

**Montana Highway Patrol  
Officers' Retirement System**

**Actuarial Valuation  
as of June 30, 2012**

**Produced by **Cheiron****

**September 2012**

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September 14, 2012

Public Employees' Retirement Board  
100 North Park, Suite 200  
Helena, Montana 59620

Dear Members of the Board:

At your request, we have conducted the annual actuarial valuation of the Montana Highway Patrol Officers' Retirement System as of June 30, 2012. The results of the valuation are contained in this report. The purpose of the valuation is discussed in the Foreword.

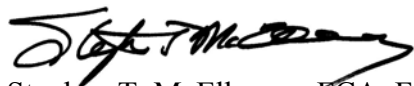
This report contains information on the System's assets, as well as analyses which combine asset and liability performance and projections. The report also discloses employer contribution levels, and required disclosures under the Governmental Accounting Standards Board Statement No. 25. This report is for the use of the Public Employees' Retirement Board and its auditors in preparing financial reports in accordance with applicable law and accounting requirements. Any other user of this report is not an intended user and is considered a third party.

Your attention is called to the Foreword in which we refer to the general approach employed in the preparation of this report. We also comment on the sources and reliability of both the data and the actuarial assumptions on which our findings are based. The results of this report are only applicable for Fiscal Year ending 2012 and rely on future system experience conforming to the underlying assumptions. To the extent that actual system experience deviates from the underlying assumptions, the results would vary accordingly.

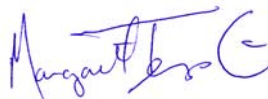
We hereby certify that, to the best of our knowledge, this report and its contents, which are based on information supplied by the Montana Public Employees' Retirement Administration, are work products of Cheiron, Inc. These work products are complete and have been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinions contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our report does not provide any legal services or advice.

Cheiron's report was prepared exclusively for the Montana Highway Patrol Officers' Retirement System for a specific and limited purpose. It is not for use or benefit of any third party for any purpose, and Cheiron assumes no duty or liability to any such party.

Sincerely,  
Cheiron



Stephen T. McElhaney, FCA, FSA  
Principal Consulting Actuary



Margaret Tempkin, FSA  
Principal Consulting Actuary



## FOREWORD

Cheiron has performed the actuarial valuation of the Montana Highway Patrol Officers' Retirement System as of June 30, 2012. The purpose of this report is to:

- 1) **Measure and disclose**, as of the valuation date, the financial condition of the System;
- 2) **Indicate trends** in the financial progress of the System;
- 3) **Determine the sufficiency of the statutory contribution rate** paid by the employers for Fiscal Year 2012 to meet the requirements of an Annual Required Contribution (ARC) under GASB 25; and
- 4) **Provide specific information** and documentation required by the Governmental Accounting Standards Board (GASB).

An actuarial valuation establishes and analyzes system assets and liabilities on a consistent basis, and traces the progress of both from one year to the next. It includes measurement of the system's investment performance as well as an analysis of actuarial liability gains and losses.

**Section I** presents a summary containing our findings and disclosing important trends experienced by the System in recent years.

**Section II** contains details on various asset measures, together with pertinent performance measurements.

**Section III** shows similar information on system liabilities, measured for actuarial, accounting, and government reporting purposes.

**Section IV** develops the employer contribution rate determined using actuarial techniques.

**Section V** includes the required disclosures under GASB Statement No. 25.

The appendices to this report contain a summary of the System's membership at the valuation date, a summary of the major provisions of the System, and the actuarial methods and assumptions used in the valuations.

In preparing our report, we relied without audit, on information (some oral and some written) supplied by the staff of the Public Employee Retirement Administration. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

The actuarial assumptions reflect our understanding of the likely future experience of the System and the assumptions as a whole represent our best estimate for the future experience of the System. The results of this report are dependent upon future experience conforming to these assumptions. To the extent that future experience deviates from the actuarial assumptions, the cost of the benefits would vary from our projections.

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION I  
BOARD SUMMARY**

**General Comments**

This is the fourth valuation of the Highway Patrol Officers' Retirement System performed by Cheiron.

The period to amortize unfunded actuarial accrued liability increased from 48.2 years at the June 30, 2011 valuation to 49.7 years as of June 30, 2012. During the year ended June 30, 2012, the System's assets gained 2.24% on a market value basis. However, due to the System's asset-smoothing technique which recognizes only a portion of the gains and losses, the return on the actuarial asset value was 3.32%. This return was below the assumed rate of return of 7.75% and resulted in an actuarial loss on investments of \$4.2 million.

The System also experienced an actuarial loss on system liabilities resulting from salary increases different than assumed and members retiring, terminating, becoming disabled and dying at rates different from the actuarial assumptions. The experience loss added \$5.6 million to the actuarial liability. Experience gains and losses are normal in the course of the System's experience. The System will experience actuarial gains and losses over time, because we cannot predict exactly how people will behave. When a system experiences alternating gains and losses that are small compared to the total actuarial liability, then the system's actuarial assumptions are reasonable. However, the current loss is almost 3.5% of the expected liabilities. A significant portion of the loss was a loss from salary increases being more than expected in that the average annual salary increased by over 11%.

As of the June 30, 2012 actuarial valuation, the System's unfunded actuarial liability was \$71.2 million. This is an increase from last year's unfunded actuarial liability of \$60.5 million. The funded ratio decreased from 61% at the prior valuation to 58% at June 30, 2012.

Montana Code Annotated (MCA) 19-2-407 requires an analysis of how market performance is affecting the actuarial funding of the Retirement System. It is our understanding of the Code to report certain key results on a market value of assets basis. The market value at June 30, 2012 was \$2.6 million greater than actuarial value. If market value were used rather than actuarial value, the funded ratio on the valuation date would be 59%, and the amortization period for the unfunded actuarial liability would be 45.1 years.

This report does not reflect any changes in pension accounting requirements from newly issued GASB Statements Nos. 67 and 68. Statement No. 67 will be effective for the plan year ending June 30, 2014. Statement No. 68 will be effective for most employers' fiscal years ending June 30, 2015. All references and calculations with respect to GASB reflect current Statements Nos. 25 and 27. In addition, in accordance with the System's funding policy, the contribution levels are compared to an amount that would satisfy the requirements for an Annual Required Contribution (ARC) under GASB No. 25. Since the concept of the ARC will disappear when GASB Nos. 67 and 68 become effective, the System may need to define a different calculation basis for measuring funding sufficiency.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

SECTION I  
BOARD SUMMARY

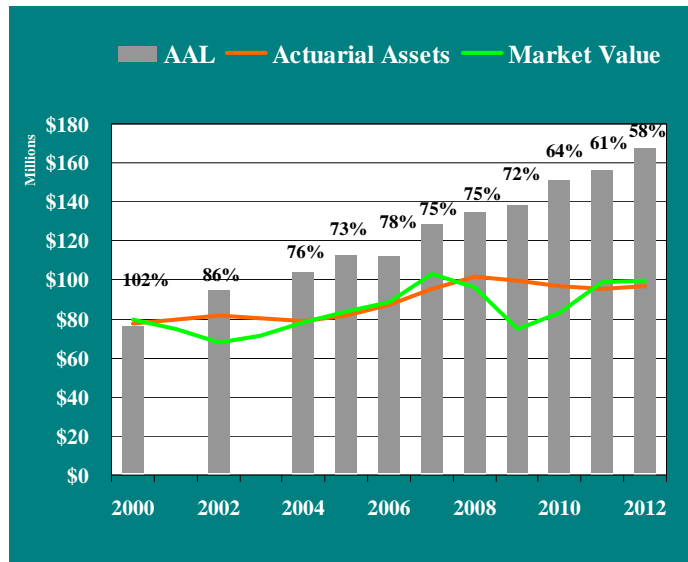
Trends

Assets and Liabilities

The market value of assets (MVA) increased over last year, returning 2.24% from the value at the prior valuation. The determination of the System's actuarial value of assets reflects only a portion of the amount by which the return was below the assumed rate of 7.75%.

Over the period July 1, 2007 to June 30, 2012 the System's assets returned approximately 2.0% per year measured at actuarial value, compared to a current valuation assumption of 7.75% per year.

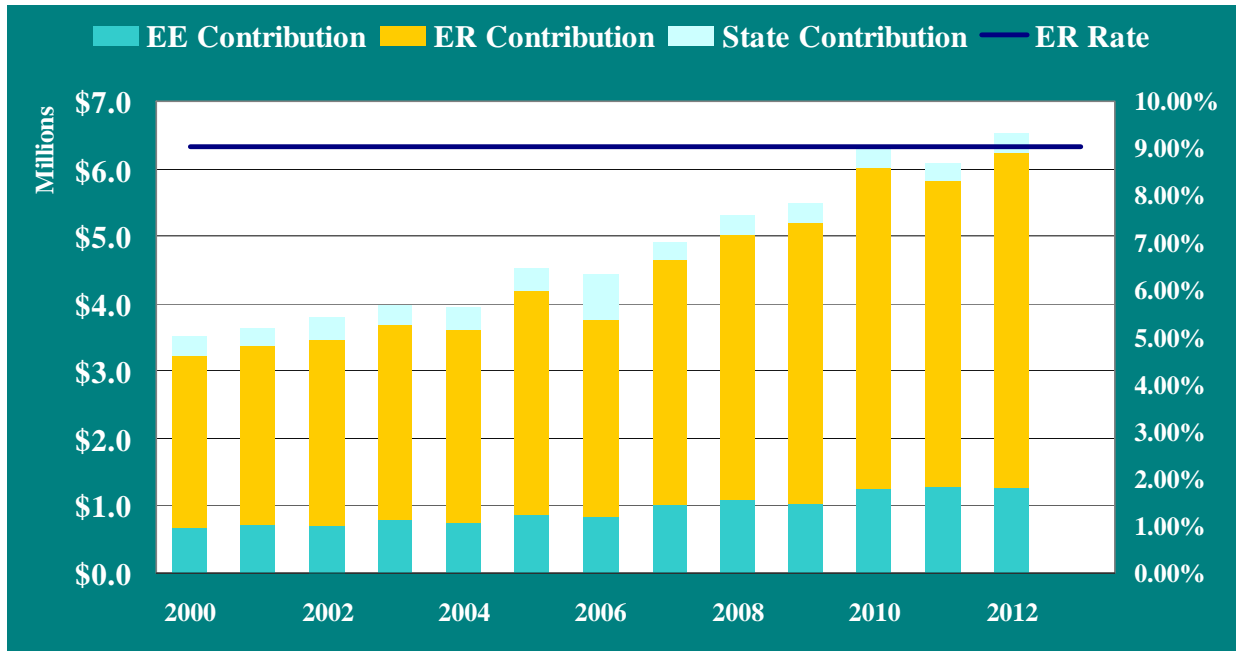
For funding purposes, the target amount is represented by the top of the gray bar. We compare the actuarial value of assets to this measure of liability in developing the funded percent. These are the percentages shown in the graph labels.



**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION I  
BOARD SUMMARY**

Contribution Rates



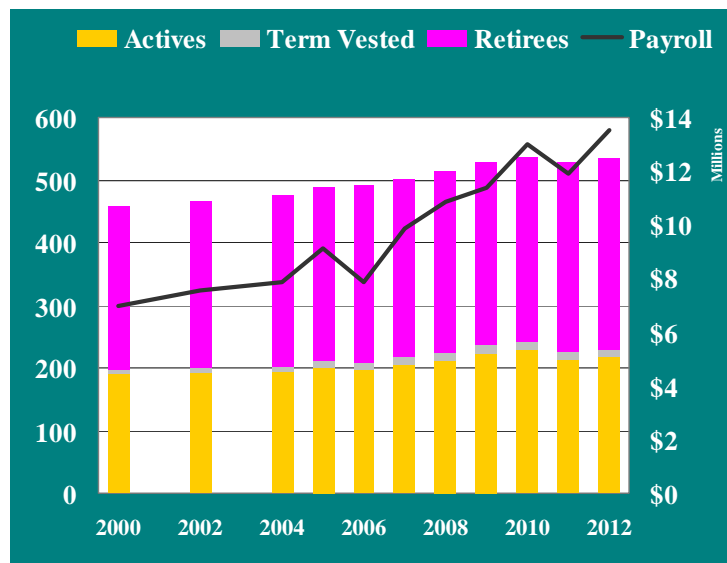
The stacked bars in this graph show the contributions made by members, employers, and the State (left hand scale). The navy line shows the employer contribution rate as a percent of payroll (right hand scale).

The employer and member contribution rates are set by State law. The actuarial valuation determines the extent to which the statutory contributions will meet the requirements of funding the System.

Participant Trends

The bars show the number of participants in each category and should be read using the left-hand scale. The active-to-inactive ratio has remained relatively constant with 0.7 actives for each inactive in 2000 and also 0.7 actives for each inactive today.

The black line shows the covered payroll in the System and is read using the right-hand scale.



**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

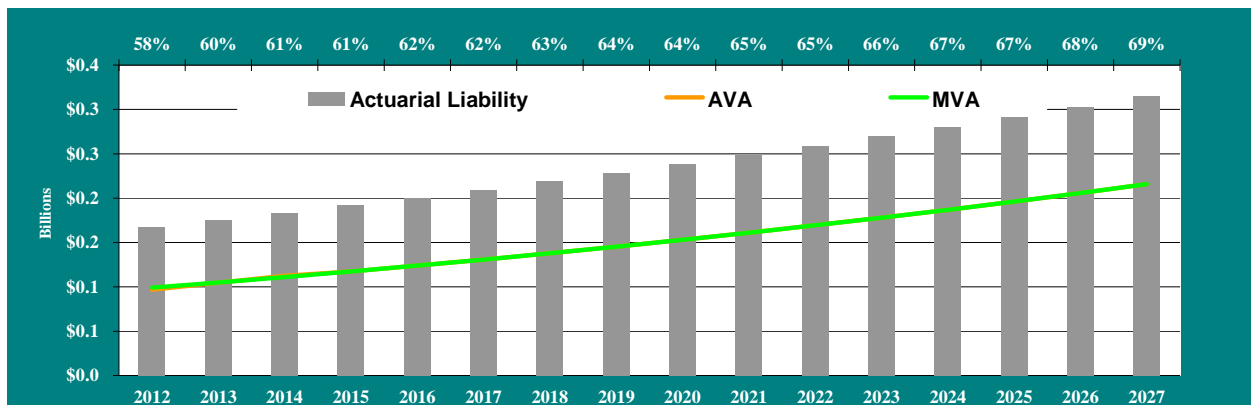
**SECTION I  
BOARD SUMMARY**

**Future Outlook**

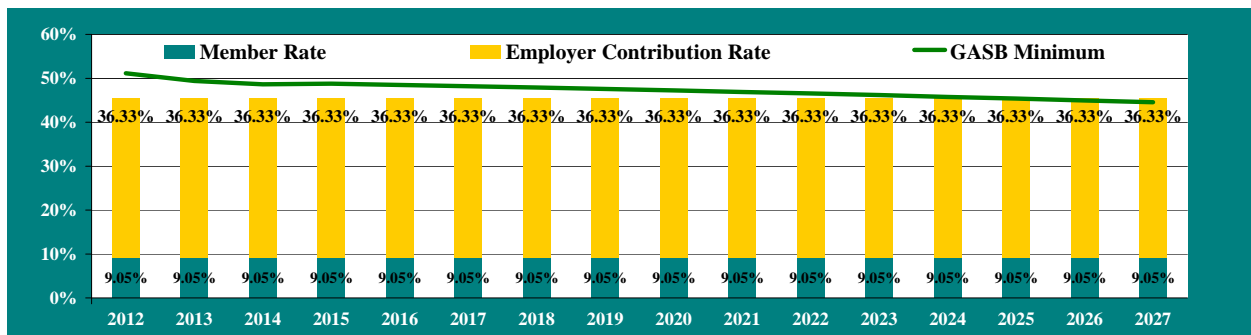
Base Line Projections

These graphs show the expected progress of the System over the next 15 years assuming the System's assets earn 7.75% on its *market value*, and that contributions continue to be made at the current statutory rates.

The values on top of the chart show the funded status of the System is expected to increase gradually from the current ratio of 58% to 69% by the end of the 15-year period.



The chart below shows that the total contribution computed on a GASB Annual Required Contribution basis will continue to exceed the statutory rate until 2026, at which point it becomes less than the statutory rate.



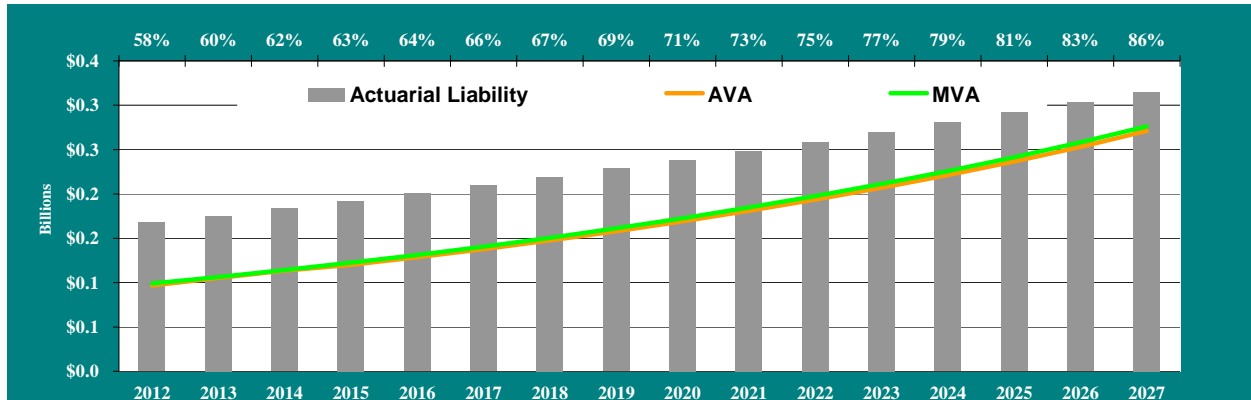


**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

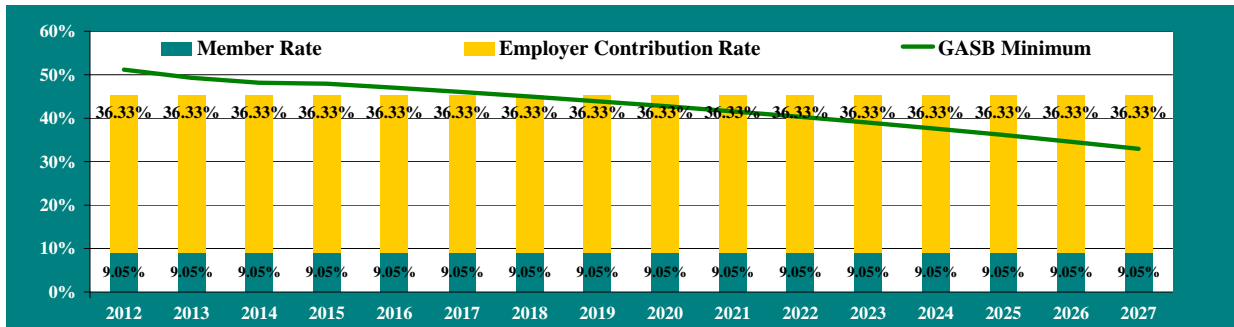
**SECTION I  
BOARD SUMMARY**

Projections with Asset Returns of 9.25%

The future funding status of this System will be largely driven by the investment earnings. Changes in the rate of return on market value can have significant effects on the System's status. These two charts below show what the next 15 years would look like with a 9.25% annual return in each year (i.e., 1.5% greater than the assumed rate of return).



Compared to the baseline projections, the funded status improves to a much greater extent. The GASB Annual Required Contribution drops below the statutory contribution rate by 2018.

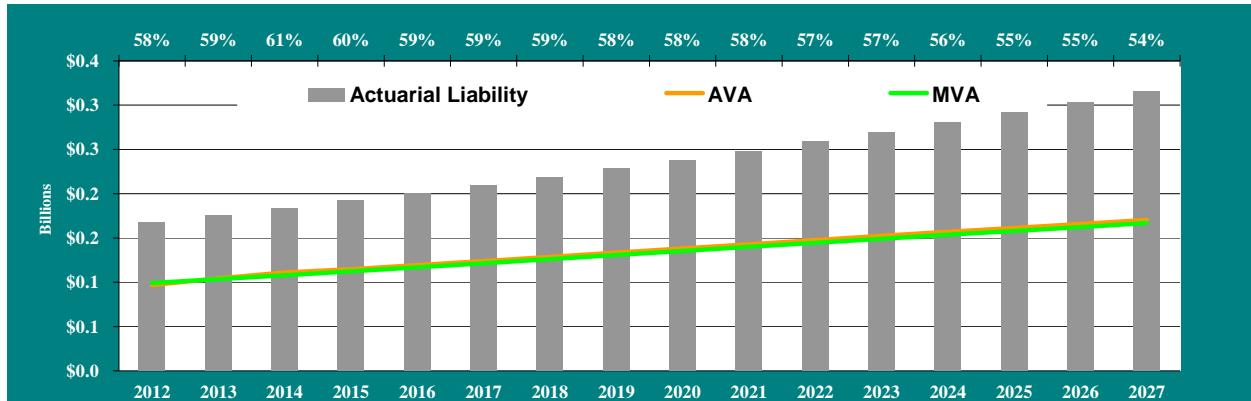


**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

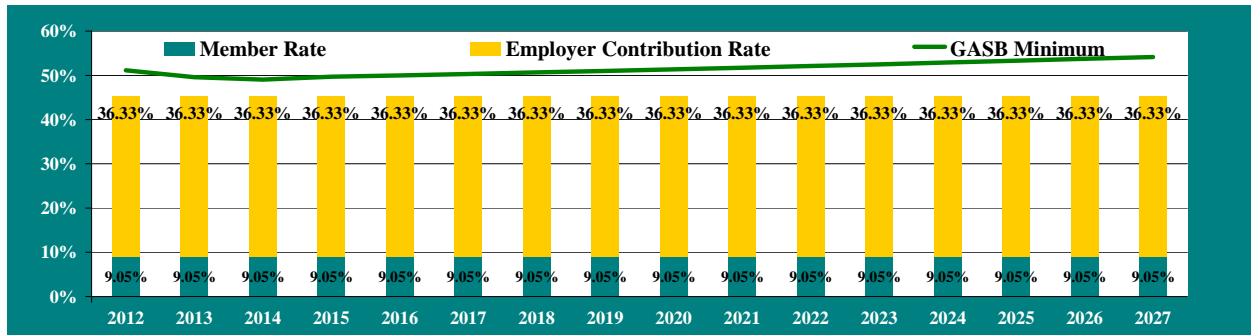
**SECTION I  
BOARD SUMMARY**

Projections with Asset Returns of 6.25%

To further demonstrate how the future funding of this System will be driven by investment earnings, we show the anticipated System funding projections if the invested assets earn 6.25% per year over the entire 15-year period (i.e., 1.5% less than the assumed rate of return).



Under this scenario, the funded status gradually declines after a slight increase in the early years. The GASB Annual Required Contribution remains above the statutory contribution rate.



MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION I  
BOARD SUMMARY**

<b>Valuation as of:</b>	<b>June 30, 2011</b>	<b>June 30, 2012</b>	<b>% Change</b>
<b>Table I-1 Montana Highway Patrol Officers' Retirement System Summary of Principal System Results</b>			
<b><u>Participant Counts</u></b>			
Active Members	214	218	1.9%
Disabled Members*	10	9	(10.0%)
Retirees and Beneficiaries*	292	296	1.4%
Terminated Vested Members	11	11	0.0%
Terminated Non-Vested Members	9	10	11.1%
Total**	536	544	1.5%
Annual Salaries of Active Members*	\$ 11,910,334	\$ 13,513,915	13.5%
Average Annual Salary	\$ 55,656	\$ 61,990	11.4%
Annual Retirement Allowances for Retired Members and Beneficiaries	\$ 7,687,413	\$ 8,085,061	5.2%
<b><u>Assets and Liabilities</u></b>			
Actuarial Accrued Liability (AAL)	\$ 155,741,798	\$ 167,823,843	7.8%
Actuarial Value of Assets (AVA)	95,273,843	96,655,208	1.4%
Unfunded AAL	\$ 60,467,955	\$ 71,168,635	17.7%
Funded Ratio (AVA/AAL)	61.17%	57.59%	
Present Value of Accrued Benefits (PVAB)	\$ 141,225,966	\$ 148,277,977	5.0%
Market Value of Assets	98,848,914	99,291,245	0.4%
Unfunded PVAB	\$ 42,377,052	\$ 48,986,732	15.6%
Accrued Benefit Funding Ratio	69.99%	66.96%	
Ratio of Actuarial Value to Market Value	96.38%	97.35%	
<b><u>Contributions as a Percentage of Payroll</u></b>			
Statutory Funding Rate	45.380%	45.380%	
Normal Cost Rate	24.140%	23.600%	
Available for Amortization of UAL	21.240%	21.780%	
Period to Amortize	48.2 years	49.7 years	
Projected 30-year Level Funding Rate	50.710%	51.160%	
Projected Shortfall (Surplus)	5.330%	5.780%	

\* Based on PERA categorization for the annual report. For actuarial valuation purposes, 20 members in 2011 and 22 members in 2012 were valued as disabled members with offsetting reductions to the number of retired members.

\*\* A reconciliation of participant counts appears at the beginning of Appendix A.

## SECTION II ASSETS

Pension plan assets play a key role in the financial operation of the System and in the decisions the Trustees may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact upon benefit levels, State contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on System assets including:

- **Disclosure** of System assets at June 30, 2011 and June 30, 2012;
- Statement of the **changes** in market values during the year;
- Development of the **Actuarial Value of Assets**;
- An assessment of **investment performance**; and
- A projection of the System's expected **cash flows** for the next 10 years.

### **Disclosure**

The market value of assets represents "snap-shot" or "cash-out" values which provide the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace.

The actuarial values are market values which have been smoothed and are used for evaluating the System's ongoing liability to meet its obligations.

The actuarial value of assets is the current market value, adjusted by a four-year smoothing of gains and losses on a market value basis. Each year's gain or loss is the determined difference between the actual market return and the expected market return using the assumed rate of investment return.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION II  
ASSETS**

<b>Table II-1 Changes in Market Values</b>		
<b>Value of Assets – June 30, 2011</b>		<b>\$ 98,848,914</b>
<b><u>Additions</u></b>		
Member Contributions	\$ 1,271,989	
Employer Contributions	4,965,952	
State Contributions	269,335	
Investment Return	2,321,043	
Other	<u>26,587</u>	
<b>Total Additions</b>	<b>\$ 8,854,906</b>	
<b><u>Deductions</u></b>		
Benefit Payments	\$ 8,290,614	
Administrative Expenses	<u>121,961</u>	
<b>Total Deductions</b>	<b>\$ 8,412,575</b>	
<b>Value of Assets – June 30, 2012</b>		<b>\$ 99,291,245</b>

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION II  
ASSETS**

**Actuarial Value of Assets (AVA)**

The actuarial value of assets represents a “smoothed” value developed by the actuary to reduce, or eliminate, volatile results which could develop from short-term fluctuations in the market value of assets. For this System, the actuarial value has been calculated by taking the market value of assets less 75% of the investment gain (loss) during the preceding year, less 50% of the investment gain (loss) during the second preceding year, and less 25% of the investment gain (loss) during the third preceding year. The tables below illustrate the calculation of actuarial value of assets for the June 30, 2012 valuation.

<b>Table II-2 Market Value Gain/(Loss)</b>	
Value of Assets – June 30, 2011	\$ 98,848,914
Employer, State and Member Contributions	6,533,863
Benefit Payments	(8,290,614)
Expected Return at 7.75%	<u>7,593,987</u>
Expected Value at June 30, 2012	\$ 104,686,150
Actual Value at June 30, 2012	\$ 99,291,245
Investment Gain/(Loss)	\$ (5,394,905)

<b>Table II-3 Develop Excluded Gain/(Loss)</b>			
		<b>Total Gain/(Loss)</b>	<b>Excluded Portion</b>
Exclude 75% of 2012 Gain/(Loss)	\$	(5,394,905)	\$ (4,046,179)
Exclude 50% of 2011 Gain/(Loss)	\$	11,503,978	\$ 5,751,989
Exclude 25% of 2010 Gain/(Loss)	\$	3,720,905	\$ 930,226
Total Excluded Gain/(Loss) for AVA Calculation			\$ 2,636,037

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION II  
ASSETS**

<b>Table II-4 Actuarial Value of Assets</b>	
Market Value of Assets – June 30, 2012	\$ 99,291,245
Total Gain/(Loss) excluded	<u>2,636,037</u>
Actuarial Value of Assets – June 30, 2012	\$ 96,655,208

**Investment Performance**

The market value of assets (MVA) returned 2.24% during 2012, which is less than the assumed 7.75% return. A return of 3.32% on the actuarial value of assets (AVA) is primarily the result of the asset smoothing method being utilized for the calculation of the actuarial value of assets. Since only 25% of the gain or loss from the performance of the System is recognized in a given year, in periods of very good performance, the AVA can lag significantly behind the MVA. In a period of negative returns, the AVA does not decline as rapidly as the MVA.

<b>Year Ending June 30,</b>	<b>Table II-5 Annual Rates of Return</b>	
	<b>Market Value</b>	<b>Actuarial Value</b>
2005	8.14%	5.27%
2006	9.03%	9.39%
2007	18.07%	12.07%
2008	(4.83%)	7.73%
2009	(20.98%)	(0.15%)
2010	13.04%	(1.16%)
2011	21.79%	(0.04%)
2012	2.24%	3.32%

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION II  
ASSETS**

**Table II-6  
Projection of System's Benefit Payments and Contributions (in thousands)**

<b>Year Beginning July 1,</b>	<b>Expected Benefits</b>	<b>Expected Contributions*</b>	<b>Net Cash Flow (excluding Investment Return)</b>	<b>Expected Investment Return**</b>	<b>Net Cash Flow (including Investment Return)</b>
2012	\$ 8,561	\$ 6,595	\$ (1,966)	\$ 7,620	\$ 5,654
2013	8,869	6,859	(2,010)	8,057	6,047
2014	9,317	7,134	(2,183)	8,519	6,336
2015	9,843	7,419	(2,424)	9,001	6,577
2016	10,348	7,716	(2,632)	9,503	6,871
2017	10,884	8,024	(2,860)	10,026	7,166
2018	11,501	8,345	(3,156)	10,571	7,415
2019	12,134	8,679	(3,455)	11,134	7,679
2020	12,709	9,026	(3,683)	11,720	8,037
2021	13,358	9,387	(3,971)	12,332	8,361

\* Expected contributions include Employer Contributions, State Contributions and Member Contributions. For illustration purposes, we have assumed that all contribution rates will remain level and that payroll will increase at the actuarially assumed rate of 4.00% per year.

\*\* Expected investment return is based upon an assumed return of 7.75% per annum.

Expected benefit payments are projected for the closed group valued at June 30, 2012. Projecting any farther than 10 years using a closed-group would not yield reliable predictions due to the omission of new hires.



**SECTION III  
LIABILITIES**

In this section, we present detailed information on System liabilities including:

- **Disclosure** of System liabilities at June 30, 2011 and June 30, 2012; and
- Statement of **changes** in these liabilities during the year; and
- Details on the source of actuarial gains and losses between this valuation and the last; and
- Development of actuarial unfunded liability on a market value basis as required under MCA 12-2-407.

**Disclosure**

Several types of liabilities are calculated and presented in this report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them.

- **Present Value of Benefits:** Used for analyzing the financial outlook of the System, this represents the amount of money needed today to fully pay off all future benefits and expenses of the System, assuming participants continue to accrue benefits.
- **Actuarial Accrued Liability:** Used for funding calculations and GASB disclosures, this liability is calculated taking the Present Value of Benefits and subtracting the present value of future Member Contributions and future Employer Normal Costs under an acceptable actuarial funding method. This method is referred to as the **Entry Age Normal (EAN)** funding method.
- **Present Value of Accrued Benefits:** Used for communicating the current level of liabilities, this liability represents the total amount of money needed today to fully pay off the current accrued obligations of the System, assuming no future accruals of benefits. These liabilities are also required for accounting purposes (FASB ASC Topic No. 960) and used to assess whether the System can meet its current benefit commitments.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION III  
LIABILITIES**

The following table discloses each of these liabilities for the current and prior valuations. With respect to each disclosure, a subtraction of the appropriate value of System assets yields, for each respective type, a **net surplus** or an **unfunded liability**.

<b>Table III-1</b>		
<b>Liabilities/Net (Surplus)/Unfunded</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
<b><u>Present Value of Benefits</u></b>		
Active Participant Benefits	\$ 71,725,272	\$ 82,121,875
Retiree and Inactive Benefits	107,954,966	111,957,125
<b>Present Value of Benefits (PVB)</b>	<b>\$ 179,680,238</b>	<b>\$ 194,079,000</b>
Market Value of Assets (MVA)	\$ 98,848,914	\$ 99,291,245
Future Member Contributions	9,075,994	10,120,408
Future Employer Contributions	36,434,349	40,627,008
Funding Shortfall/(Surplus)	35,320,981	44,040,339
<b>Total Resources</b>	<b>\$ 179,680,238</b>	<b>\$ 194,079,000</b>
<b><u>Actuarial Accrued Liability</u></b>		
Present Value of Benefits (PVB)	\$ 179,680,238	\$ 194,079,000
Present Value of Future Normal Costs (PVFNC)	23,938,440	26,255,157
<b>Actuarial Accrued Liability (AAL=PVB-PVFNC)</b>	<b>155,741,798</b>	<b>167,823,843</b>
Actuarial Value of Assets (AVA)	95,273,843	96,655,208
<b>Net (Surplus)/Unfunded (AAL - AVA)</b>	<b>\$ 60,467,955</b>	<b>\$ 71,168,635</b>
<b><u>Present Value of Accrued Benefits</u></b>		
Present Value of Benefits (PVB)	\$ 179,680,238	\$ 194,079,000
Present Value of Future Benefit Accruals (PVFBA)	38,454,272	45,801,023
<b>Present Value of Accrued Benefits (PVAB=PVB-PVFBA)</b>	<b>141,225,966</b>	<b>148,277,977</b>
Market Value of Assets (MVA)	98,848,914	99,291,245
<b>Net Unfunded (PVAB - MVA)</b>	<b>\$ 42,377,052</b>	<b>\$ 48,986,732</b>

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION III  
LIABILITIES**

**Changes in Liabilities**

Each of the Liabilities disclosed in the prior table are expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation
- Benefits accrued since the last valuation
- System amendments increasing benefits
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, or dying at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method

Unfunded liabilities will change because of all of the above, and also due to changes in system assets resulting from:

- Employer contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure system assets

In each valuation, we report on those elements of change which are of particular significance, potentially affecting the long-term financial outlook of the System. Below we present key changes in liabilities since the last valuation.

<b>Table III-2</b>			
<b>(In Thousands)</b>	<b>Present Value of Benefits</b>	<b>Actuarial Accrued Liability</b>	<b>Present Value of Accrued Liability</b>
Liabilities June 30, 2011	\$ 179,680,238	\$ 155,741,798	\$ 141,225,966
Liabilities June 30, 2012	194,079,000	167,823,843	148,277,977
Liability			
Increase (Decrease)	14,398,762	12,082,045	7,052,011
Change Due to:			
Actuarial (Gain)/Loss	NC*	5,603,243	NC*
Plan Changes	0	0	0
Benefits Accumulated and Other Sources	14,398,762	6,478,802	7,052,011

\* NC = not calculated.

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION III  
LIABILITIES**

**Table III-3  
Summary of Actuarial Gains and Losses as of June 30, 2012**

Actuarial Liabilities as of July 1, 2011	\$ 155,741,798
Normal Cost	2,803,434
Actual Benefit Payments	(8,290,614)
Interest	<u>11,965,982</u>
Expected Actuarial Liability as of July 1, 2012	162,220,600
Actual Liability as of July 1, 2012	\$ 167,823,843
Liability (Gain)/Loss	\$ 5,603,243
Sources of Liability (Gain)/Loss	
Salary (Gain)/Loss	\$ 3,654,471
New Participant (Gain)/Loss	122,016
Active Retirements (Gain)/Loss	(113,129)
Active Terminations (Gain)/Loss	536,737
Active Deaths (Gain)/Loss	(34,034)
Active Disability (Gain)/Loss	(106,532)
Inactive Decrements (Gain)/Loss	1,543,714
Actual Liability as of July 1, 2012	\$ 167,823,843
Liability (Gain)/Loss due to plan changes	\$ 0
Actuarial Value of Assets as of July 1, 2011	\$ 95,273,843
Net Cash Flow	(1,756,751)
Expected Earnings	<u>7,316,919</u>
Expected Actuarial Value of Assets as of July 1, 2012	100,834,011
Actual Actuarial Value of Assets as of July 1, 2012	\$ 96,655,208
Investment (Gain)/Loss	\$ 4,178,803
Total Liability (Gain)/Loss	<u>5,603,243</u>
Total Actuarial (Gain)/Loss	\$ 9,782,046

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION III  
LIABILITIES**

Table III-4 shows the actuarial liabilities as of the prior and current valuation dates. The unfunded actuarial liability is the difference between the actuarial liability and the actuarial value of assets. The funded ratio is the ratio of the actuarial value of assets to the actuarial liability.

<b>Table III-4</b>		
<b>Actuarial Liabilities for Funding</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
1. Actuarial Liabilities		
Retiree and Inactive Benefits	\$ 107,954,966	\$ 111,957,125
Active Member Benefits	<u>47,786,832</u>	<u>55,866,718</u>
<b>Total Actuarial Liability</b>	<b>\$ 155,741,798</b>	<b>\$ 167,823,843</b>
2. Actuarial Value of Assets	\$ 95,273,843	\$ 96,655,208
3. Unfunded Actuarial Liability	\$ 60,467,955	\$ 71,168,635
4. Funded Ratio	61.17%	57.59%

Montana Code Annotated (MCA) 19-2-407 requires an analysis of how market performance is affecting the actuarial funding of the System. Table III-5 presented below shows the same information as in Table III-4 above, but using market value of assets rather than actuarial value of assets.

<b>Table III-5</b>		
<b>Actuarial Liabilities on Market Value Basis (MCA 19-2-407)</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
1. Actuarial Liabilities		
Retiree and Inactive Benefits	\$ 107,954,966	\$ 111,957,125
Active Member Benefits	<u>47,786,832</u>	<u>55,866,718</u>
<b>Total Actuarial Liability</b>	<b>\$ 155,741,798</b>	<b>\$ 167,823,843</b>
2. Market Value of Assets	\$ 98,848,914	\$ 99,291,245
3. Unfunded Actuarial Liability	\$ 56,892,884	\$ 68,532,598
4. Funded Ratio	63.47%	59.16%

**SECTION IV  
CONTRIBUTIONS**

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the System. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For this System, the funding method employed is the **Entry Age Actuarial Cost Method**. Under this method, there are two components to the total contribution: the **normal cost rate** and the **unfunded actuarial liability rate** (UAL rate). The normal cost rate is determined by taking the value, as of entry age into the system, of each member's projected future benefits. This value is then divided by the value, also at entry age, of each member's expected future salary. The normal cost rate is multiplied by current salary to determine each member's normal cost rate. Finally, the total normal cost rate is reduced by the member contribution to produce the employer normal cost rate. The difference between the EAN actuarial liability and the actuarial value of assets is the unfunded actuarial liability.

For purposes of determining the adequacy of the statutory funding rate, the UAL rate is calculated by subtracting the normal cost rate from the statutory rate. A calculation is then made to determine the period over which the UAL rate will amortize the unfunded actuarial liability. A second UAL rate is calculated based upon a 30-year amortization of the UAL, which is the maximum amortization period permitted under GASB Statement No. 25, but which should not necessarily be construed as a recommended contribution level. All UAL payments are determined as a level percentage of pay, assuming that total pay increases by the annual inflation rate of 4.00%.

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION IV  
CONTRIBUTIONS**

The tables below present and compare the contribution rates for the System for this valuation and the prior one.

<b>Table IV-1 Statutory Basis</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
<b>Statutory Funding Rates</b>		
Members	9.050%	9.050%
Employers	26.150%	26.150%
State	10.180%	10.180%
<b>Total</b>	<b>45.380%</b>	<b>45.380%</b>
Normal Cost Rate	24.140%	23.600%
Funding Rate Available for Amortization	21.240%	21.780%
Unfunded Actuarial Liability (Surplus)	\$60,467,955	\$71,168,635
Years to Amortize*	48.2 years	49.7 years

\* On a market value basis, the Years to Amortize the Unfunded Actuarial Liability was 41.5 years at June 30, 2011 and 45.1 years at June 30, 2012.

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION IV  
CONTRIBUTIONS**

<b>Table IV-2 Calculated Contribution Basis</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
Normal Cost Rate	24.140%	23.600%
Amortization Payment (30-years)	<u>26.570%</u>	<u>27.560%</u>
Total Calculated Contribution Rate	50.710%	51.160%
Less Statutory Rate	<u>45.380%</u>	<u>45.380%</u>
Shortfall (Surplus) in Statutory Rate	5.330%	5.780%

<b>Table IV-3 Calculated Contribution on Market Value (MCA 19-2-407)</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
Normal Cost Rate	24.140%	23.600%
Amortization Payment (30-years)	<u>25.000%</u>	<u>26.540%</u>
Total Calculated Contribution Rate	49.140%	50.140%
Less Statutory Rate	<u>45.380%</u>	<u>45.380%</u>
Shortfall (Surplus) in Statutory Rate	3.760%	4.760%

The following table projects the results for the next five valuations (assuming all assumptions are met, including 7.75% return).

<b>Table IV-4 Projected Calculated Contribution Rates</b>	
<b>Valuation Year</b>	<b>Rate</b>
2013	49.43%
2014	48.62%
2015	48.82%
2016	48.52%
2017	48.22%



**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM**  
**ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**SECTION V**  
**ACCOUNTING STATEMENT INFORMATION**

Accounting Standard Codification Topic No. 960 of the Financial Accounting Standards Board specifies certain information for a plan to disclose regarding its funded status. Statement No. 25 of the Governmental Accounting Standards Board (GASB) establishes standards for disclosure of pension information by public employee retirement systems (PERS) and governmental employers in notes to financial statements and supplementary information.

The FASB ASC Topic No. 960 disclosures provide a quasi “snap shot” view of how the System’s assets compare to its liabilities if contributions stopped and accrued benefit claims had to be satisfied. However, due to potential legal requirements and the possibility that alternative interest rates would have to be used to determine the liabilities, these values may not be a good indication of the amount of money it would take to buy the benefits for all members if the System were to terminate.

The GASB-25 actuarial accrued liability is the same as the actuarial liability amount calculated for funding purposes.

Both the present value of accrued benefits (FASB ASC Topic No. 960) and the actuarial accrued liability (GASB-25) are determined assuming that the System is on-going and participants continue to terminate employment, retire, etc., in accordance with the actuarial assumptions. Liabilities are discounted at the assumed valuation interest rate of 7.75% per annum.

FASB ASC Topic No. 960 specifies that a comparison of the present value of accrued (accumulated) benefits with the market value of the assets as of the valuation date must be provided. GASB Statement No. 25 requires the actuarial accrued liability be compared with the actuarial value of assets for funding purposes. The relevant amounts as of June 30, 2012 are exhibited in Table V-1.

Tables V-2 through V-5 are exhibits to be used with the System CAFR report. Table V-2 is the Note to Required Supplementary Information, Table V-3 is a history of gains and losses in Accrued Liability, Table V-4 is the Schedule of Funding Progress, and V-5 is the Solvency Test which shows the portion of Accrued Liability covered by Assets.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION V**  
**ACCOUNTING STATEMENT INFORMATION**

<b>Table V-1</b>		
<b>Accounting Statement Information</b>		
	<b>June 30, 2011</b>	<b>June 30, 2012</b>
<b>A. FASB ASC Topic No. 960 Basis</b>		
1. Present Value of Benefits Accrued and Vested to Date		
a. Members Currently Receiving Payments	\$ 107,034,907	\$ 110,875,944
b. Former Vested Members	920,059	1,081,181
c. Active Members	<u>33,271,000</u>	<u>36,320,852</u>
2. Total Present Value of Accrued Benefits (1 (a) + 1(b) + 1(c))	\$ 141,225,966	\$ 148,277,977
3. Assets at Market Value	<u>98,848,914</u>	<u>99,291,245</u>
4. Unfunded Present Value of Accrued Benefits (2 – 3)	\$ 42,377,052	\$ 48,986,732
5. Ratio of Assets to Present Value of Accrued Benefits (3 / 2)	69.99%	66.96%
<b>B. GASB No. 25 Basis</b>		
1. Actuarial Accrued Liabilities for retirees and beneficiaries currently receiving benefits and terminated employees not yet receiving benefits	\$ 107,954,966	\$ 111,957,125
2. Actuarial Accrued Liabilities for current employees	<u>47,786,832</u>	<u>55,866,718</u>
3. Total Actuarial Accrued Liability (1 + 2)	\$ 155,741,798	\$ 167,823,843
4. Net Actuarial Assets available for benefits	<u>95,273,843</u>	<u>96,655,208</u>
5. Unfunded Actuarial Accrued Liability (3 – 4)	\$ 60,467,955	\$ 71,168,635

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION V**  
**ACCOUNTING STATEMENT INFORMATION**

**Table V-2**  
**Note To Required Supplementary Information**

The information presented in the required supplementary schedules was determined as part of the actuarial valuation at the date indicated. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2012
Actuarial cost method	Entry age
Amortization method	Open
Remaining amortization period for Annual Required Contribution	30 years
Asset valuation method	Four-Year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.75%
General wage growth*	4.00%
Merit salary increases	0.0% - 7.3%
*Includes inflation at	3.00%

The actuarial assumptions used have been recommended based on the most recent review of the System's experience (completed in 2010) and adopted by the Retirement Board.

The rate of employer contributions to the System is composed of the normal cost and amortization of the unfunded actuarial accrued liability. The normal cost is a level percent of payroll cost which will pay for projected benefits at retirement for each participant. The actuarial accrued liability is that portion of the present value of projected benefits that will not be paid by future normal costs. The difference between this liability and the funds accumulated as of the same date is the unfunded actuarial accrued liability.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION V**  
**ACCOUNTING STATEMENT INFORMATION**

**Table V-3**  
**Analysis of Financial Experience\***

**Gain and Loss in Accrued Liability During Years Ended June 30**  
**Resulting from Differences Between Assumed Experience and Actual Experience**

*Gain (or Loss) for Year ending June 30,  
(expressed in thousands)*

Type of Activity	2007	2008	2009	2010	2011	2012
Investment Income on Actuarial Assets	\$ 3,481	\$ (287)	\$ (8,202)	\$ (9,065)	\$ (7,496)	\$ (4,179)
Combined Liability Experience	<u>(12,517)</u>	<u>(932)</u>	<u>2,835</u>	<u>(4,848)</u>	<u>2,128</u>	<u>(5,603)</u>
(Loss)/Gain During Year from Financial Experience	\$ (9,036)	\$ (1,219)	\$ (5,367)	\$ (13,913)	\$ (5,368)	\$ (9,782)
Non-Recurring Items	<u>0</u>	<u>0</u>	<u>0</u>	<u>(2,700)</u>	<u>0</u>	<u>0</u>
Composite Gain (or Loss) During Year	\$ (9,036)	\$ (1,219)	\$ (5,367)	\$ (16,613)	\$ (5,368)	\$ (9,782)

**Table V-4**  
**Schedule of Funding Progress\***  
(expressed in thousands)

Valuation Date June 30,	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2012	\$ 96,655	\$ 167,824	58%	\$ 71,169	\$ 13,618	523%
2011	95,274	155,742	61%	60,468	12,472	485%
2010	97,204	151,177	64%	53,973	13,036	414%
2009	99,652	137,815	72%	38,163	11,425	334%
2008	101,500	134,683	75%	33,183	10,866	305%
2007	95,758	128,306	75%	32,548	9,858	330%

\* Years prior to 2009 were taken from reports prepared by prior actuary.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**SECTION V**  
**ACCOUNTING STATEMENT INFORMATION**

**Table V-5**  
**Solvency Test\***  
**Aggregate Accrued Liabilities for**  
**(expressed in thousands)**

Valuation Date June 30,	Active Member Contributions	Retirees & Beneficiaries	Active Member Employer Financed Contributions	Actuarial Value of Reported Assets	Portion of Accrued Liabilities Covered by Reported Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
2012	\$ 11,455	110,876	\$ 45,493	\$ 96,655	100%	77%	0%
2011	10,795	107,035	37,911	95,274	100%	79%	0%
2010	10,369	102,450	38,359	97,204	100%	85%	0%
2009	9,571	97,087	31,157	99,652	100%	93%	0%
2008	8,796	96,395	29,492	101,500	100%	96%	0%
2007	8,049	93,187	27,070	95,758	100%	94%	0%

\* Years prior to 2009 were taken from reports prepared by prior actuary.

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX A  
MEMBERSHIP INFORMATION**

<b>Reconciliation of Participant Counts</b>							
	<b>Active</b>	<b>Disabled</b>	<b>Retirees and Beneficiaries</b>	<b>Terminated Vested Members</b>	<b>Terminated Non-Vested Members</b>	<b>Total</b>	
Participant counts used for valuation	218	22	283	11	10	544	
Disabled members having attained normal retirement age		(13)	13			-	
Beneficiaries of Disabled Members						-	
Beneficiaries with less than one year of certain payments remaining			-			-	
Other Adjustments						-	
Participant counts shown in Annual Financial Report	218	9	296	11	10	544	

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Board Summary (page 7) match the CAFR reports at the request of the Board. The differences between the counts, if any, have no material effect upon the liability calculation.

The salaries used in the tables and charts which follow are different than the salaries used for the Board Summary on page 7. For this Appendix A, the valuation projected salaries are to be paid for the following fiscal year, whereas for the Board Summary, salaries are applicable in the year ending on the valuation date.

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX A  
MEMBERSHIP INFORMATION**

The benefits for retirees and beneficiaries used for the tables and charts which follow are different than the benefits used for the Board Summary on page 7. For this Appendix A, the valuation projected benefits to be paid for the following fiscal year (including Guaranteed Annual Benefit Adjustment (GABA) where applicable), whereas for the Board Summary, annual benefits are as of the valuation date.

**Montana Highway Patrol Officers' Retirement System Distribution of  
Active Members by Age and Service as of June 30, 2012**

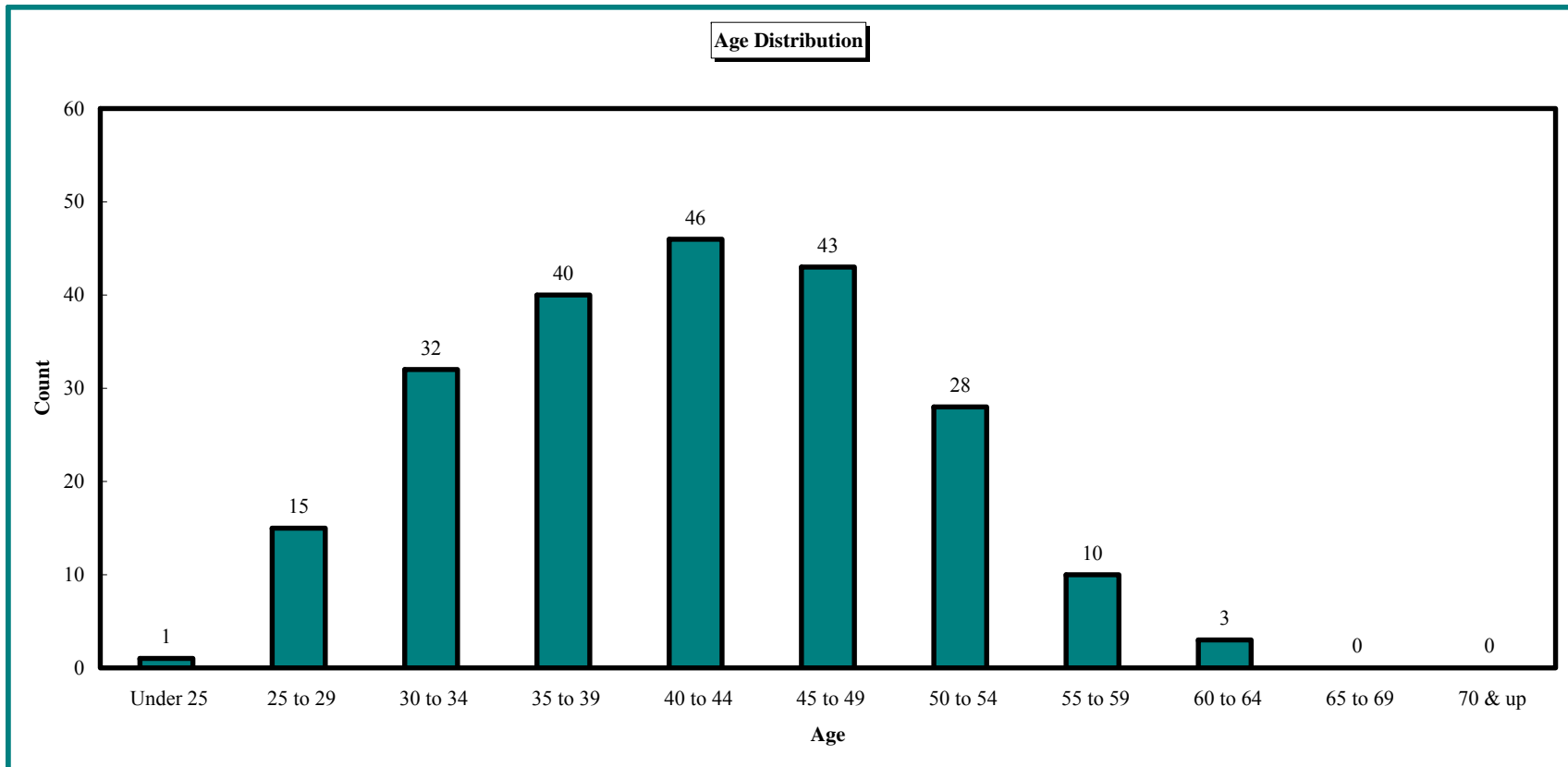
**COUNTS BY AGE/SERVICE**

Age	Service										Total	
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up		
Under 25	1	0	0	0	0	0	0	0	0	0	0	1
25 to 29	4	10	1	0	0	0	0	0	0	0	0	15
30 to 34	4	12	13	3	0	0	0	0	0	0	0	32
35 to 39	3	6	18	13	0	0	0	0	0	0	0	40
40 to 44	1	4	9	15	15	2	0	0	0	0	0	46
45 to 49	0	4	10	7	12	9	1	0	0	0	0	43
50 to 54	0	1	3	8	5	8	3	0	0	0	0	28
55 to 59	0	2	2	1	1	2	1	1	1	0	0	10
60 to 64	0	0	0	0	2	0	1	0	0	0	0	3
65 to 69	0	0	0	0	0	0	0	0	0	0	0	0
70 & up	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	13	39	56	47	35	21	6	1	0	0	0	218

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of  
Active Members by Age as of June 30, 2012

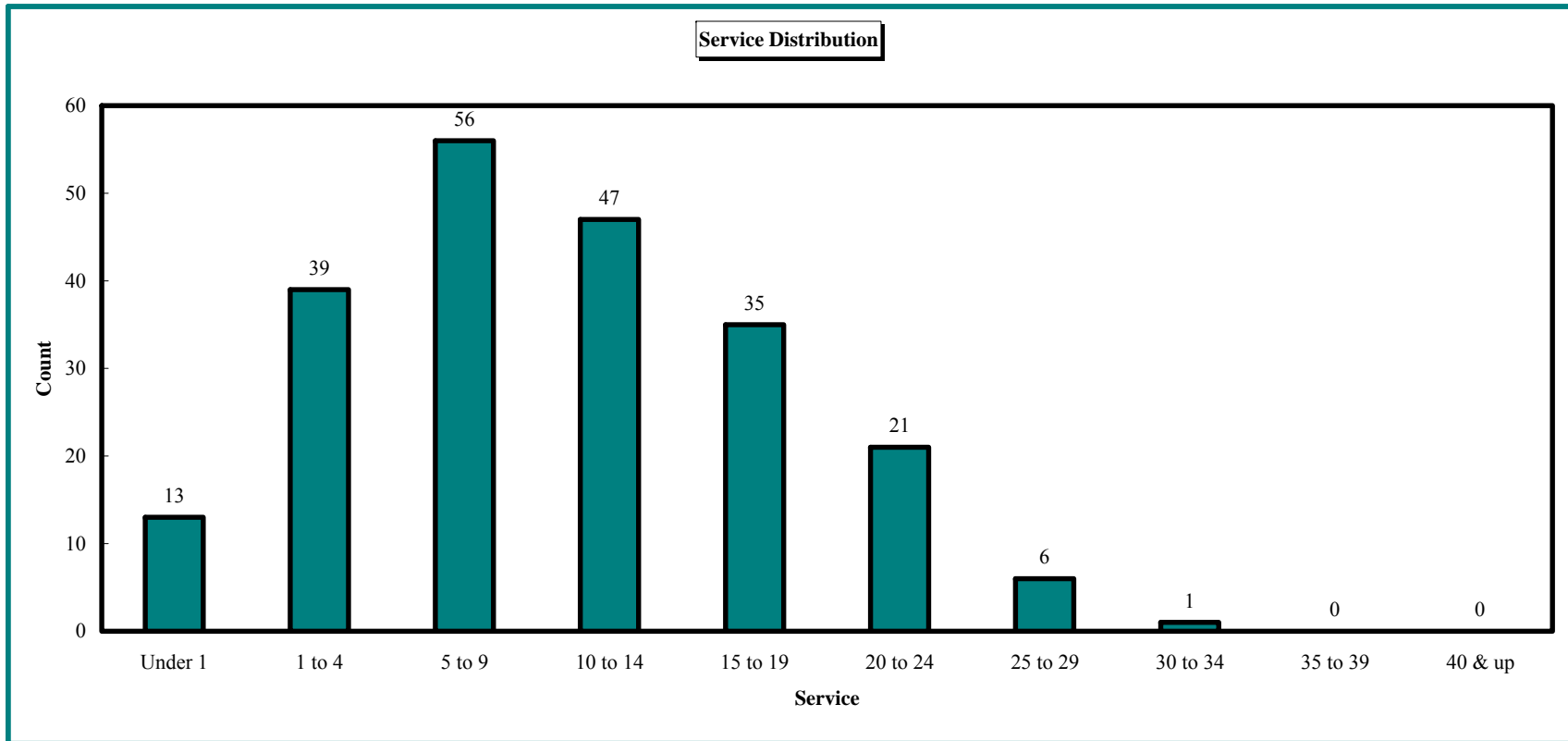




MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of  
Active Members by Service as of June 30, 2012



**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX A  
MEMBERSHIP INFORMATION**

**Montana Highway Patrol Officers' Retirement System Distribution of  
Active Members by Age and Service as of June 30, 2012**

**AVERAGE SALARY BY AGE/SERVICE**

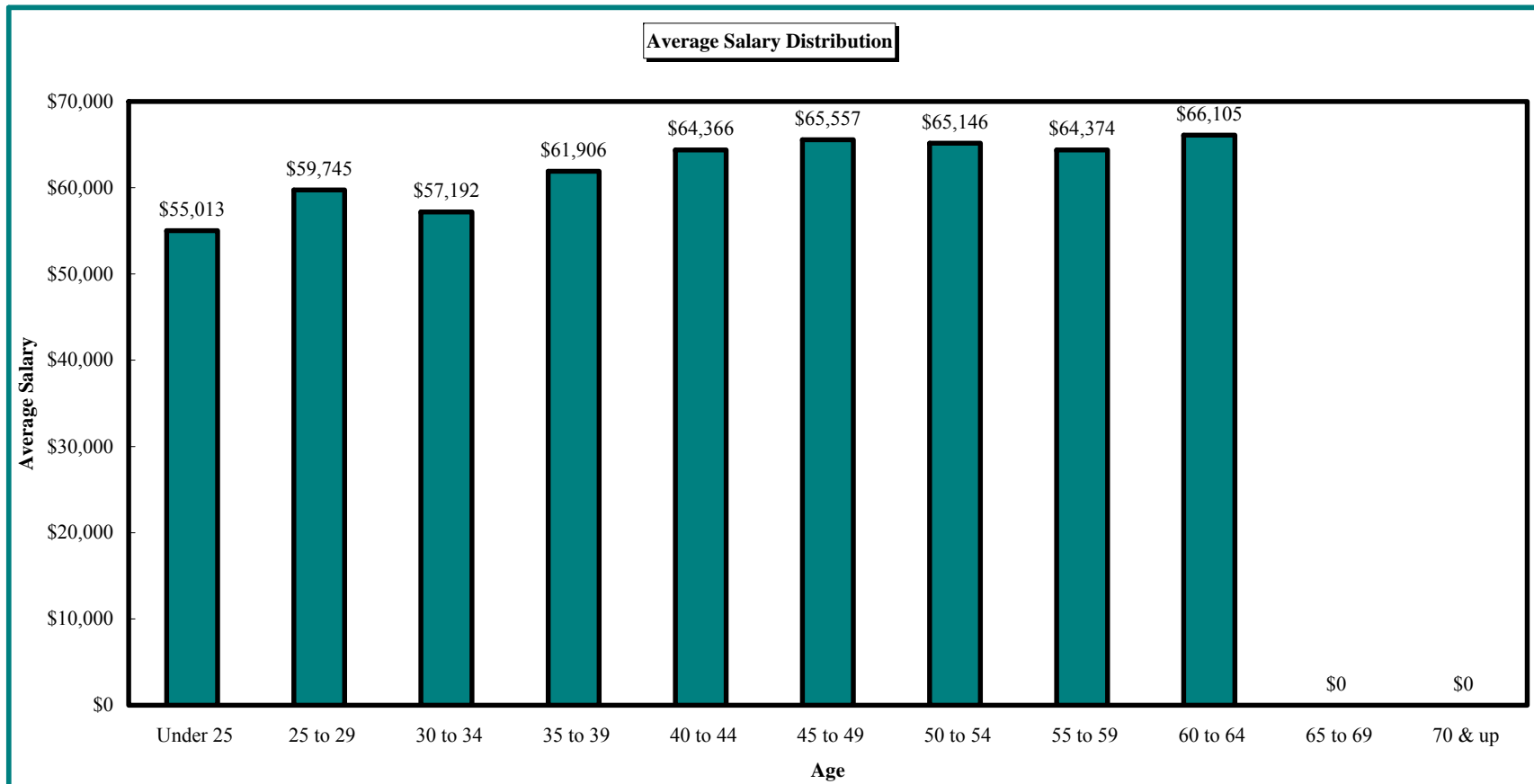
Age	Service										Total
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	
Under 25	\$55,013	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$55,013
25 to 29	\$57,667	\$59,313	\$72,374	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$59,745
30 to 34	\$55,970	\$52,458	\$60,439	\$63,684	\$0	\$0	\$0	\$0	\$0	\$0	\$57,192
35 to 39	\$53,023	\$59,509	\$62,181	\$64,682	\$0	\$0	\$0	\$0	\$0	\$0	\$61,906
40 to 44	\$55,194	\$63,804	\$57,586	\$65,511	\$67,548	\$68,142	\$0	\$0	\$0	\$0	\$64,366
45 to 49	\$0	\$54,992	\$57,793	\$59,252	\$68,122	\$76,645	\$99,013	\$0	\$0	\$0	\$65,557
50 to 54	\$0	\$53,857	\$57,879	\$59,663	\$66,165	\$68,905	\$79,077	\$0	\$0	\$0	\$65,146
55 to 59	\$0	\$54,747	\$60,439	\$67,046	\$63,323	\$60,331	\$87,646	\$74,690	\$0	\$0	\$64,374
60 to 64	\$0	\$0	\$0	\$0	\$61,063	\$0	\$76,190	\$0	\$0	\$0	\$66,105
65 to 69	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
70 & up	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$55,679</b>	<b>\$56,877</b>	<b>\$60,144</b>	<b>\$63,270</b>	<b>\$67,056</b>	<b>\$71,333</b>	<b>\$83,347</b>	<b>\$74,690</b>	<b>\$0</b>	<b>\$0</b>	<b>\$62,860</b>

The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

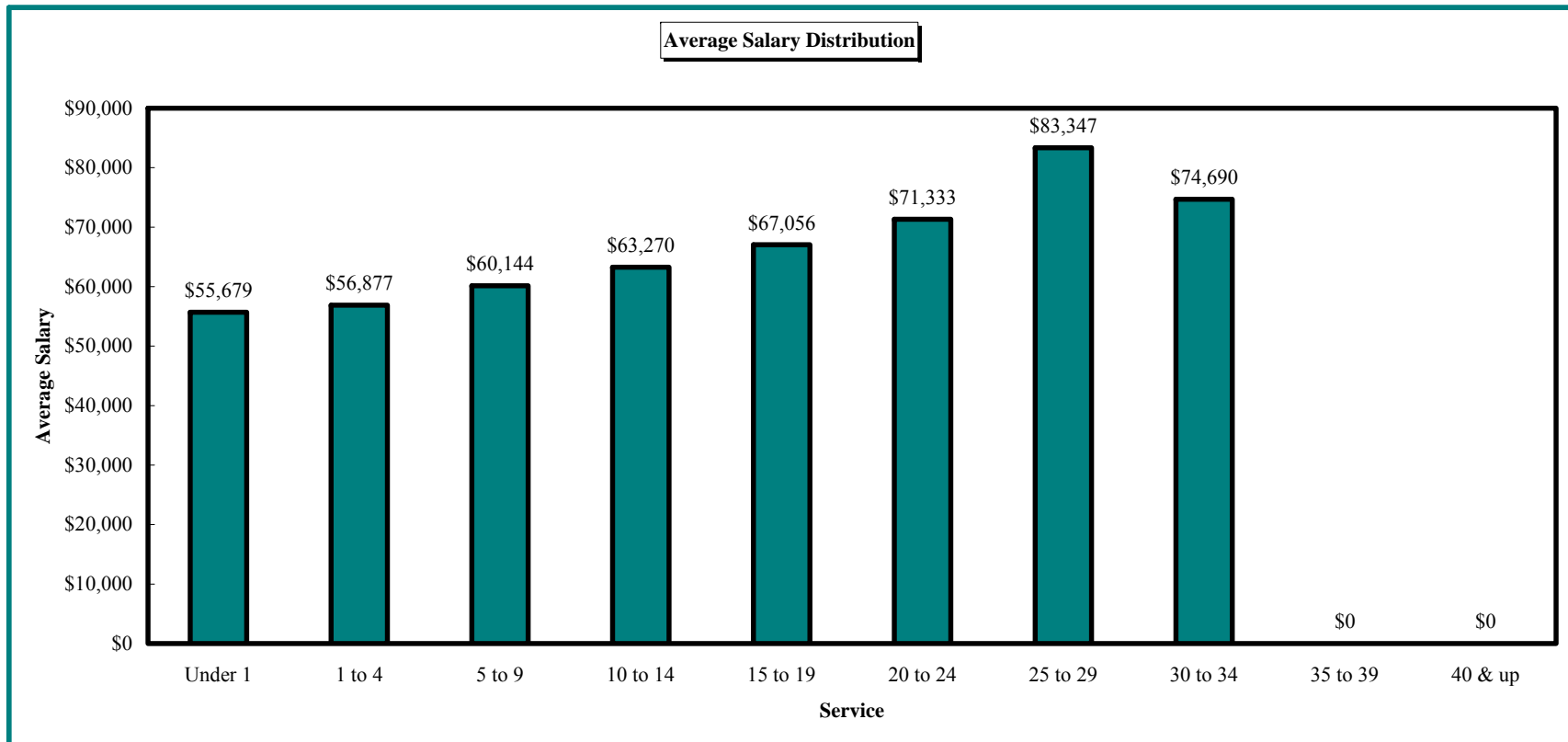
Montana Highway Patrol Officers' Retirement System Distribution of  
Active Members by Age as of June 30, 2012



MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of  
Active Members by Service as of June 30, 2012



**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX A  
MEMBERSHIP INFORMATION**

**Montana Highway Patrol Officers' Retirement System Distribution of Retired  
Members, Survivors, and Disabled Members as of June 30, 2012**

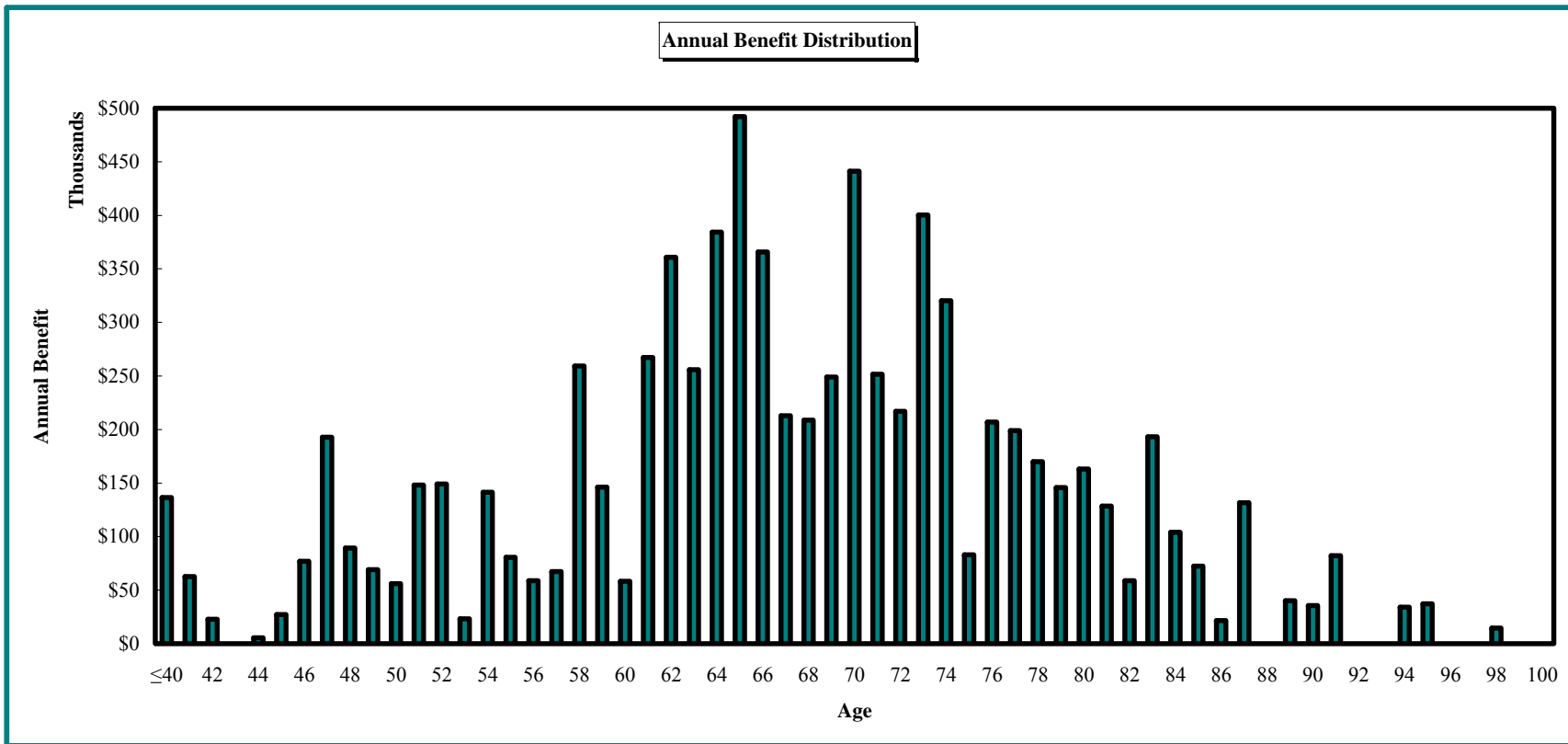
Age	Count	Annual Benefit	Age	Count	Annual Benefit
<25	4	\$44,120	73	13	\$400,252
25	0	\$0	74	12	\$320,323
26	0	\$0	75	3	\$82,961
27	0	\$0	76	9	\$207,052
28	0	\$0	77	9	\$198,934
29	0	\$0	78	8	\$170,064
30	0	\$0	79	7	\$145,909
31	0	\$0	80	8	\$163,173
32	0	\$0	81	6	\$128,546
33	1	\$23,651	82	4	\$58,870
34	1	\$22,582	83	7	\$193,180
35	0	\$0	84	3	\$104,015
36	0	\$0	85	3	\$72,514
37	1	\$23,696	86	1	\$21,611
38	0	\$0	87	6	\$131,528
39	1	\$22,474	88	0	\$0
40	0	\$0	89	2	\$40,029
41	3	\$62,737	90	2	\$35,613
42	1	\$22,710	91	4	\$82,245
43	0	\$0	92	0	\$0
44	1	\$5,461	93	0	\$0
45	1	\$27,229	94	2	\$34,133
46	3	\$76,888	95	2	\$37,237
47	6	\$192,839	96	0	\$0
48	4	\$89,343	97	0	\$0
49	4	\$69,111	98	1	\$14,588
50	2	\$56,040	99	0	\$0
51	4	\$148,091	100	0	\$0
52	7	\$149,114	101	0	\$0
53	1	\$23,256	102	0	\$0
54	5	\$141,297	103	0	\$0
55	2	\$80,605	104	0	\$0
56	2	\$58,731	105	0	\$0
57	2	\$67,329	106	0	\$0
58	8	\$259,336	107	0	\$0
59	6	\$146,217	108	0	\$0
60	2	\$58,308	109	0	\$0
61	8	\$267,375	110	0	\$0
62	11	\$360,833	111	0	\$0
63	9	\$255,829	112	0	\$0
64	11	\$384,397	113	0	\$0
65	18	\$492,227	114	0	\$0
66	10	\$365,763	115	0	\$0
67	5	\$212,858	116	0	\$0
68	8	\$208,663	117	0	\$0
69	9	\$249,115	118	0	\$0
70	15	\$441,225	119	0	\$0
71	9	\$251,612	120	0	\$0
72	8	\$216,907			
Totals				305	\$8,220,748

The chart above reflects the counts and benefits used for valuation purposes as a result of data processing. The benefit amounts shown have been projected using a half year COLA assumption.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of Retired  
Members, Survivors, and Disabled Members as of June 30, 2012



**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX A  
MEMBERSHIP INFORMATION**

**Montana Highway Patrol Officers' Retirement System Distribution of  
Terminated Vested Members as of June 30, 2012**

Age	Count	Annual Benefit*	Account Balance*	Age	Count	Annual Benefit*	Account Balance*
<25	0	\$0	\$0	73	0	\$0	\$0
25	0	\$0	\$0	74	0	\$0	\$0
26	0	\$0	\$0	75	0	\$0	\$0
27	0	\$0	\$0	76	0	\$0	\$0
28	0	\$0	\$0	77	0	\$0	\$0
29	0	\$0	\$0	78	0	\$0	\$0
30	0	\$0	\$0	79	0	\$0	\$0
31	0	\$0	\$0	80	0	\$0	\$0
32	0	\$0	\$0	81	0	\$0	\$0
33	0	\$0	\$0	82	0	\$0	\$0
34	0	\$0	\$0	83	0	\$0	\$0
35	0	\$0	\$0	84	0	\$0	\$0
36	1	\$6,753	\$0	85	0	\$0	\$0
37	1	\$7,056	\$0	86	0	\$0	\$0
38	0	\$0	\$0	87	0	\$0	\$0
39	1	\$7,178	\$0	88	0	\$0	\$0
40	1	\$5,077	\$0	89	0	\$0	\$0
41	0	\$0	\$0	90	0	\$0	\$0
42	0	\$0	\$0	91	0	\$0	\$0
43	0	\$0	\$0	92	0	\$0	\$0
44	1	\$12,366	\$0	93	0	\$0	\$0
45	0	\$0	\$0	94	0	\$0	\$0
46	0	\$0	\$0	95	0	\$0	\$0
47	0	\$0	\$0	96	0	\$0	\$0
48	1	\$14,379	\$0	97	0	\$0	\$0
49	2	\$49,014	\$0	98	0	\$0	\$0
50	0	\$0	\$0	99	0	\$0	\$0
51	0	\$0	\$0	100	0	\$0	\$0
52	1	\$10,493	\$0	101	0	\$0	\$0
53	0	\$0	\$0	102	0	\$0	\$0
54	1	\$12,103	\$0	103	0	\$0	\$0
55	1	\$9,518	\$0	104	0	\$0	\$0
56	0	\$0	\$0	105	0	\$0	\$0
57	0	\$0	\$0	106	0	\$0	\$0
58	0	\$0	\$0	107	0	\$0	\$0
59	0	\$0	\$0	108	0	\$0	\$0
60	0	\$0	\$0	109	0	\$0	\$0
61	0	\$0	\$0	110	0	\$0	\$0
62	0	\$0	\$0	111	0	\$0	\$0
63	0	\$0	\$0	112	0	\$0	\$0
64	0	\$0	\$0	113	0	\$0	\$0
65	0	\$0	\$0	114	0	\$0	\$0
66	0	\$0	\$0	115	0	\$0	\$0
67	0	\$0	\$0	116	0	\$0	\$0
68	0	\$0	\$0	117	0	\$0	\$0
69	0	\$0	\$0	118	0	\$0	\$0
70	0	\$0	\$0	119	0	\$0	\$0
71	0	\$0	\$0	120	0	\$0	\$0
72	0	\$0	\$0				
<b>Totals</b>					11	\$133,937	\$0

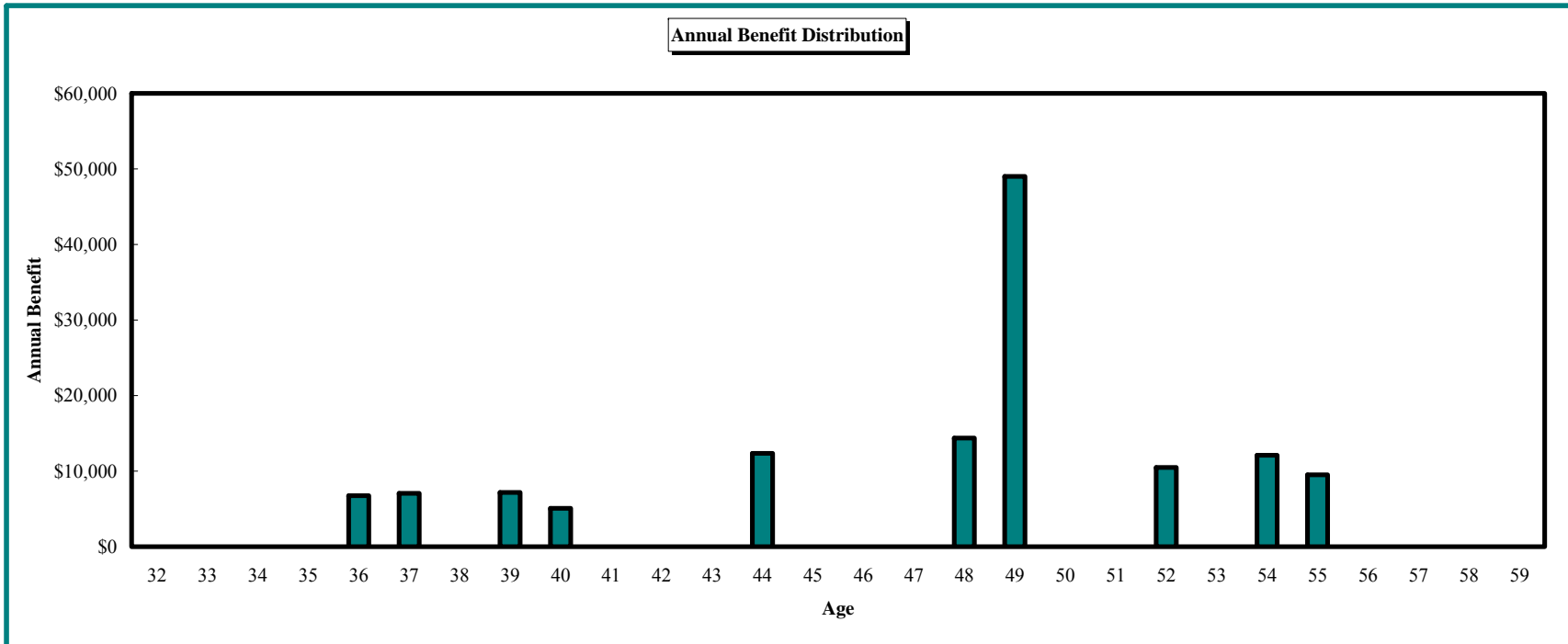
\* payable at the greater of age 60 or current age (use current age if member has 20 years of service)

The chart above reflects the counts and benefits used for valuation purposes as a result of data processing.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of  
Terminated Vested Members as of June 30, 2012





**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX A  
MEMBERSHIP INFORMATION**

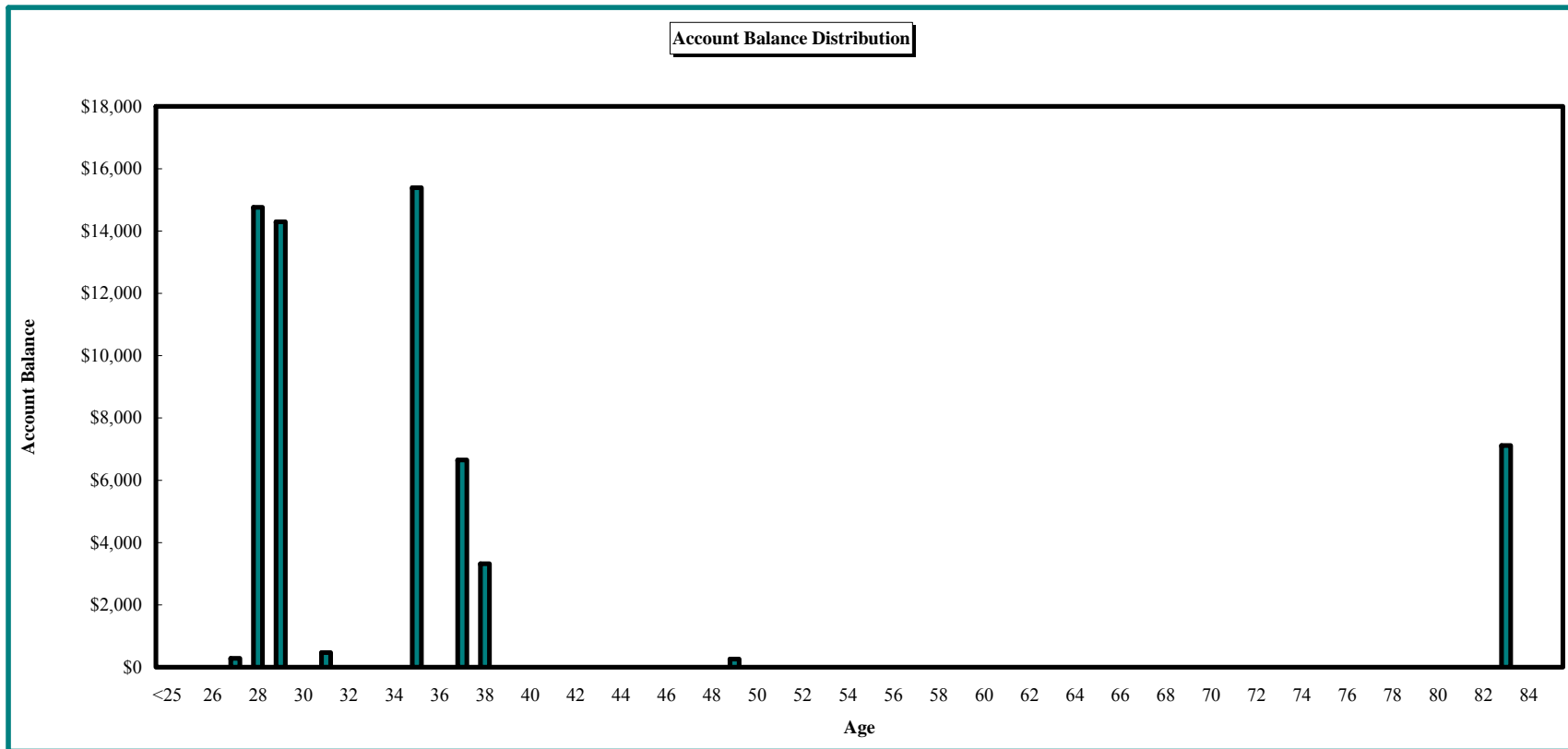
**Montana Highway Patrol Officers' Retirement System Distribution of  
Terminated Non-Vested Members as of June 30, 2012**

Age	Count	Account Balance	Age	Count	Account Balance
<25	0	\$0	73	0	\$0
25	0	\$0	74	0	\$0
26	0	\$0	75	0	\$0
27	1	\$285	76	0	\$0
28	1	\$14,761	77	0	\$0
29	1	\$14,297	78	0	\$0
30	0	\$0	79	0	\$0
31	1	\$470	80	0	\$0
32	0	\$0	81	0	\$0
33	0	\$0	82	0	\$0
34	0	\$0	83	1	\$7,118
35	1	\$15,390	84	0	\$0
36	0	\$0	85	0	\$0
37	2	\$6,653	86	0	\$0
38	1	\$3,321	87	0	\$0
39	0	\$0	88	0	\$0
40	0	\$0	89	0	\$0
41	0	\$0	90	0	\$0
42	0	\$0	91	0	\$0
43	0	\$0	92	0	\$0
44	0	\$0	93	0	\$0
45	0	\$0	94	0	\$0
46	0	\$0	95	0	\$0
47	0	\$0	96	0	\$0
48	0	\$0	97	0	\$0
49	1	\$265	98	0	\$0
50	0	\$0	99	0	\$0
51	0	\$0	100	0	\$0
52	0	\$0	101	0	\$0
53	0	\$0	102	0	\$0
54	0	\$0	103	0	\$0
55	0	\$0	104	0	\$0
56	0	\$0	105	0	\$0
57	0	\$0	106	0	\$0
58	0	\$0	107	0	\$0
59	0	\$0	108	0	\$0
60	0	\$0	109	0	\$0
61	0	\$0	110	0	\$0
62	0	\$0	111	0	\$0
63	0	\$0	112	0	\$0
64	0	\$0	113	0	\$0
65	0	\$0	114	0	\$0
66	0	\$0	115	0	\$0
67	0	\$0	116	0	\$0
68	0	\$0	117	0	\$0
69	0	\$0	118	0	\$0
70	0	\$0	119	0	\$0
71	0	\$0	120	0	\$0
72	0	\$0			
			Totals	10	\$62,561

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX A  
MEMBERSHIP INFORMATION

Montana Highway Patrol Officers' Retirement System Distribution of  
Terminated Non-Vested Members as of June 30, 2012



**APPENDIX B  
ACTUARIAL ASSUMPTIONS AND METHODS**

**A. Long-Term Assumptions Used to Determine Plan Costs and Liabilities**

**1. Demographic Assumptions**

**a. Healthy Retirees, Beneficiaries and Non-Retired Members**

Male and Female RP-2000 Combined Employee and Annuitant Mortality Tables. To reflect mortality improvements since the date of the table and to project future mortality improvements, the tables are projected to 2015 using scale AA.

<b>Sample Rates of Healthy Mortality</b>		
<b>Age</b>	<b>Male</b>	<b>Female</b>
50	0.163%	0.130%
55	0.272%	0.241%
60	0.530%	0.469%
65	1.031%	0.900%
70	1.770%	1.553%
75	3.062%	2.492%
80	5.536%	4.129%
85	9.968%	7.076%
90	17.271%	12.588%

70% of deaths from active service are assumed to be duty related.

**b. Disabled Inactive Mortality**

Male and Female RP-2000 Combined Employee and Annuitant Mortality Tables with no projections. No future mortality improvement is assumed.

<b>Sample Rates of Disabled Inactive Mortality</b>		
<b>Age</b>	<b>Male</b>	<b>Female</b>
50	0.214%	0.168%
55	0.362%	0.272%
60	0.675%	0.506%
65	1.274%	0.971%
70	2.221%	1.674%
75	3.783%	2.811%
80	6.437%	4.588%
85	11.076%	7.745%
90	18.341%	13.168%

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

**APPENDIX B  
ACTUARIAL ASSUMPTIONS AND METHODS**

**c. Rates of Active Disability**

<b>Sample Rates of Active Disability</b>	
<b>Age</b>	<b>Rate</b>
22	0.00%
27	0.10%
32	0.10%
37	0.10%
42	0.40%
47	0.40%
52	0.40%
57	0.40%
62	0.00%

75% of all disabilities are assumed to be duty related and all disabilities are assumed to be permanent and without recovery.

**d. Termination of Employment (Prior to Normal Retirement Eligibility)**

<b>Service</b>	<b>Rate</b>
0	12.0%
1 – 4	7.5%
5 – 9	5.0%
10 – 14	3.0%
15 & over	1.0%

**e. Probability of Electing a Refund of Member Contributions upon Termination**

<b>Age at Term.</b>	<b>Probability of Electing Refund</b>	
	<b>Non-Vested</b>	<b>Vested</b>
Under 35	100%	40%
35-39	100%	40%
40-44	100%	40%
45-49	100%	30%
50 & Over	100%	0%

**MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012**

**APPENDIX B  
ACTUARIAL ASSUMPTIONS AND METHODS**

**f. Retirement**

<b>Age</b>	<b>Annual Retirement Rates 20 years or more</b>
<50	12.00%
50 – 54	16.00%
55 – 59	20.00%
60 & over	100.00%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

**g. Merit/Seniority Salary Increase (in addition to across-the-board increase)**

Service based table plus an annual inflation rate of 4.00% (rates shown below exclude amount for inflation).

<b>Service</b>	<b>Annual Increase</b>
1	7.3%
2	5.6%
3	4.4%
4	3.5%
5	2.8%
6	2.2%
7	1.7%
8	1.3%
9	1.0%
10	0.7%
11-15	0.4%
16-20	0.2%
21 & over	0.0%

**h. Family Composition**

Female spouses are assumed to be three years younger than males.

100% of non-retired employees are assumed married for both male and female employees.

Actual marital characteristics are used for pensioners.

MONTANA HIGHWAY PATROL OFFICERS' RETIREMENT SYSTEM  
ACTUARIAL VALUATION AS OF JUNE 30, 2012

APPENDIX B  
ACTUARIAL ASSUMPTIONS AND METHODS

i. **Vested Benefits for Terminated Members**

Vested benefits for members who terminated during the years ending June 30, 2009 and later were estimated based upon compensation and service information in the census data. For members who terminated prior to June 30, 2008, vested benefits valued were the same as had been calculated by the prior actuary for the June 30, 2008 actuarial valuation.

2. **Economic Assumptions**

a. <b>Rate of Investment Return:</b>	7.75% (net of expenses)
b. <b>Rate of Wage Inflation:</b>	4.00%
	(3.00% inflation plus 1.00% real wage growth)
c. <b>Interest on Member Contributions:</b>	3.50%
d. <b>Rate of Increase in Total Payroll (for Amortization):</b>	4.00%

3. **Changes since Last Valuation**

None.

**APPENDIX B**  
**ACTUARIAL ASSUMPTIONS AND METHODS**

**B. Actuarial Methods**

**1. Funding Method**

The Entry Age Normal Actuarial Cost method is used to determine costs. Under this funding method, a normal cost is determined as a level percent of pay individually for each active employee.

The actuarial accrued liability is that portion of the present value of projected benefits that will not be paid by future normal costs. The difference between this liability and funds accumulated as of the same date is referred to as the unfunded actuarial liability.

The portion of the actuarial accrued liability in excess of Plan assets is amortized to develop an additional cost or savings which is added to each year's employer normal cost. Under this cost method, actuarial gains and losses are directly reflected in the size of the unfunded actuarial liability.

**2. Actuarial Value of Assets**

For purposes of determining the unfunded actuarial accrued liability, we use an actuarial value of assets. The asset adjustment method dampens the volatility in asset values that could occur because of fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process.

The actuarial value of assets is the current market value, adjusted by a four-year smoothing of gains and losses on a market value basis. Each year's gain or loss is determined as the difference between the actual market return and the expected market return using the assumed rate of investment return.

**3. Amortization Method**

The unfunded actuarial accrued liability is amortized as a level percentage of future payroll. The valuation determines the period over which the statutory contributions will fully amortize the unfunded actuarial accrued liability.

**4. Changes since Last Valuation**

None.

**APPENDIX C**  
**SUMMARY OF PLAN PROVISIONS**

**1. Membership**

The plan is a single employer defined benefit plan that covers all members of the Montana Highway Patrol including the supervisor and assistant supervisor.

**2. Contributions**

For members not covered by GABA, members contribute 9% of their compensation. For members covered by GABA, members contribute 9.05% of their compensation. Interest is credited at rates determined by the Board.

Member contributions are made through an “employer pick-up” arrangement which results in deferral of taxes on the contributions.

The Employer contributes 36.33% of each member’s compensation.

**3. Service Credit**

Service used to determine the amount of retirement benefit. One month of service credit is earned for each month where the member is paid for 160 hours. This includes certain transferred and purchased service.

**4. Membership Service**

Service used to determine eligibility for vesting, retirement, or other HPORS benefits. One month of membership service is earned for any month member contributions are made to HPORS regardless of hours worked.

**5. Highest Average Compensation (HAC)**

Highest Average Compensation (HAC) is the average of the highest 36 consecutive months (or shorter period of total service) of compensation paid to the member. Compensation is specifically defined in law.

**6. Service Retirement**

Eligibility: 20 years of membership service.

Benefit: 2.5% of highest average compensation times years of service credit.

**7. Early Retirement**

Eligibility: Age 50 with five years of membership service; if discontinued from service other than for cause.



**APPENDIX C**  
**SUMMARY OF PLAN PROVISIONS**

Benefit: Normal retirement benefit calculated using highest average compensation and service credit at early retirement, and reduced to the actuarial equivalent based on a retirement age of 60.

**8. Disability Benefit**

Eligibility: Any active member.

Benefit: (i) For duty-related disability, (a) If less than 20 years of membership service: 50% of highest average compensation (b) If 20 years or more of membership service: 2.5% of highest average compensation multiplied by years of service credit.

(ii) For regular disability, the actuarial equivalent of the normal retirement benefit based on retirement age of 60.

**9. Survivor's Benefit**

Eligibility: Active or retired member.

Benefit: For duty-related deaths, a monthly survivor benefit to the surviving spouse or dependent child equal to 50% of highest average compensation of the member.

For non-duty-related deaths, the member's spouse will receive (or, if there is no surviving spouse or after the surviving spouse dies, each dependent child for as long as they remain dependent children will equally receive) a benefit that is the actuarial equivalent of the early retirement benefit.

A beneficiary may elect to receive the payment as an annuity that is the actuarial equivalent of the amount of benefit.

For retired members without a surviving spouse or dependent child, the member's designated beneficiary will receive a payment equal to the retired member's accumulated contributions reduced by any retirement benefits already paid.

**APPENDIX C**  
**SUMMARY OF PLAN PROVISIONS**

**10. Vesting**

Eligibility: Five years of membership service.

Benefit: Accrued normal retirement benefit, payable at normal or early retirement date. In lieu of a pension, a member may receive a refund of accumulated contributions. Upon receipt of a refund of contributions a member's vested right to a monthly benefit shall be forfeited.

**11. Withdrawal of Employee Contributions**

Eligibility: Terminates service and is not eligible for other benefits.

Benefit: Accumulated member contributions. Upon receipt of a refund of contributions a member's vested right to a monthly annuity is forfeited.

**12. Form of Payment**

The retirement benefit is paid for the retired member's life. Upon the death of the retired member, the benefit is paid to the surviving spouse. If there is no surviving spouse, or after the death of a surviving spouse, benefits are paid to the dependent children, if any, for as long as they remain dependent children.

**13. Post Retirement Benefit Increases**

For retired members who became active members on or after July 1, 1997 and those who elected to be covered under this provision, and who have been retired at least 12 months, a Guaranteed Annual Benefit Adjustment (GABA) will be paid each year in January equal to 3%.

For retired members who were hired prior to July 1, 1997 and who did not elect GABA, the minimum monthly benefit is provided equal to 2% times service credit multiplied by the current base compensation of a probationary highway patrol officer. Such benefit may not exceed 60% of the current base compensation of a probationary highway patrol office and the annual increase may not exceed 5% of the current benefit.

For non-GABA members who retired prior to July 1, 1991 and meet eligibility requirements, a lump sum payment will be made each year based on the increase in the Consumer Price Index.

**14. Changes since Last Valuation**

None

**APPENDIX D  
GLOSSARY**

**1. Actuarial Assumptions**

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

**2. Actuarial Cost Method**

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a Normal Cost and an Actuarial Liability.

**3. 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.

**4. Actuarial Liability**

The portion of the Actuarial Present Value of Projected Benefits which will not be paid by future Normal Costs. It represents the value of the past Normal Costs with interest to the valuation date.

**5. Actuarial Present Value (Present Value)**

The value as of a given date of a future amount or series of payments. The Actuarial Present Value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made. As a simple example: assume you owe \$100 to a friend one year from now. Also, assume there is a 1% probability of your friend dying over the next year, in which case you won't be obligated to pay him. If the assumed investment return is 10%, the actuarial present value is as follows:

$$\begin{array}{rcccl} \text{Amount} & & \text{Probability of} & \text{1/(1+Investment} & \\ & & \text{Payment} & \text{Return)} & \\ \$100 & \times & (1 - .01) & 1/(1+.1) & = \$90 \end{array}$$

**6. Actuarial Valuation**

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

**APPENDIX D  
GLOSSARY**

**7. Actuarial Value of 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. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values. This way long-term costs are not distorted by short-term fluctuations in the market.

**8. Actuarially Equivalent**

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

**9. Amortization Payment**

The portion of the pension plan contribution which is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

**10. Entry Age Normal Actuarial Cost Method**

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages.

**11. 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.

**12. Unfunded Actuarial Liability**

The excess of the Actuarial Liability over the Actuarial Value of Assets.

**13. Projected Benefits**

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

**14. Funded Percentage**

The ratio of the Actuarial Liabilities to the Actuarial Value of Assets.

**APPENDIX D  
GLOSSARY**

**15. Mortality Table**

A set of percentages which estimate the probability of death at a particular point in time. Typically, the rates are annual and based on age and sex.

**16. Investment Return Assumption**

The assumed interest rate used for projecting dollar related values in the future.

**17. Inflation (CPI)**

The assumed increase in dollar related values in the future due to the general increase in the cost-of-living. The usual measure for inflation is the Consumer Price Index (CPI).