

**Actuarial Audit of Tacoma Employees'
Retirement System**

July 29, 2009

SUBMITTED BY:

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July 29, 2009

Jodie Trueblood
Tacoma Employees' Retirement System Board
Tacoma Public Utilities Admin Building
Ground Floor
3628 South 35th Street
Tacoma, WA 98409

RE: ACTUARIAL AUDIT OF TACOMA EMPLOYEES' RETIREMENT SYSTEM

Dear Jodie:

We have completed our actuarial audit of the January 1, 2009 valuation of the Tacoma Employees' Retirement System performed by the system's actuary (Milliman, Inc.) as requested by the Tacoma Employees' Retirement System Board. As shown in the attached findings, we have matched actuarial calculations quite closely, and have several related comments. None of the comments reflects a critical concern. Our audit finds that the actuarial calculations completed by Milliman were reasonable, consistent and accurate.

Sincerely,

A handwritten signature in black ink that reads "W B Forna".

William B. Forna, FSA, EA, MAAA
Senior Vice President
Aon Consulting, Inc.

A handwritten signature in blue ink that reads "Daniel R. McMonagle".

Daniel R. McMonagle, ASA, EA, MAAA
Assistant Vice President
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SECTION 1 – GENERAL FINDINGS

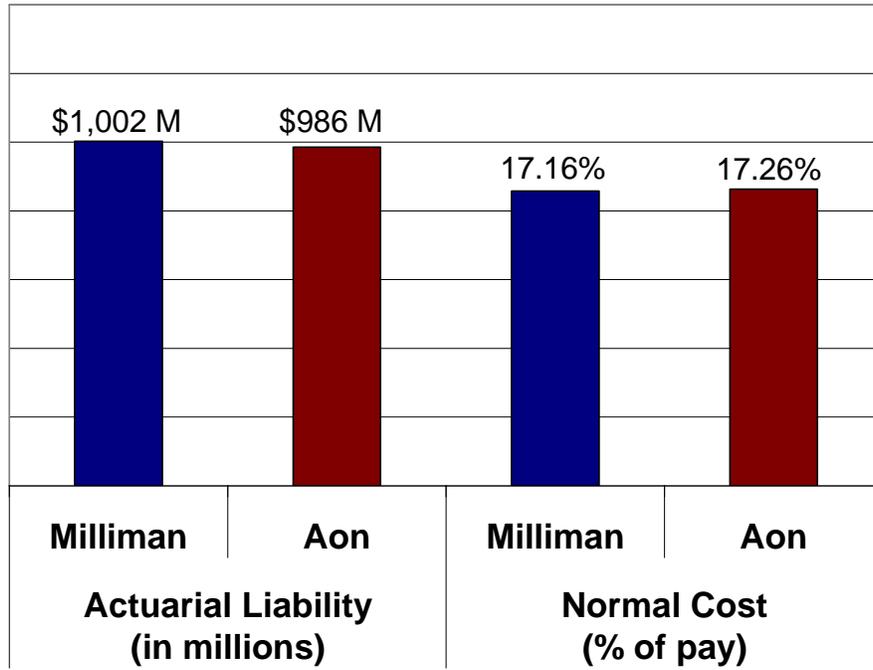
The Tacoma Employees' Retirement System Board (the Retirement Board) engaged Aon Consulting to conduct an independent audit of the January 1, 2009 valuation of the TERS plan by the system's actuary, Milliman Inc. Although the audit was not required by City statute, the Retirement Board desired the audit as a matter of due diligence in exercising their fiduciary responsibility over the plan. As part of the audit, we reviewed the reasonableness, consistency and accuracy of the methods, factors and assumptions used in the actuarial valuation, as well as the accuracy of the results of the valuation itself. In our opinion, the results of the valuation process are reasonable, consistent and accurate, as will be discussed in the following pages.

We have duplicated the actuarial valuation conducted by Milliman and the results match quite closely. The primary purpose of an actuarial audit is to confirm that there are no significant errors in the actuarial calculations. Based on our replication, we report that we have found no significant discrepancies and conclude that there are no significant errors.

The following table summarizes the actuarial liabilities and normal costs produced by Milliman and Aon actuarial valuations. Numbers below are in \$millions.

Participants	Actuarial Present Value of Future Benefits		
	Milliman	Aon	% Diff.
Active	783.9	796.0	1.5%
Inactive, retired, and beneficiaries	497.6	490.9	(1.3%)
Total	1,281.5	1,286.9	0.4%
Actuarial Liability	1,002.3	985.7	(1.7%)
Normal Cost (% pay)	17.16%	17.26%	0.6%

Actuarial Liability and Normal Cost for Current Members



SECTION 2 – AUDIT OF ACTUARIAL METHOD, FACTORS AND ASSUMPTIONS USED IN ACTUARIAL VALUATIONS

The first step in the actuarial audit process is to review the actuarial method, actuarial factors and actuarial assumptions used in the actuarial valuations.

ACTUARIAL METHOD

Milliman uses several actuarial methods in determining costs and liabilities for the Tacoma Employees' Retirement System.

- ↳ The actuarial funding method is the Entry Age Normal actuarial cost method
- ↳ The actuarial asset valuation method is a 4 year smoothed market value
- ↳ The amortization method for determining funding amounts is a level payroll, open period method
- ↳ The amortization method under Government Accounting Standards Board (GASB) reporting is a level dollar, open period

ACTUARIAL FUNDING METHOD

The Entry Age Normal actuarial cost method is used for actuarial valuations of the Tacoma Employees' Retirement System. This method is designed to maintain constant plan costs throughout each employee's career as a portion of pay. We believe this is a reasonable and appropriate method. It is the most common method used by large public pension systems such as the Tacoma Employees' Retirement System. Milliman is applying the method reasonably, consistently and accurately.

ACTUARIAL ASSET VALUATION METHOD

Milliman employs a four year smoothed market value actuarial asset valuation method. Unlike actuarial funding methods, actuarial asset valuation methods are not precisely defined. Most actuaries use what could be categorized as a "four or five year smoothed market value actuarial asset valuation method" as does Milliman, but might use quite different methods. We have reviewed the precise provisions of the method that Milliman employs and find it to be reasonable, consistently applied, and accurate.

The Milliman method is a very conventional and appropriate application of the four year smoothed method. They spread any investment gains or losses (relative to the actuarial assumption) over four years and do not apply a maximum disparity from true market value. We find their method consistent with Actuarial Standard of Practice No. 44 governing asset smoothing methods for pension valuations.

AMORTIZATION METHOD FOR DETERMINING FUNDING AMOUNTS

In addition to the Entry Age Normal actuarial cost method, Milliman and the Tacoma Employees' Retirement System use a method for amortizing components of unfunded liability. GASB

prescribes that the amortization of the total unfunded liability be not less than the amount that would be calculated using a thirty year amortization as a level % of payroll.

The Tacoma method is considered an open period method, meaning that each year's unplanned increase or decrease in the actuarial unfunded liability is not amortized over a new period, but aggregated with prior gains and losses and amortized over a thirty year period. Because the plan is technically funded at more than 100% (on an actuarial value of asset basis), this issue is less important than it will be shortly when the asset losses cause the plan to have an unfunded actuarial accrued liability. A closed period approach tends to be more conservative than an open period approach for an underfunded plan.

We find the funding policy rigorously formulated, which will be helpful as the plan becomes less than 100% funded.

AMORTIZATION METHOD FOR GASB DETERMINATIONS

The Government Accounting Standards Board (GASB) has very specific requirements for its amortization method. For a closed plan, the total amortization payment must be sufficient to fully amortize the total unfunded liability over a period of no more than 30 years. Milliman uses the methods discussed in the prior section, which satisfies the GASB requirements. The Milliman calculations are reasonable, consistent and accurate.

ACTUARIAL ASSUMPTIONS

We have reviewed the actuarial assumptions used by the actuary and find them to be reasonable, consistent, and accurate.

The actuary uses a large number of actuarial assumptions, including:

- ↳ Demographic Assumptions
 - Mortality During Active Service
 - Mortality After Retirement
 - Mortality After Disability Retirement
 - Withdrawal From Service Before Retirement
 - Retirement
 - Disability Retirement
 - Withdrawal of Contributions at Termination
 - Other Demographic Assumptions
- ↳ Economic Assumptions
 - Investment Return Rate
 - Inflation
 - Individual Salary Increases

- Payroll Growth

DEMOGRAPHIC ASSUMPTIONS

MORTALITY DURING ACTIVE SERVICE

We concur that the mortality tables used by Milliman are reasonable, consistent and accurate.

MORTALITY AFTER RETIREMENT

We find the assumptions used by Milliman to be reasonable, consistent and accurate, but we question the utility of conducting mortality studies as frequently as every four years. This is particularly true now that Milliman is using a generational mortality table. By using a generational table, it might never be necessary to change the table and it is less risky to analyze experience less frequently. In addition, the size of the Tacoma Employees' Retirement System is not large, so that the use of this standardized generational national mortality table is very appropriate.

MORTALITY AFTER DISABILITY RETIREMENT

We concur that the mortality tables used by Milliman are reasonable, consistent and accurate.

WITHDRAWAL FROM SERVICE BEFORE RETIREMENT

We concur that the withdrawal tables used by Milliman are reasonable, consistent and accurate. Milliman uses a table based on service. We find that this is a sound methodology because individuals do have higher likelihood of termination during their first few years of employment than later in their career.

RETIREMENT

We concur that the retirement tables used by Milliman are reasonable, consistent and accurate. Milliman uses different retirement tables based on whether the members are eligible for an unreduced retirement benefit. This is a sound method because individuals often are reluctant to retire if the benefit is subject to a reduction for early retirement.

DISABILITY RETIREMENT

We concur that the disability tables used by Milliman are reasonable, consistent and accurate.

WITHDRAWAL OF CONTRIBUTIONS AT TERMINATION

We concur that the assumptions for withdrawal of contributions at termination used by Milliman are reasonable, consistent and accurate.

OTHER DEMOGRAPHIC ASSUMPTIONS

We concur that the other demographic assumptions used by Milliman are reasonable, consistent and accurate.

These assumptions include:

- ↳ Marriage Rates
- ↳ Age Difference Between Husbands and Wives
- ↳ Number of Dependent Children
- ↳ Part Time Service Earned During the Year
- ↳ Occupational versus Non-occupational Death and Disability

ECONOMIC ASSUMPTIONS

INVESTMENT RETURN RATE

Milliman uses a 7.75% investment return rate. This assumption is lower than that used by most systems (8.0%). According to 2007 Public Funds Survey, the median assumption for large primarily state systems is 8.00%. This conservatism gives TERS additional credibility.

We concur that the investment return assumptions used by Milliman are reasonable, consistent and accurate.

INFLATION

Milliman uses a 3.25% assumed rate of inflation. This is considerably higher than the inflation rate forecast by most economists and the implicit rate based on the yield on inflation-indexed treasury bonds. As of January, 2009, yields on 20-year treasury bonds have fallen to 3.65%, although during 2008, the yield was generally in the 4.0% to 4.5% rate. Yields on 20-year inflation-indexed bonds are now 2.57%, meaning that the implicit 20-year inflation rate is only 1.08%! This is much lower than a year ago, but the TIPS/treasury spread has been predicting long-term inflation under 3% for several years now. Balancing this is the fact that the 3.25% rate is consistent with the median rate used by public funds according to the 2007 public fund survey.

If the inflation assumption was to decrease by 25 basis points, for example, from 3.25% to 3.00%, the investment return rate and salary growth rates would all decrease by 0.25%. The investment return rate would then be cited as 7.50%, which appears even more conservative than peers. Of course, overall costs and liabilities would increase as a result of this change.

We concur that the inflation rate used by Milliman is reasonable, consistent and accurate.

INDIVIDUAL SALARY INCREASES AND PAYROLL GROWTH

Milliman assumed a payroll growth rate of 4.25%, which combined with an inflation assumption of 3.25% results in a real payroll growth rate assumption of 1.0%. We concur that the payroll growth and individual salary increase assumptions used by Milliman are reasonable, consistent and accurate.

SECTION 3 – AUDIT OF ACTUARIAL VALUATION

The cornerstone of an actuarial audit is a replication of the actuarial valuation. As mentioned above, we matched quite closely the costs and liabilities developed by Milliman for the retirement system. Consequently, we conclude that the valuation results are reasonable, accurate and consistent.

The grand total present value of future benefits calculated by Aon was within 0.4% of the same calculated by Milliman. The total normal cost calculated by Aon was within 1.6% of that calculated by Milliman. Actuaries generally use a 5% deviation as an acceptable range of error. Because our deviation was well within this “margin of error”, we are quite satisfied that numbers are appropriate.

In the appendix, a comparison of liabilities for sample participants shows some areas or decrements where our numbers did not match as closely. It is as likely that the figures we have calculated are off as that the Milliman numbers were off. Because each of these was a small subset of the total and not material in the grand scheme of things, no attempt was made to reconcile the small (in total dollar) differences.

For example, the one area where we differed the most from Milliman was the survivor’s benefits actuarial present value. The liability which we measured was \$31.2 million, while Milliman calculated \$35.6 million. This is nearly a 12% difference, a number which would seem troublesome. But because the difference is only \$4.4 million in a system with \$1,281.5 million, the \$4.4 million deviation only represents 0.34% of the total. Consequently, the importance of drilling down on the difference is questionable.

However, if there is a desire to review further, we can provide Milliman with more of our data for comparison. Again, we do not believe it is in the best interest of the Tacoma Employees’ Retirement System to hire actuaries to analyze potential discrepancies of 0.34%. Such a value is dwarfed by more significant assumptions, methods and processes which the systems and actuaries make routinely. As a simple example, liabilities are measured using an assumed rate of investment return of 7.75%. If for some reason, the actuary were to have chosen 7.76% instead, that difference would be about the same as the \$4.4 million difference discussed above.

There are several other minor benefits where our numbers differed from Milliman’s, but due to the small size of the benefit, we did not attempt to resolve the differences. All in all, we were impressed by the detail and accuracy of the Milliman actuarial valuation results.

COMPARISON OF LIABILITY BY PARTICIPANT STATUS

PRESENT VALUE OF BENEFITS FOR ACTIVE PARTICIPANTS BY DECREMENT CATEGORY

The following table compares the breakdown of present value of benefits broken down by decrement category for active participants. While there are differences in the break down by

category due to system differences (primarily between the retirement and vested termination decrements), the total present value of benefits is very similar under the two systems.

ACTUARIAL PRESENT VALUE OF BENEFITS			
Active Participants	Global (in Millions)		% Difference
	Milliman	Aon	
Retirement	714.0	730.1	2%
Termination	44.4	38.5	-13%
Disability	4.9	4.8	-2%
Death	<u>20.6</u>	<u>22.6</u>	10%
	783.9	796.0	2%

PRESENT VALUE OF BENEFITS FOR INACTIVE PARTICIPANTS BY STATUS

The following table compares the liability by type of inactive participant.

Inactive Participants	Milliman	Aon	% Difference
Retirees	398.8	400.1	0%
Disabled	4.1	4.1	0%
Beneficiary	35.6	31.2	-12%
Terminated Vested	<u>59.1</u>	<u>55.5</u>	-6%
	497.6	490.9	-1%

SECTION 4 – OTHER CONSIDERATIONS

We found Milliman’s work to be strong. It was reasonable, consistent and accurate. The following observations represent our thoughts on the strengths of the Milliman work as well as some items related to timing that could be done differently.

TIMING OF VALUATIONS

The Tacoma Employees’ Retirement System currently engages Milliman to perform a full valuation every other year with experience studies in the off years. The experience studies alternate between a mortality study and a study of other decrements, so that all decrement assumptions are reviewed once every four years. This methodology is not common for systems the size of the Tacoma Employees’ Retirement System.

The advantage of having regular experience studies is that it allows the actuary to keep the actuarial assumptions as close to real experience as possible. However, it could be argued that for a group the size of the City of Tacoma, the underlying data is insufficient to be considered credible and warrant a full review of experience every four years, particularly when it comes to mortality experience. TERS may be better served by performing a full valuation every year in order to keep a closer tab on liability swings while performing experience studies less frequently.

FORECASTING TOOLS

“ADVANCE WARNING LETTER”

In the off-valuation years, Milliman sends the system an “Advance Warning Letter” that looks at economic trends and gives TERS a mini-forecast of where the valuation is likely to be in the ensuing year. This letter is a great example of forward thinking that enables TERS to plan for the future and stay “ahead of the curve”. In the absence of a full valuation every year, the Advance Warning Letter is an excellent tool to keep TERS apprised of the plan’s current status.

COST PROJECTIONS

In the valuation report, Milliman shows three (3) sets of projections to illustrate the effect of asset returns on plan costs over time. The three projections illustrate the effect of 7.75% returns for all years (i.e., meeting valuation assumptions) as well as illustrating a one-year loss of 10% vs. a one-year gain of 25% followed by 7.75% in future years. These projections are another item that enables TERS to keep an eye on future trends for the plan. Projections like this are not typically included with many valuations of similar sized plans, and we applaud Milliman and TERS for recognizing the value of including the projections in the valuation report.

The one suggestion we have regarding the projections is that it may benefit TERS to look at additional scenarios, probably as a separate project from the valuation. Some items that TERS may wish to consider as alternative scenarios to review include:

- ↳ Historic returns on plan assets. Actual returns and the magnitude of year to year changes can be incorporated in designing projection scenarios.
- ↳ Alternative discount rates. Although the current 7.75% assumption is conservative compared to other public plans, TERS may want to review the impact on costs if a change in discount assumption is made, particularly if asset classes are adjusted in order to minimize impact of future economic turbulence.
- ↳ Long-term effect of difference between discount assumption and actual returns, for example a 20-year projection that assumes assets return 2% greater than the discount rate and/or 2% less than the discount rate. These projections highlight the effect of the asset-smoothing method on valuation results when markets are positive or negative, as the actuarial value will tend to lag behind market value.
- ↳ Stochastic projections. Many software programs allow for the use of stochastic variables that show a range of possible valuation outcomes rather than a single outcome per year as shown in the static projections in the report. While the resulting graphs from stochastic projections may appear confusing (some describe them as a “jumble of lines”), they illustrate the most likely outcomes as well as the best-case and worst-case scenarios based on assumptions given.

FINAL THOUGHTS

As mentioned when we met with the Retirement Board when Milliman presented the actuarial report on July 16th, the advance planning done by the Board in working with Milliman is an excellent example of how plan sponsors can do things right. Although the current economic storm is impacting the Tacoma Employees' Retirement System, the City is in a better position than the majority of public plan sponsors due to the advance planning and forethought exhibited by the Board in working with Milliman.

We would also like to mention that, in performing this audit, we found Milliman's staff to be fully cooperative and transparent, which eased in the process. As a final conclusion, we wish to reiterate that the work done by Milliman on the January 1, 2009 valuation was reasonable, consistent and accurate.

APPENDIX – REVIEW OF SAMPLE LIVES

The following tables illustrate the differences in liability between sample lives under the Milliman valuation system and Aon’s valuation system. Note that all differences are reasonable and/or explainable.

TABLE 1 – COMPARISON OF ACTIVE SAMPLE LIABILITIES

The following table compares the liability for sample active participants with the liability broken into different sources – retirement, withdrawal, disability and death. Note that while liability amounts vary within the decrement categories due to system differences, the difference in total liability is within a reasonable margin of difference.

COMPARISON OF TEST LIVES			
LIABILITY FOR ACTIVES BY DECREMENT CATEGORY			
	<u>Milliman</u>	<u>Aon</u>	<u>% Difference</u>
Female 1			
Retirement *	136,848	145,206	6%
Withdrawal *	18,357	17,309	-6%
Disability	2,004	1,970	-2%
Death	<u>2,766</u>	<u>2,914</u>	5%
Total PVB	159,975	167,399	5%
Accrued Liability	74,988	79,080	5%
* Difference caused by 1-year difference between retirement and withdrawal eligibility (system rounding differences)			
Female 2			
Retirement	210,883	215,629	2%
Withdrawal	0	0	0%
Disability	784	740	-6%
Death **	<u>3,842</u>	<u>3,168</u>	-18%
Total PVB	215,509	219,537	2%
Accrued Liability	159,572	163,437	2%
** Slight difference in mortality rate at younger age			
Male 1			
Retirement ***	167,148	190,463	14%
Withdrawal ***	17,591	24,001	36%
Disability	2,865	3,015	5%
Death	<u>3,687</u>	<u>4,872</u>	32%
Total PVB	191,291	222,351	16%
Accrued Liability	24,651	24,802	1%
*** System differences in rounding of entry age leads to different timing on decrements and increased liability			

TABLE 2 – COMPARISON OF INACTIVE SAMPLE LIABILITIES

The following table compares the liability for sample inactive participants of different status.

INACTIVE TEST LIVES			
	<u>Milliman</u>	<u>Aon</u>	<u>% Difference</u>
Retiree	334,306	328,857	-2%
Beneficiary	129,909	127,892	-2%
Beneficiary #2	83,510	80,105	-4%
Disabled	163,673	164,080	0%
Vested Termination *	33,790	41,687	23%
Vested Termination #2	96,713	97,018	0%

* Difference caused by age difference: age 44 in Milliman data vs. age 46 in Aon.
Correcting data discrepancy would reduce or eliminate difference in liability.