975	10,423,242	17,665,617,110	229,084,841,345
27	229,084,841,345	5,557,816,075	24,266,687,511	9,591,005	17,592,452,956	227,958,831,861
28	227,958,831,861	5,574,218,741	24,556,672,279	8,766,073	17,491,671,802	226,459,284,052
29	226,459,284,052	5,591,213,339	24,862,874,603	7,941,668	17,360,394,559	224,540,075,679
30	224,540,075,679	5,612,753,031	25,138,633,812	7,145,684	17,196,915,962	222,203,965,175
31	222,203,965,175	5,640,051,825	25,183,819,303	6,381,813	17,009,355,384	219,663,171,268
32	219,663,171,268	5,673,497,988	25,368,256,138	5,652,135	16,800,197,060	216,762,958,044
33	216,762,958,044	5,712,551,956	25,521,484,824	4,953,315	16,563,728,288	213,512,800,149
34	213,512,800,149	5,755,051,332	25,672,448,182	4,268,715	16,299,487,419	209,890,622,004
35	209,890,622,004	5,802,281,041	25,799,887,062	3,605,903	16,006,592,525	205,896,002,606
36	205,896,002,606	5,856,083,017	25,879,574,755	2,976,142	15,686,032,170	201,555,566,896
37	201,555,566,896	5,918,940,873	25,882,054,247	2,395,920	15,341,188,748	196,931,246,351
38	196,931,246,351	5,993,912,148	25,769,904,041	1,881,783	14,978,604,141	192,131,976,815
39	192,131,976,815	6,083,689,680	25,514,132,110	1,452,774	14,608,235,481	187,308,317,093
40	187,308,317,093	6,189,205,894	25,107,522,880	1,111,975	14,242,447,002	182,631,335,134
41	182,631,335,134	6,308,451,132	24,580,201,900	850,762	13,893,663,799	178,252,397,403
42	178,252,397,403	6,438,097,391	23,975,844,803	643,492	13,572,152,219	174,286,158,717
43	174,286,158,717	6,576,770,018	23,309,173,190	479,729	13,286,453,593	170,839,729,410
44	170,839,729,410	6,723,765,040	22,587,879,603	353,079	13,044,807,600	168,020,069,368
45	168,020,069,368	6,878,416,916	21,819,892,019	256,161	12,855,434,192	165,933,772,295
46	165,933,772,295	7,039,936,039	21,014,497,701	181,485	12,726,465,839	164,685,494,987
47	164,685,494,987	7,207,917,088	20,177,156,563	123,986	12,666,045,186	164,382,176,712
48	164,382,176,712	7,382,058,945	19,312,737,101	80,314	12,682,524,701	165,133,942,943
49	165,133,942,943	7,562,236,501	18,424,652,176	48,289	12,784,575,711	167,056,054,690
50	167,056,054,690	7,748,428,116	17,515,765,332	26,412	12,981,305,967	170,269,997,030

## SINGLE DISCOUNT RATE DEVELOPMENT

### Projection of Plan Fiduciary Net Position Beginning September 1, 2016 (continued)

Year	Projected Beginning Plan Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 8.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
51	170,269,997,030	7,940,521,494	16,492,704,725	13,029	13,286,092,959	175,003,893,730
52	175,003,893,730	8,138,355,758	15,564,951,559	6,080	13,708,962,308	181,286,254,157
53	181,286,254,157	8,341,602,409	14,632,990,783	3,004	14,256,086,000	189,250,948,779
54	189,250,948,779	8,550,040,186	13,703,779,190	1,292	14,937,892,173	199,035,100,656
55	199,035,100,656	8,763,745,593	12,780,720,368	426	15,765,220,169	210,783,345,625
56	210,783,345,625	8,982,826,493	11,866,933,175	108	16,749,522,743	224,648,761,579
57	224,648,761,579	9,207,394,426	10,965,487,043	7	17,902,930,101	240,793,599,055
58	240,793,599,055	9,437,579,090	10,079,311,637	-	19,238,312,446	259,390,178,953
59	259,390,178,953	9,673,518,567	9,211,280,189	-	20,769,348,152	280,621,765,483
60	280,621,765,483	9,915,356,531	8,364,347,011	-	22,510,588,094	304,683,363,096
61	304,683,363,096	10,163,240,444	7,541,592,789	-	24,477,517,555	331,782,528,306
62	331,782,528,306	10,417,321,456	6,746,433,214	-	26,686,612,989	362,140,029,537
63	362,140,029,537	10,677,754,492	5,982,515,122	-	29,155,398,878	395,990,667,785
64	395,990,667,785	10,944,698,354	5,253,653,276	-	31,902,515,879	433,584,228,742
65	433,584,228,742	11,218,315,814	4,563,665,348	-	34,947,803,462	475,186,682,669
66	475,186,682,669	11,498,773,708	3,916,354,074	-	38,312,396,610	521,081,498,914
67	521,081,498,914	11,786,243,051	3,315,350,526	-	42,018,837,131	571,571,228,570
68	571,571,228,570	12,080,899,128	2,764,150,031	-	46,091,198,867	626,979,176,534
69	626,979,176,534	12,382,921,606	2,265,619,095	-	50,555,240,802	687,651,719,847
70	687,651,719,847	12,692,494,645	1,821,944,560	-	55,438,594,535	753,960,864,466
71	753,960,864,466	13,009,807,012	1,434,286,489	-	60,770,982,436	826,307,367,426
72	826,307,367,426	13,335,052,188	1,102,685,718	-	66,584,471,058	905,124,204,953
73	905,124,204,953	13,668,428,492	825,870,049	-	72,913,756,187	990,880,519,583
74	990,880,519,583	14,010,139,204	601,043,675	-	79,796,486,882	1,084,086,101,994
75	1,084,086,101,994	14,360,392,684	423,917,094	-	87,273,622,850	1,185,296,200,433
76	1,185,296,200,433	14,719,402,501	288,918,086	-	95,389,810,930	1,295,116,495,779
77	1,295,116,495,779	15,087,387,564	189,727,788	-	104,193,762,074	1,414,207,917,629
78	1,414,207,917,629	15,464,572,254	119,781,212	-	113,738,616,998	1,543,291,325,669
79	1,543,291,325,669	15,851,186,560	72,670,612	-	124,082,304,879	1,683,152,146,496
80	1,683,152,146,496	16,247,466,224	42,442,656	-	135,287,902,646	1,834,645,072,711
81	1,834,645,072,711	16,653,652,879	23,966,765	-	147,423,996,461	1,998,698,755,286
82	1,998,698,755,286	17,069,994,201	13,151,022	-	160,565,048,646	2,176,320,647,111
83	2,176,320,647,111	17,496,744,056	7,044,611	-	174,791,781,153	2,368,602,127,708
84	2,368,602,127,708	17,934,162,658	3,698,144	-	190,191,591,028	2,576,724,183,250
85	2,576,724,183,250	18,382,516,724	1,912,870	-	206,859,014,655	2,801,963,801,759
86	2,801,963,801,759	18,842,079,642	977,821	-	224,896,249,694	3,045,701,153,275
87	3,045,701,153,275	19,313,131,633	495,185	-	244,413,736,348	3,309,427,526,070
88	3,309,427,526,070	19,795,959,924	249,429	-	265,530,797,400	3,594,754,033,965
89	3,594,754,033,965	20,290,858,922	125,198	-	288,376,338,033	3,903,421,105,722
90	3,903,421,105,722	20,798,130,395	62,734	-	313,089,606,730	4,237,308,780,113
91	4,237,308,780,113	21,318,083,655	31,355	-	339,821,019,930	4,598,447,852,343
92	4,598,447,852,343	21,851,035,746	15,599	-	368,733,054,296	4,989,031,926,785
93	4,989,031,926,785	22,397,311,640	7,684	-	400,001,211,229	5,411,430,441,971
94	5,411,430,441,971	22,957,244,431	3,706	-	433,815,059,035	5,868,202,741,731
95	5,868,202,741,731	23,531,175,542	1,718	-	470,379,358,689	6,362,113,274,244
96	6,362,113,274,244	24,119,454,930	749	-	509,915,279,814	6,896,148,008,239
97	6,896,148,008,239	24,722,441,304	300	-	552,661,713,999	7,473,532,163,241
98	7,473,532,163,241	25,340,502,336	115	-	598,876,693,240	8,097,749,358,702
99	8,097,749,358,702	25,974,014,895	47	-	648,838,921,884	8,772,562,295,435
100	8,772,562,295,435	26,623,365,267	21	-	702,849,431,153	9,502,035,091,834

# SINGLE DISCOUNT RATE DEVELOPMENT

## Present Values of Projected Benefits Beginning September 1, 2016

Year	Projected Beginning Plan Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^((a)-.5)	(g)=(e)*vf^((a)-.5)	(h)=((c)/(1+sdr))^((a)-.5)
1	\$ 134,008,636,155	\$ 12,103,719,224	\$ 12,103,719,224	\$ -	\$ 11,646,809,254	\$ -	\$ 11,646,809,254
2	138,544,336,518	10,465,497,101	10,465,497,101	-	9,324,471,557	-	9,324,471,557
3	145,069,322,913	11,012,475,290	11,012,475,290	-	9,085,013,108	-	9,085,013,108
4	151,499,241,254	11,559,324,793	11,559,324,793	-	8,829,768,604	-	8,829,768,604
5	157,837,611,211	12,113,854,148	12,113,854,148	-	8,567,920,749	-	8,567,920,749
6	164,075,398,053	12,672,337,711	12,672,337,711	-	8,299,006,084	-	8,299,006,084
7	170,206,547,628	13,229,293,074	13,229,293,074	-	8,021,992,045	-	8,021,992,045
8	176,228,270,355	13,801,954,054	13,801,954,054	-	7,749,298,877	-	7,749,298,877
9	182,117,113,868	14,393,597,095	14,393,597,095	-	7,482,856,558	-	7,482,856,558
10	187,842,308,487	15,007,078,603	15,007,078,603	-	7,223,879,286	-	7,223,879,286
11	193,366,395,043	15,643,987,094	15,643,987,094	-	6,972,652,417	-	6,972,652,417
12	198,646,193,335	16,304,250,469	16,304,250,469	-	6,728,645,536	-	6,728,645,536
13	203,633,254,421	16,981,526,780	16,981,526,780	-	6,489,030,131	-	6,489,030,131
14	208,282,256,284	17,670,227,293	17,670,227,293	-	6,252,035,521	-	6,252,035,521
15	212,551,578,539	18,364,902,113	18,364,902,113	-	6,016,503,356	-	6,016,503,356
16	216,402,696,705	19,056,474,651	19,056,474,651	-	5,780,619,072	-	5,780,619,072
17	219,803,996,441	19,738,151,615	19,738,151,615	-	5,543,888,858	-	5,543,888,858
18	222,729,450,939	20,400,614,112	20,400,614,112	-	5,305,514,674	-	5,305,514,674
19	225,162,717,816	21,029,458,479	21,029,458,479	-	5,063,940,719	-	5,063,940,719
20	227,103,897,712	21,609,903,695	21,609,903,695	-	4,818,252,988	-	4,818,252,988
21	228,570,238,055	22,133,000,587	22,133,000,587	-	4,569,338,247	-	4,569,338,247
22	229,591,289,335	22,593,890,506	22,593,890,506	-	4,318,970,889	-	4,318,970,889
23	230,204,645,139	23,004,536,607	23,004,536,607	-	4,071,730,180	-	4,071,730,180
24	230,436,967,547	23,364,453,188	23,364,453,188	-	3,829,105,811	-	3,829,105,811
25	230,317,604,906	23,684,241,939	23,684,241,939	-	3,593,995,090	-	3,593,995,090
26	229,865,810,919	23,979,772,975	23,979,772,975	-	3,369,297,054	-	3,369,297,054
27	229,084,288,837	24,266,687,511	24,266,687,511	-	3,157,046,490	-	3,157,046,490
28	227,958,233,042	24,556,672,279	24,556,672,279	-	2,958,123,070	-	2,958,123,070
29	226,458,635,398	24,862,874,603	24,862,874,603	-	2,773,156,047	-	2,773,156,047
30	224,539,373,385	25,138,633,812	25,138,633,812	-	2,596,216,376	-	2,596,216,376
31	222,203,205,125	25,183,819,303	25,183,819,303	-	2,408,224,954	-	2,408,224,954
32	219,662,349,009	25,368,256,138	25,368,256,138	-	2,246,168,416	-	2,246,168,416
33	216,762,068,760	25,521,484,824	25,521,484,824	-	2,092,347,837	-	2,092,347,837
34	213,511,838,633	25,672,448,182	25,672,448,182	-	1,948,818,874	-	1,948,818,874
35	209,889,582,627	25,799,887,062	25,799,887,062	-	1,813,419,329	-	1,813,419,329
36	205,894,879,285	25,879,574,755	25,879,574,755	-	1,684,278,156	-	1,684,278,156
37	201,554,353,055	25,882,054,247	25,882,054,247	-	1,559,666,226	-	1,559,666,226
38	196,929,934,875	25,769,904,041	25,769,904,041	-	1,437,877,774	-	1,437,877,774
39	192,130,560,007	25,514,132,110	25,514,132,110	-	1,318,154,188	-	1,318,154,188
40	187,306,786,620	25,107,522,880	25,107,522,880	-	1,201,062,273	-	1,201,062,273
41	182,629,681,979	24,580,201,900	24,580,201,900	-	1,088,737,918	-	1,088,737,918
42	178,250,611,809	23,975,844,803	23,975,844,803	-	983,304,589	-	983,304,589
43	174,284,230,133	23,309,173,190	23,309,173,190	-	885,150,788	-	885,150,788
44	170,837,646,434	22,587,879,603	22,587,879,603	-	794,222,343	-	794,222,343
45	168,017,819,676	21,819,892,019	21,819,892,019	-	710,387,773	-	710,387,773
46	165,931,342,572	21,014,497,701	21,014,497,701	-	633,487,630	-	633,487,630
47	164,682,870,845	20,177,156,563	20,177,156,563	-	563,190,517	-	563,190,517
48	164,379,342,612	19,312,737,101	19,312,737,101	-	499,132,033	-	499,132,033
49	165,130,882,098	18,424,652,176	18,424,652,176	-	440,907,165	-	440,907,165
50	167,052,748,967	17,515,765,332	17,515,765,332	-	388,108,560	-	388,108,560



# SINGLE DISCOUNT RATE DEVELOPMENT

## PVs of Projected Benefits Beginning September 1, 2016 (continued)

Year	Projected Beginning Plan Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^((a)-.5)	(g)=(e)*vf^((a)-.5)	(h)=((c)/(1+sdr))^((a)-.5)
51	\$ 170,269,997,030	\$ 16,492,704,725	\$ 16,492,704,725	\$ -	\$ 338,370,296	\$ -	\$ 338,370,296
52	175,003,893,730	15,564,951,559	15,564,951,559	-	295,681,645	-	295,681,645
53	181,286,254,157	14,632,990,783	14,632,990,783	-	257,386,602	-	257,386,602
54	189,250,948,779	13,703,779,190	13,703,779,190	-	223,187,277	-	223,187,277
55	199,035,100,656	12,780,720,368	12,780,720,368	-	192,735,031	-	192,735,031
56	210,783,345,625	11,866,933,175	11,866,933,175	-	165,699,069	-	165,699,069
57	224,648,761,579	10,965,487,043	10,965,487,043	-	141,770,458	-	141,770,458
58	240,793,599,055	10,079,311,637	10,079,311,637	-	120,660,448	-	120,660,448
59	259,390,178,953	9,211,280,189	9,211,280,189	-	102,101,071	-	102,101,071
60	280,621,765,483	8,364,347,011	8,364,347,011	-	85,845,709	-	85,845,709
61	304,683,363,096	7,541,592,789	7,541,592,789	-	71,668,097	-	71,668,097
62	331,782,528,306	6,746,433,214	6,746,433,214	-	59,362,648	-	59,362,648
63	362,140,029,537	5,982,515,122	5,982,515,122	-	48,741,522	-	48,741,522
64	395,990,667,785	5,253,653,276	5,253,653,276	-	39,632,634	-	39,632,634
65	433,584,228,742	4,563,665,348	4,563,665,348	-	31,877,302	-	31,877,302
66	475,186,682,669	3,916,354,074	3,916,354,074	-	25,329,462	-	25,329,462
67	521,081,498,914	3,315,350,526	3,315,350,526	-	19,854,077	-	19,854,077
68	571,571,228,570	2,764,150,031	2,764,150,031	-	15,327,034	-	15,327,034
69	626,979,176,534	2,265,619,095	2,265,619,095	-	11,632,141	-	11,632,141
70	687,651,719,847	1,821,944,560	1,821,944,560	-	8,661,321	-	8,661,321
71	753,960,864,466	1,434,286,489	1,434,286,489	-	6,313,369	-	6,313,369
72	826,307,367,426	1,102,685,718	1,102,685,718	-	4,494,209	-	4,494,209
73	905,124,204,953	825,870,049	825,870,049	-	3,116,660	-	3,116,660
74	990,880,519,583	601,043,675	601,043,675	-	2,100,197	-	2,100,197
75	1,084,086,101,994	423,917,094	423,917,094	-	1,371,548	-	1,371,548
76	1,185,296,200,433	288,918,086	288,918,086	-	865,528	-	865,528
77	1,295,116,495,779	189,727,788	189,727,788	-	526,276	-	526,276
78	1,414,207,917,629	119,781,212	119,781,212	-	307,643	-	307,643
79	1,543,291,325,669	72,670,612	72,670,612	-	172,820	-	172,820
80	1,683,152,146,496	42,442,656	42,442,656	-	93,457	-	93,457
81	1,834,645,072,711	23,966,765	23,966,765	-	48,865	-	48,865
82	1,998,698,755,286	13,151,022	13,151,022	-	24,827	-	24,827
83	2,176,320,647,111	7,044,611	7,044,611	-	12,314	-	12,314
84	2,368,602,127,708	3,698,144	3,698,144	-	5,985	-	5,985
85	2,576,724,183,250	1,912,870	1,912,870	-	2,867	-	2,867
86	2,801,963,801,759	977,821	977,821	-	1,357	-	1,357
87	3,045,701,153,275	495,185	495,185	-	636	-	636
88	3,309,427,526,070	249,429	249,429	-	297	-	297
89	3,594,754,033,965	125,198	125,198	-	138	-	138
90	3,903,421,105,722	62,734	62,734	-	64	-	64
91	4,237,308,780,113	31,355	31,355	-	30	-	30
92	4,598,447,852,343	15,599	15,599	-	14	-	14
93	4,989,031,926,785	7,684	7,684	-	6	-	6
94	5,411,430,441,971	3,706	3,706	-	3	-	3
95	5,868,202,741,731	1,718	1,718	-	1	-	1
96	6,362,113,274,244	749	749	-	0	-	0
97	6,896,148,008,239	300	300	-	0	-	0
98	7,473,532,163,241	115	115	-	0	-	0
99	8,097,749,358,702	47	47	-	0	-	0
100	8,772,562,295,435	21	21	-	0	-	0
<b>Totals</b>					\$ 207,410,708,945	\$ -	\$ 207,410,708,945