MERCER OLIVER WYMAN

Actuarial Valuation of Outstanding Benefit Costs Heart Disease, Lung Disease, and Hepatitis Claims as of June 30, 2004

City of Las Vegas

April 2005

CONTENTS

INTRODUCTION

Our Understanding of the Situation

Mercer Oliver Wyman Actuarial Consulting, Inc. (Mercer) has been engaged by the City of Las Vegas (the "City") to provide actuarial consulting services to the following municipal entities in the State of Nevada (hereafter referred to as "the Cities"):

- Las Vegas
- North Las Vegas
- Henderson
- Reno
- Sparks
- Las Vegas Metropolitan Police Department (hereafter referred to as "Metro Police")

The Cities require an actuarial estimate of their liability for the outstanding (unpaid) cost of indemnity (wage replacement) benefits and medical benefits for disability of public safety employees who develop heart disease, lung disease or hepatitis (HLH). The liability is the sum of two components:

- The outstanding benefit costs due to reported claims for which the Cities are currently paying benefits; and
- The outstanding benefit costs for future claims expected to be reported by the Cities' current population of active and retired public safety employees who meet eligibility requirements for awards under Nevada statutes.

The Cities require that this estimate represent the low-end of a reasonable range of possible results.

The specific statutes governing the award of benefits are:

NRS 617.457 Heart diseases as occupational diseases of firemen and police officers.

NRS 617.455 Lung diseases as occupational diseases of firemen and police officers.

NRS 617.485 Hepatitis as occupational disease of police officer, fireman or emergency medical attendant.

Hereafter, the statutes cited above will be referred to as the "HLH Statutes."

This is our report to the City of Las Vegas, hereafter referred to as "Las Vegas."

Considerations and Background

General Approach

At the outset of this assignment, the Cities and Mercer discussed different approaches to the project. Agreement was reached that the approach and goal of the study should be to produce a "low end" estimate of the outstanding benefit costs due to claims filed under the HLH Statutes. As such, actuarial judgments and assumptions in this study were made in the context of this agreement. A detailed discussion of this aspect of the study is included in the sections on considerations and methodology.

It is imperative that readers of this study understand that the results and observations presented in this report reflect the low end of a reasonable range of results (unless otherwise indicated), and that the potential for actual results to exceed the published results of this study is greater than 50%[1], perhaps significantly so.

Numerous considerations apply to the results of this study. These considerations are discussed in detail later in this report.

Components of Outstanding Benefit Costs

There are two general components of the outstanding benefit costs payable under the HLH Statutes: Outstanding Cost due to Reported Claims and Outstanding Cost due to Unreported Claims.

Outstanding Cost due to Reported Claims: The unpaid cost of HLH claims that have been reported to the Cities. The outstanding cost of reported claims is composed of two elements:

> *Case Reserves*: Case reserves are established individually for each claim. For each claim, the case reserve is the claims administrator's best estimate of outstanding cost based on the information available to the administrator at the time the case reserve is either established or adjusted. Case reserves may reflect the impact of excess insurance protection.[2,3]

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[1] The "average" or "mean" estimate is toward the center of a range of reasonable estimates, with roughly a 50% probability that actual results will be greater, and a 50% probability that actual results will be lower. The high end of a range of reasonable estimates has a lower probability that actual results will be greater because it is greater than the average estimate, whereas the low end the range has a higher probability that results will be greater, because it is lower than the average estimate. As stated in the text, the results presented in this report represent the low end of a reasonable range of estimates. Therefore, the probability that actual cost will be greater than the results of this study are greater than 50%.

[2] For example, assume the retention under an excess insurance policy is $1,000,000, and $400,000 has been paid to date on a specific claim. Even if the claims administrator expects an additional $850,000 to be paid on this specific claim before it is closed (total claim cost of $1,250,000 = $400,000 + $850,000), the posted reserve will be limited to $600,000, because that is the most that could be paid on this claim before excess insurance protection begins. Excess insurance will fund the remaining $250,000 of unpaid cost.

IBNR[4] Costs due to Reported Claims: As claims age into their life cycles, more information becomes available to the administrator regarding the expected future outcome of individual cases, and case reserves are adjusted accordingly. Inevitably, as claims age, costs will increase. This is not necessarily because the claims administrator is reserving inadequately, though this occasionally may be an issue. Usually, growth in expected cost on individual cases is due to case deterioration, which can only be reflected in case reserves after the fact, that is only after the additional information has become available. For example, claims initially expected to be medical only or permanent partial disabilities evolve into permanent partial or permanent total disabilities. Claims that may have been slated to settle for lower amounts deteriorate, and higher settlements are necessary. Most importantly, as respects claims filed under the HLH statutes, estimates of future medical costs are especially uncertain. For a case with lifetime medical exposure, it is possible to reserve for the future cost of annual, repetitive, medical services. But the claims administrator cannot know that a specific claimant will need heart surgery in three years, and therefore cannot reserve for that additional cost. Furthermore, claims administrators typically do not provide for the impact of inflation on medical costs in case reserves. This is usual industry practice. As such, reserves for the future cost of annual, repetitive, medical services, even if based on life expectancy, are generally inadequate because of the impact of medical inflation on costs.[5]

For the purpose of this report, we have accepted case reserves established by the Cities as the estimates of outstanding costs for reported claims, and have assumed IBNR for reported claims to be zero. This is an extremely optimistic assumption, given that case development is expected and is the industry norm.

<u>Outstanding Costs due to Unreported Claims</u>: The expected cost of HLH claims that have **not** been reported to the Cities. These are claims that are expected to be reported over the next 50 years by the *current* population of active employees and retired employees eligible for benefits under the HLH Statutes. This study does not address HLH claims that may be filed by future public safety employees that currently are not active employees, but will enter the active workforce in the future.

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[3] We have assumed, based on information provided by the Cities, as well as our review of data, that case reserves on HLH claims reflect the impact of applicable excess insurance protection.

[4] Incurred But Not Reported.

[5] The impact of unforeseeable medical costs not contemplated in case reserves is significant. Based on countrywide insurance industry workers compensation data, for groups of claims that are 8 years old, there is $2.63 in unreported medical costs for every dollar of medical costs in case reserves. The implication is that for a claim that is 8 years old with $50,000 in case reserves for medical costs, actual medical costs, on average, may be expected to be $181,000. For comparison purposes, the comparable number for indemnity benefits is $0.35, so for the same claim with $50,000 in case reserves for indemnity costs, actual indemnity costs, on average, may be expected to be $67,500. This example does not factor in the impact of unreported claims. However, after 8 years, the impact of unreported claims for typical workers compensation exposures is not expected to be material.

Historical Insurance Program

Currently, all the Cities are self-insured for their workers compensation exposure, including exposure under the HLH Statutes. Prior to becoming self-insured, each city purchased insurance from either the State Industrial Insurance System (SIIS), or the Employers Insurance Company of Nevada (EICN).[6] The dates when each city became self-insured follow:

City	Effective Date of Self-Insurance
Las Vegas	January 1, 1986
North Las Vegas	January 1, 1994
Henderson	April 1, 1993
Reno	September 1, 1992
Sparks	February 1, 1993
Metro Police	January 1, 1993

Under self-insurance, the Cities have maintained individual excess insurance programs that provide insurance coverage for costs above specified amounts on a per claim basis. These amounts, generally referred to as retentions, are analogous to a deductible applied on a per claim[7] basis. For example, if the retention is $1,000,000 for a particular policy with an individual City, then that City is responsible for the first $1.0 million of claim costs on every claim. The insurance company providing the excess insurance coverage will reimburse the City for claim payments above $1.0 million.

Our understanding is that the excess insurance programs for the Cities have varied over time and, that for more recent program years, retentions, or the amount of each claim a City must pay before excess insurance protection begins, have increased dramatically. For example, Las Vegas currently retains $4,000,000 per claim.

For the purpose of this study, we have assumed that the effect of historical excess insurance protection is reflected in case reserves established by the Cities for reported claims. This is based on information provided by the Cities. We have also assumed that excess insurance programs will not materially impact unreported claims. This assumption is consistent with current insurance market conditions which demand relatively high retentions. This is also

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[6] SIIS was replaced by EICN effective January 1, 2000.

[7] In this context, the term "claim" usually refers to all individual claims filed due to injuries that result from a single incident (occurrence or accident). The specified retention would be applied only once to the combined cost for all claims due to a single incident, not individually to each claim. For example, in the event of a scaffolding collapse that results in injuries to five municipal employees and subsequently five individual claims, the scaffolding collapse would be considered as a single incident. A City would be responsible for the combined cost on all five claims up to the stated retention. The retention would generally not be applied to each of the five claims individually. The exact application of the specified retention will depend on the contractual terms in the applicable excess insurance policy.

consistent with our overall approach to produce a low end estimate of the outstanding costs of benefits under the HLH Statutes.[8]

We have also assumed that the "trigger date" of insurance protection on HLH claims is the last date of injurious exposure, e.g., the last day worked. This is significant in that the cost of HLH claims filed by inactive employees whose last day worked was prior to the effective date of self insurance will be funded through insurance policies purchased through SIIS-EICN. This assumption is based on discussions with the Cities. The impact of this assumption, as respects the results of this study, is somewhat minimized because we assume that the most costly HLH claims, PTD claims, will be filed by active employees only.

Claim Types

This study addresses the component of the outstanding cost of indemnity and medical benefits payable under the HLH Statutes (NRS 617.455, NRS 617.457, and NRS 617.485). Claims filed under other statutes, including cancer claims, are not addressed by this study. We note that no PTD cases were identified as being cancer cases, and one non-PTD case was identified as being a cancer case. The study provides estimates separately for claims awarded permanent total disability benefits (PTD claims) and all other claims (non-PTD claims). Non-PTD claims are composed of claims that have not been awarded permanent disability benefits and claims that have been awarded permanent partial disability benefits. The indemnity and medical components of each claim type are estimated individually.

Claim Adjustment and Administrative Expenses

The results of this study provide only for the cost of indemnity and medical benefits for HLH claims. The results of this study do not include provisions for expected future allocated loss adjustment expense (ALAE) and program administrative expenses. ALAE is composed of expenses other than benefit costs that may be are attributed to individual claims and includes primarily the cost of defense and investigation. Program administrative expenses consist of salaries, office space, information technology, and other overhead costs. Our understanding is that the Cities do not reserve for either expense. Nevertheless, it is important to note that these expenses are not insignificant. We do not have any data from which to estimate defense and investigation costs for claims filed under HLH Statutes. However, typical ratios of defense and investigation costs to benefit costs for workers compensation claims are 6% to 8%. Program administrative expenses have been conservatively estimated to be $800 per PTD claim per year by the City of Las Vegas.[9] This is roughly 2% of the annual benefit costs for a typical PTD claim.

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[8] Retentions available for excess insurance protection vary with insurance market conditions, but are generally established at levels materially above expected claim costs, that is, towards the high end of the range of expected claim costs. As such, given that the estimates calculated in this study are at the low end of a reasonable range of results, it is reasonable to assume that the impact of excess reinsurance will be minimal.

[9] $25,000 (25% of the cost of the annual cost of salary, benefits for one administrative assistant), as per the City of Las Vegas, for maintaining 32 PTD claims. Note that this does not include the cost of other overhead expenses.

Other Considerations

This study addresses only the outstanding cost of indemnity and medical benefits for HLH claims. No other expenses are considered, as discussed above. For the purpose of this report, the terms "outstanding liabilities," "outstanding cost," and "outstanding benefit costs" are synonymous and refer to the unpaid costs of indemnity and medical benefits of reported and unreported HLH claims, as discussed previously.

The results of this study implicitly include the impact of future excess of loss protection, which is expected to be minimal in the context of this report. All results published in this study are therefore assumed to be on a retained basis, that is, represent the portion of the outstanding benefit costs for HLH claims that the Cities will fund. Therefore, for the purpose of this report, the terms "outstanding liabilities," "outstanding cost," and "outstanding benefit costs" implicitly mean "outstanding retained liabilities," "outstanding retained cost," and "outstanding costs of indemnity and medical benefits," respectively.

PRESENTATION OF RESULTS

Outstanding Benefit Costs as of June 30, 2004

Table 1A (below) displays, Mercer's estimates of Las Vegas' outstanding benefit costs for HLH claims as of June 30, 2004. Estimates are provided on an undiscounted basis and on a basis discounted for the time value of money using interest rates of 3%, 4%, 5%, 6%, and 7%.

Table 1A   **Total Reserve for All Claims (in millions)**
3.0% Annual Wage Inflation
7.0% Annual Medical Inflation

Claim		Discounted at				
Type	Nominal	3%	4%	5%	6%	7%
PTD	$760.0	$271.7	$200.6	$151.0	$115.9	$90.7
Non-PTD	30.9	11.2	8.3	6.2	4.8	3.7
Total	$790.9	$282.9	$208.9	$157.3	$120.7	$94.4

The following considerations apply to Table 1A:

1. The undiscounted values are the expected benefit costs, prior to consideration of investment income and the time value of money. The discounted values are the estimated principal amounts that must be placed on deposit June 30, 2004, such that the sum of principal plus investment income at the stated annual interest rate will be sufficient to fund benefit payments when due. Total outstanding benefit costs are the sum of case reserves for reported claims and forecasts of benefit costs for unreported claims. Case reserves are not discounted.

2. The values include a provision for reported and unreported claims.

3. The provision for claims reported to Las Vegas as of June 30, 2004 is equal to case reserves as of that date. There is no provision for benefit costs not contemplated in case reserves.

4. The provision for unreported claims provides for the benefit costs of claims expected to be filed by active and retired employees as of June 30, 2004 who are eligible for benefits under the HLH Statutes. The provision for unreported claims does not include claims that may be filed by future employees or employees currently not eligible for benefits.

5. The provision for reported claims reflects historical excess insurance protection. The provision for unreported claims assumes that the impact of future excess of loss insurance policies will be immaterial, as discussed earlier in this report.

6. The values in Table 1A represent the low end of a range of reasonable estimates. The potential for actual benefit costs to exceed the amounts presented in Table 1A is significant.

7. There is no provision for costs other than indemnity and medical benefits.

Numerous other considerations apply to Table 1A. The considerations listed here and other considerations are discussed later in this report.

Table 1B displays Mercer's estimates of Las Vegas' outstanding benefit costs for HLH claims as of June 30, 2004. Estimates are provided on an undiscounted basis and on a basis discounted for the time value of money using interest rates of 3%, 4%, 5%, 6%, and 7%. Table 1B provides estimates separately for reported and unreported claims, and individually for PTD claims and non-PTD claims. The considerations that apply to Table 1A apply to Table 1B.

Table 1B   Outstanding Benefit Costs as of June 30, 2004 (in millions)
Details by Reserve and Claim Type
3.0% Annual Wage Inflation
7.0% Annual Medical Inflation

Unreported Cost

Claim Type	Nominal	Discounted at				
		3%	4%	5%	6%	7%
PTD	$752.4	$264.1	$193.0	$143.4	$108.3	$83.0
Non-PTD	30.8	11.1	8.1	6.1	4.6	3.6
Total	$783.1	$275.2	$201.1	$149.5	$112.9	$86.6

Case Reserves

Claim Type	Nominal	Discounted at				
		3%	4%	5%	6%	7%
PTD	$7.6	$7.6	$7.6	$7.6	$7.6	$7.6
Non-PTD	0.1	0.1	0.1	0.1	0.1	0.1
Total	$7.7	$7.7	$7.7	$7.7	$7.7	$7.7

Total Case Reserves and Unreported Cost

Claim Type	Nominal	Discounted at				
		3%	4%	5%	6%	7%
PTD	$760.0	$271.7	$200.6	$151.0	$115.9	$90.7
Non-PTD	30.9	11.2	8.3	6.2	4.8	3.7
Total	$790.9	$282.9	$208.9	$157.3	$120.7	$94.4

Sensitivity to Underlying Parameters

Numerous judgments and assumptions underlie the results of this study. However, key parameters are wage inflation, medical inflation, and the annual interest rate used for discounting. Results will vary materially with these key assumptions. Tables 2A through 2E present the results of this study under various combinations of these parameters. Each Table presents the total outstanding benefit costs for five different values of annual medical inflation (6%, 7%, 8%, 9%, and 10%) and five different values of annual wage inflation (2.5%, 3.0%, 3.5%, 4.0%, and 4.5%). Table 2A presents the results discounted using an annual interest rate of 3.0%. Tables 2B, 2C, 2D, and 2E present the results discounted using annual interest rates of 4.0%, 5.0%, 6.0% and 7.0%, respectively. The sensitivity to underlying parameters is discussed in the considerations section of this report. The tables follow below and on the following page. The same considerations that apply to Table 1A apply to Tables 2A through 2E.

Table 2A   **Total Outstanding Benefit Costs as of June 30, 2004 (in millions)**
Annual Wage Inflation from 2.5% to 4.5%
Medical Inflation from 6.0% to 10.0%
3.0% Annual Interest Rate

Annual Medical Inflation	Annual Wage Inflation				
	2.5%	3.0%	3.5%	4.0%	4.5%
6%	$244.4	$261.7	$280.9	$302.3	$326.3
7%	257.9	275.2	294.4	315.8	339.8
8%	274.9	292.2	311.4	332.8	356.8
9%	296.4	313.7	332.9	354.3	378.3
10%	323.7	341.0	360.2	381.6	405.6

Table 2B   **Total Outstanding Benefit Costs as of June 30, 2004 (in millions)**
Annual Wage Inflation from 2.5% to 4.5%
Medical Inflation from 6.0% to 10.0%
4.0% Annual Interest Rate

Annual Medical Inflation	Annual Wage Inflation				
	2.5%	3.0%	3.5%	4.0%	4.5%
6%	$179.7	$191.9	$205.4	$220.5	$237.3
7%	189.0	201.1	214.7	229.8	246.5
8%	200.5	212.7	226.3	241.3	258.1
9%	215.0	227.2	240.8	255.9	272.6
10%	233.3	245.5	259.1	274.1	290.9

Table 2C **Total Outstanding Benefit Costs as of June 30, 2004 (in millions)**
Annual Wage Inflation from 2.5% to 4.5%
Medical Inflation from 6.0% to 10.0%
5.0% Annual Interest Rate

Annual Medical Inflation	Annual Wage Inflation				
	2.5%	3.0%	3.5%	4.0%	4.5%
6%	$134.4	$143.1	$152.8	$163.6	$175.5
7%	140.8	149.5	159.2	170.0	181.9
8%	148.7	157.5	167.2	177.9	189.9
9%	158.6	167.4	177.1	187.8	199.8
10%	171.0	179.8	189.5	200.2	212.2

Table 2D **Total Outstanding Benefit Costs as of June 30, 2004 (in millions)**
Annual Wage Inflation from 2.5% to 4.5%
Medical Inflation from 6.0% to 10.0%
6.0% Annual Interest Rate

Annual Medical Inflation	Annual Wage Inflation				
	2.5%	3.0%	3.5%	4.0%	4.5%
6%	$102.1	$108.4	$115.5	$123.3	$131.9
7%	106.5	112.9	120.0	127.8	136.4
8%	112.1	118.5	125.5	133.3	141.9
9%	118.9	125.3	132.3	140.1	148.8
10%	127.4	133.8	140.8	148.6	157.3

Table 2E **Total Outstanding Benefit Costs as of June 30, 2004 (in millions)**
Annual Wage Inflation from 2.5% to 4.5%
Medical Inflation from 6.0% to 10.0%
7.0% Annual Interest Rate

| Annual Medical Inflation	Annual Wage Inflation				
	2.5%	3.0%	3.5%	4.0%	4.5%
6%	$78.7	$83.4	$88.7	$94.4	$100.7
7%	81.9	86.6	91.8	97.6	103.9
8%	85.8	90.5	95.7	101.4	107.8
9%	90.5	95.3	100.5	106.2	112.5
10%	96.4	101.1	106.3	112.1	118.4

Observations

Introduction

The actuarial methodology underlying this study is straightforward. As respects reported HLH claims, we accept case reserves. For unreported HLH claims, we forecast the number of unreported HLH claims and multiply each unreported claim by the expected cost of each claim. The number of unreported HLH claims is determined by the frequency of claims expected per employee and by employee age. The expected cost of each claim (claim severity) is determined, in the case of PTD claims, by the age of claimant and when the claim is reported. The expected cost of non-PTD claims is determined by when the claim is reported, but is assumed, for the purpose of this analysis, to be independent of claimant age.

Frequency Assumptions

The actuarial forecast of the number of unreported HLH claims is based on an expected frequency of HLH claims by age. The frequency underlying this study is based on data supplied by the Cities combined.[10] Table 3A and 3B (following) display the frequency of expected PTD on non-PTD claims by age, respectively, for Las Vegas.

Table 3A   Frequency of PTD Claims by Age

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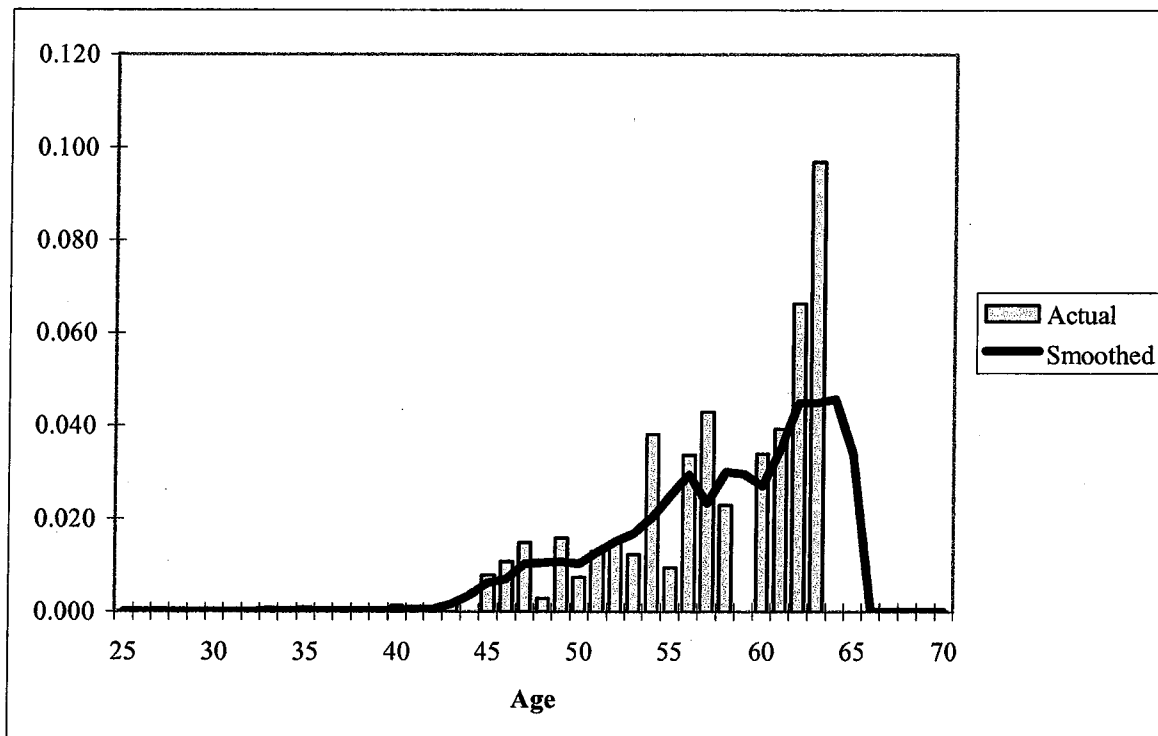
[10] Excluding Metro Police.

Table 3B   Frequency of Non-PTD Claims by Age
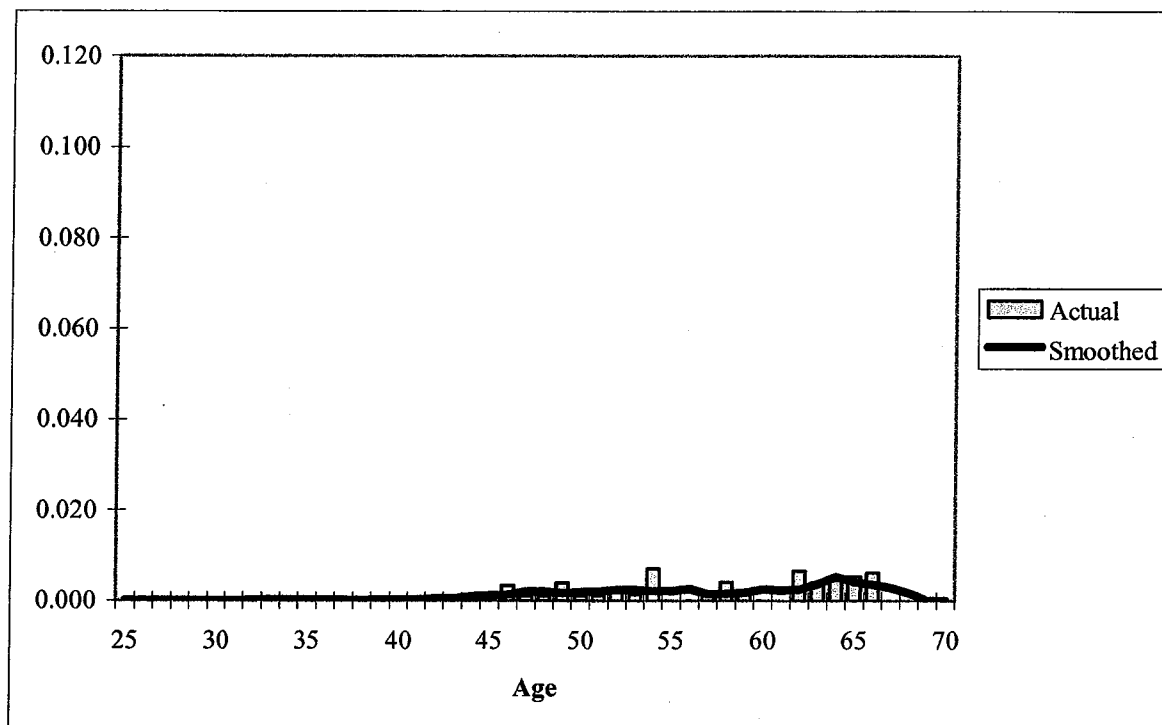
The frequency of PTD claims in Table 3A is a function of active employees only because our analysis assumes that PTD claims will be generated only by active employees. This assumption is supported by qualitative and quantitative data supplied by the cities, and is discussed in greater detail later in this report in the considerations and methodology section.

The frequency of non-PTD claims in Table 3B is a function of both active and retired employees. Our analysis assumes that non-PTD claims will be generated by both active and retired employees. This assumption is supported by qualitative and quantitative data supplied by the cities, and is discussed in greater detail later in this report under both consideration and methodology.

Tables 3A and 3B present combined frequency for all occupations. Analysis of underlying data indicates that the relative frequency for firefighters is greater than the relative frequency for police officers. The relativities are presented in Table 3C, by occupation and claim type.

Table 3C: Relative Frequency Adjustments to Average

Claim Type	Firefighters	Police Officers
PTD	1.75	0.30
NON PTD	1.00	1.00

These relativities are based on the relative number of claims filed by occupation for all the Cities combined, except Metro Police. Metro Police was excluded from the overall calculation because the combination of Metro Police's large population of employees and its self-insurance date of January 1, 1993 resulted in material shifts in the proportion of firefighters to police officers in the underlying distribution of employees, resulting in skewed frequency measurements.

Relativities specific to each entity are calculated based on the relative distribution of active employees by occupation to determine an overall frequency adjustment factor. Table 3A and Table 3B both reflect application of this factor. The adjustment factors by entity are provided below in Table 3D:

Table 3D: Frequency Relativities by Entity and Claim Type

Entity	PTD	Non-PTD
Las Vegas	1.259	1.000
North Las Vegas	0.724	1.000
Henderson	0.991	1.000
Reno	0.833	1.000
Sparks	1.018	1.000
Metro Police	0.303	1.500

The relativities in Table 3D can be viewed as the relative claim potential, by claim type, for each entity relative to the average for all entities combined, excluding Metro Police. Relativities depend entirely on the current composition of each entity's active workforce.

Our analysis indicated that Metro Police incurs, on average, 50% more non-PTD clams per unit exposure than the other entities. Additionally, Metro Police is composed exclusively of police officers, and therefore has a very low number of PTD claims relative to the other entities.

Forecasts of Claim Emergence

Table 4A (below) presents our forecasts of total expected HLH claims. Claim counts are partitioned into reported to date and unreported, by claim type, PTD and non-PTD.

Table 4A   Total Expected HLH Claims

Claim Type	Reported Claims	Unreported Claims	Total Claims
PTD	32	281	313
Non-PTD	12	42	54
Total	44	323	367

The number of reported claims in Table 4A is based on data provided by Las Vegas and is the number of HLH claims reported as of June 30, 2004. The number of unreported claims is the actuarial forecast of HLH claims that are expected to be reported by the current workforce and the current population of retired employees, as reported by Las Vegas.

Of note is the expected emergence of the unreported HLH claims over time. Tables 4B and 4C (following page) display our forecast of the number of PTD claims and non-PTD claims we expect will be reported to Las Vegas by year for the next 50 years.
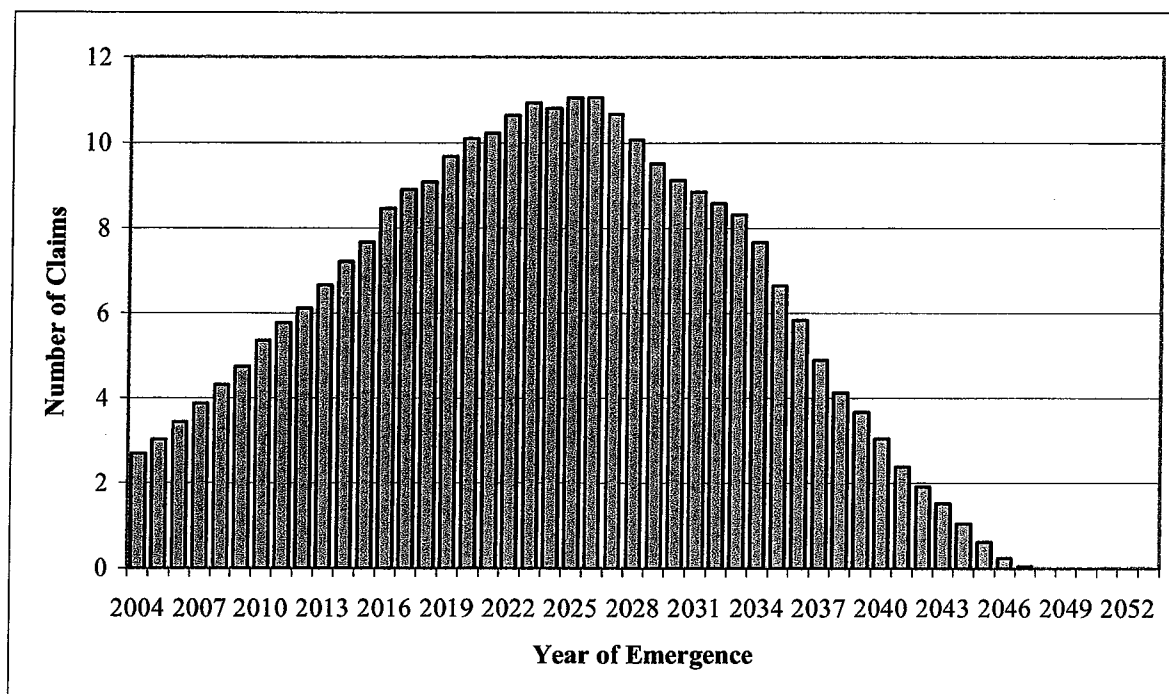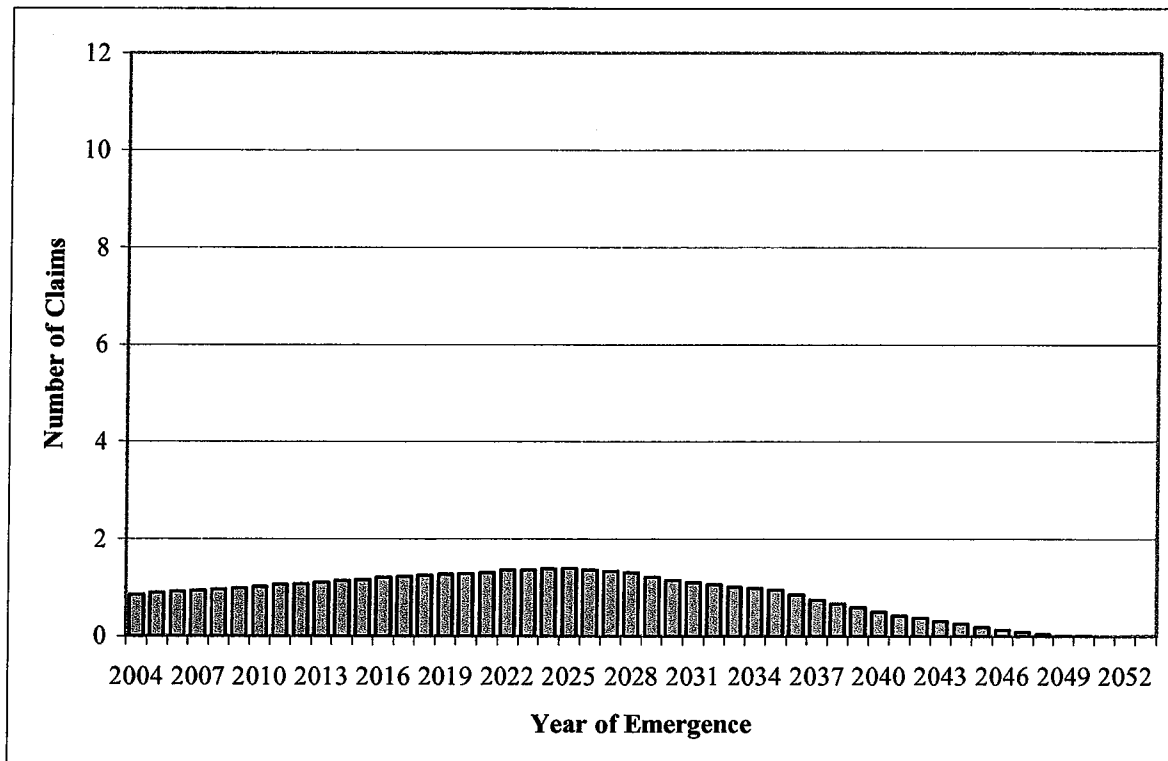
Table 4B   Emergence of Unreported PTD Claims by Year

Table 4C   Emergence of Unreported Non-PTD Claims by Year

Average Claim Severity Assumptions: July 1, 2004 – June 30, 2005

PTD Claim Severity Assumptions

The expected average cost of a PTD claim depends on the age at which the benefits are awarded, expected future wage inflation, assumptions regarding associated medical costs, and expected future medical inflation. We have assumed that in the case of PTD awards, the maximum weekly benefit will be paid, with a 2.3% annual cost of living adjustment, as per Nevada statute. We also assume that the maximum weekly benefit will increase annually at a rate of 3.0%. Associated medical costs are based on historical data. Medical costs are assumed to inflate at an annual rate of 7.0%. Additional details regarding expected average cost of PTD claims are discussed later in this report. Tables 5A and 5B (following page) display the total (indemnity and medical) expected PTD claim cost, by age, for PTD claims awarded between July 1, 2004 and June 30, 2005. Indemnity and medical components are displayed in "stacked bar" fashion. Table 5A is on an undiscounted basis and does not consider the impact of investment income. Table 5B provides the same information, but considers the impact of investment income using an annual interest rate of 5.0%. The information in Table 5A and 5B represents the same common underlying assumptions for all the Cities.

Table 5A   Severity of PTD Claims by Age
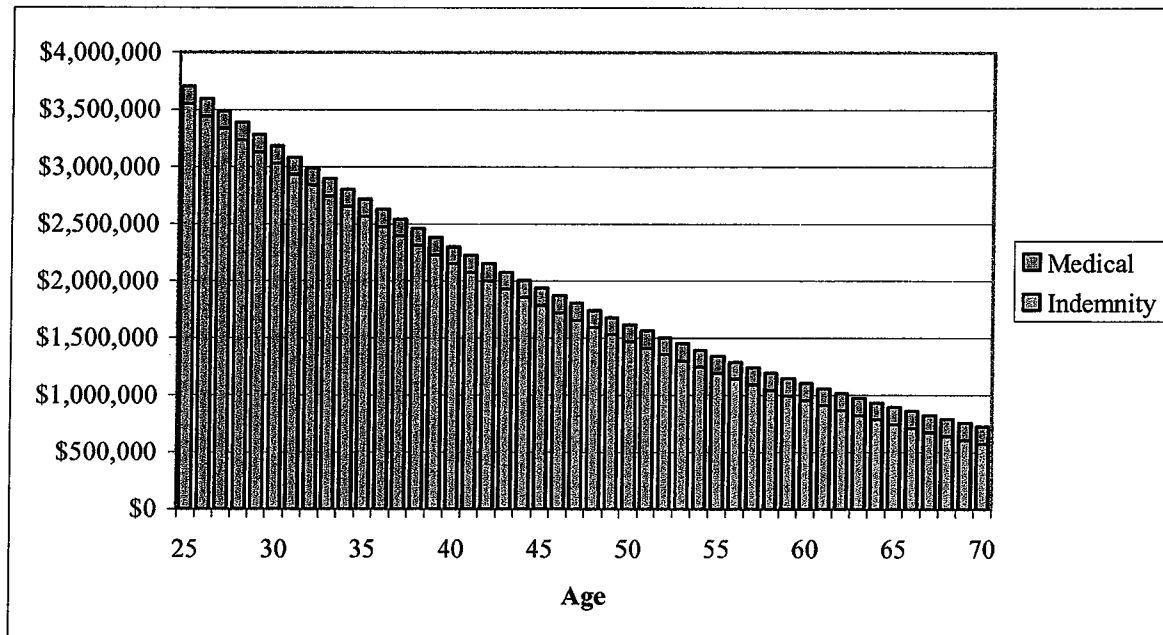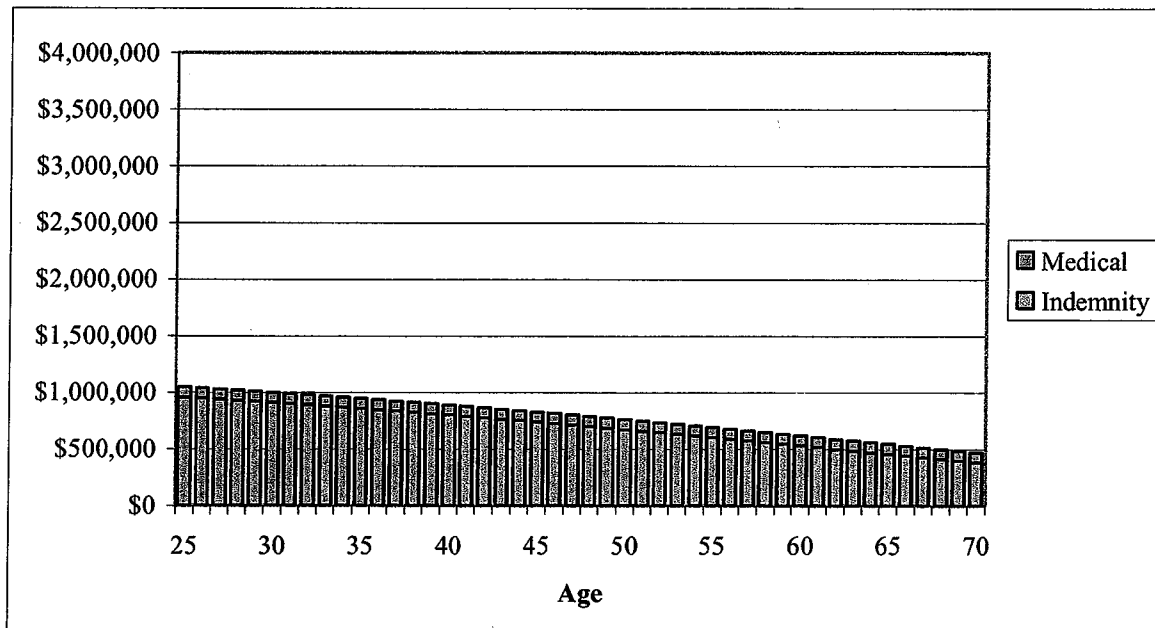**July 1, 2004 Benefit Level; 7% Medical Inflation**
Undiscounted for Investment Income

Table 5B   Severity of PTD Claims by Age
July 1, 2004 Benefit Level; 7% Medical Inflation
Annual Interest Rate of 5.0%

Non-PTD Claim Severity Assumptions

The expected average cost of a non-PTD claim is assumed to be independent of age. This assumption and additional details regarding expected average cost of non-PTD claims are discussed later in this report. For the purpose of this study, we assume that the total (indemnity and medical) average cost of a non-PTD claim awarded between July 1, 2004 and June 30, 2005, undiscounted for the impact of investment income, is $208,000, composed of $72,000 for indemnity benefits and $136,000 for medical benefits. The same values, discounted for the impact of investment income using an annual interest rate of 5.0%, is $138,221, composed of $58,376 for indemnity benefits and $79,845 for medical benefits.

While independent of age, the expected average cost of non-PTD claims does depend on expected future wage inflation, assumptions regarding associated medical costs, and expected future medical inflation. The average cost of non-PTD claims awarded between July 1, 2004 and June 30, 2005 are provided above. For claims awarded on future dates, we assume that the indemnity benefit will increase annually at a rate of 3.0% and medical costs will inflate at an annual rate of 7.0%. Additional details regarding expected average cost of non-PTD claims are discussed later in this report.

Claim Severity Forecasts

Forecasts of PTD Claim Severity

Tables 6A and 6B (following page) display the forecasts of the average cost of PTD claims, by year of emergence, undiscounted and discounted for the impact of investment income, respectively. Tables 6A and 6B reflect specific employee characteristics of Las Vegas. Key assumptions underlying Table 6A are as follows:

- Claimants, at time of claim filing, will receive the maximum workers compensation indemnity benefit.
- The maximum workers compensation indemnity benefit will increase at the rate of 3.0% annually.
- Cost of living adjustments for awarded claims will be 2.3% annually, as per statute.
- Medical costs will inflate at the rate of 7.0% annually.

These assumptions and additional details regarding expected average cost of PTD claims are discussed later in this report.

Table 6B reflects the impact of investment income using a 5.0% annual rate of interest, discounted to June 30, 2004. Therefore, Table 6B provides the amount required as of June 30, 2004, to fund claims expected to emerge over the next 50 years, assuming an annual interest rate of 5%.

Table 6A   Average Claim Cost of Unreported PTD Claims by Year of Emergence Undiscounted for Investment Income
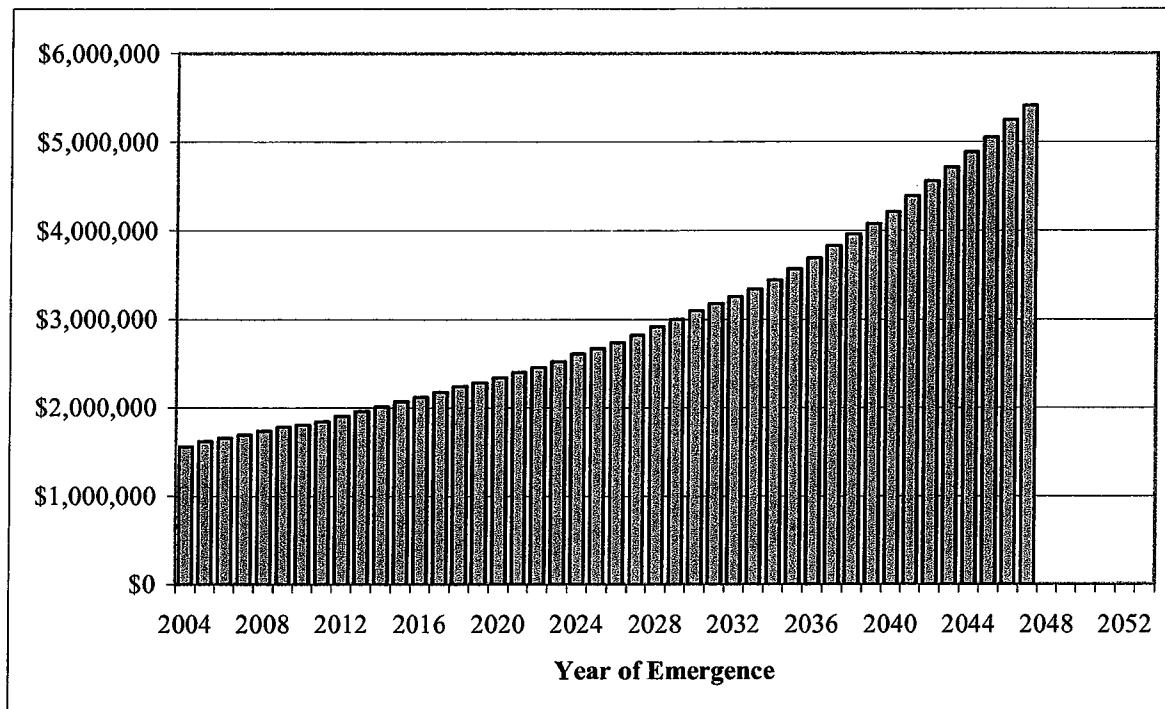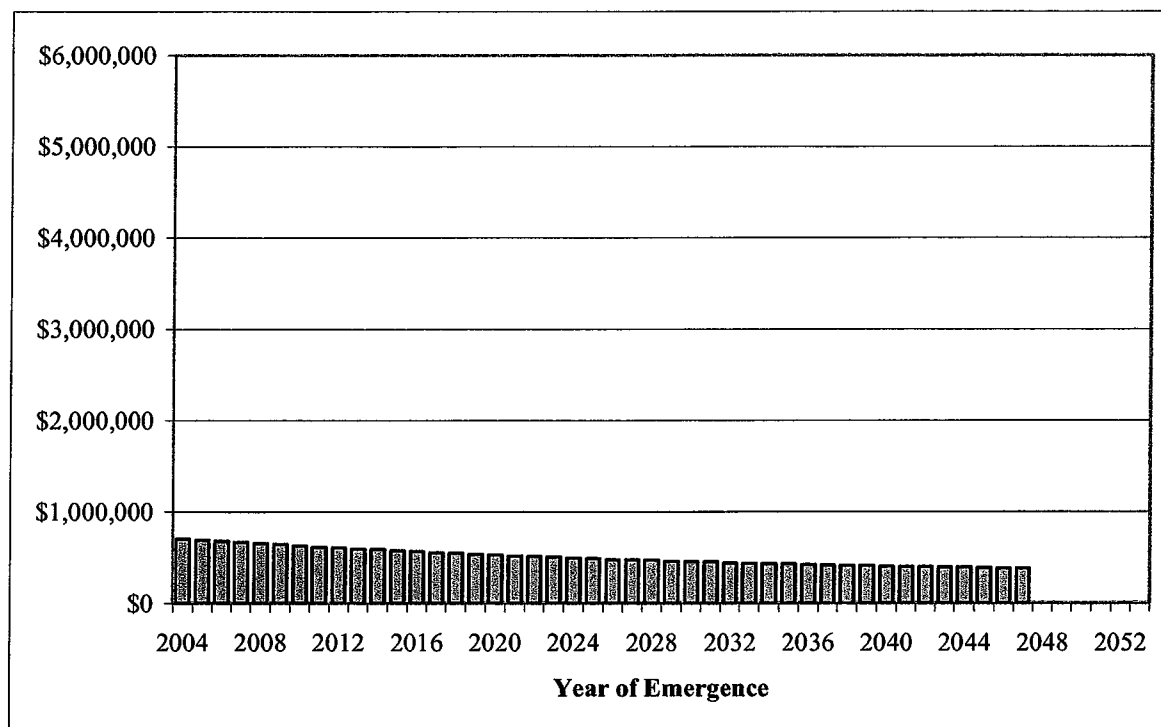

Year of Emergence

Table 6B   Average Claim Cost of Unreported PTD Claims by Year of Emergence 5.0% Annual Interest Rate Discounted to June 30, 2004

Year of Emergence
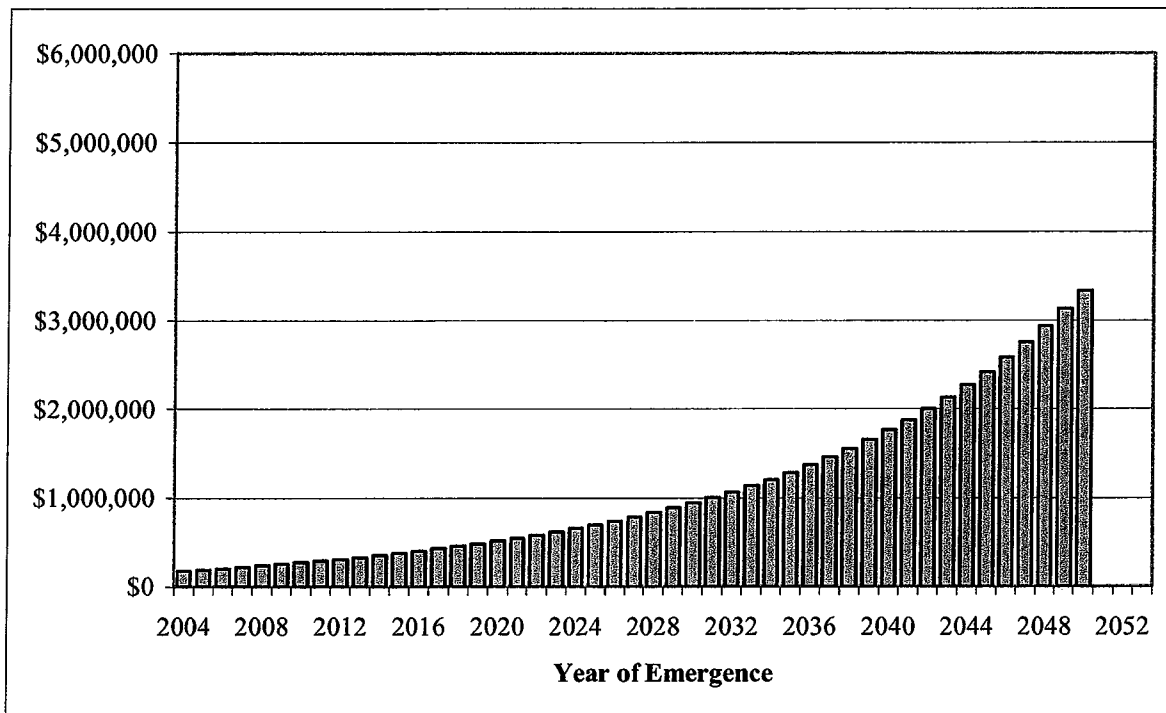
Forecasts of non-PTD Claim Severity

Tables 7A and 7B (following page) display the forecasts of the average cost of non-PTD claims, by year of emergence, undiscounted and discounted for the impact of investment income, respectively. Tables 7A and 7B reflect specific employee characteristics of Las Vegas. Key assumptions underlying Table 6A are as follows:

- The cost of the indemnity benefit portion of these claims will increase at the rate of 3.0% annually.
- Medical costs will inflate at the rate of 7.0% annually.

These assumptions and additional details regarding expected average cost of non-PTD claims are discussed later in this report.

Table 7B reflects the impact of investment income using a 5.0% annual rate of interest, discounted to June 30, 2004. Therefore, Table 7B provides the amount required as of June 30, 2004, to fund claims expected to emerge over the next 50 years, assuming an annual interest rate of 5%.

Table 7A   Average Claim Cost of Unreported Non-PTD Claims by Year of Emergence Undiscounted for Investment Income


Table 7B   Average Claim Cost of Unreported Non-PTD Claims by Year of Emergence 5.0% Annual Interest Rate from June 30, 2004
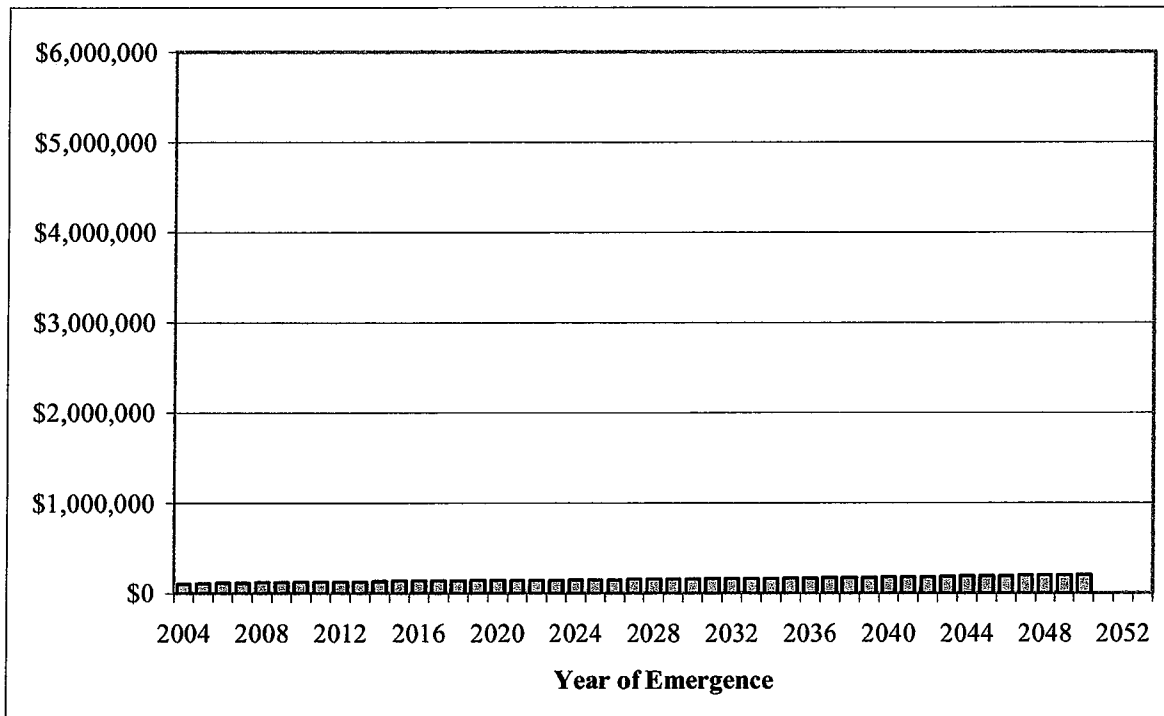
Forecasts of Total Annual Cost

Tables 8A and 8B (following page) display by year of emergence, estimates of the total cost of HLH claims, undiscounted for the impact of investment income, and discounted for the impact of investment income assuming a 5% annual interest rate, respectively. Each graph displays, in stacked-bar fashion, costs associated with PTD claims and costs associated with non-PTD claims. When considering the impact of investment income, costs are discounted to June 30, 2004. For example, if the expected cost of HLH claims expected to emerge in 2025 is ~$20 million, as recorded in Table 8A, then the amount recorded in Table 8B, ~$4.0 million, is the amount required to placed on deposit June 30, 2004 such that the sum of principal plus investment income at the stated annual interest rate of 5% will be sufficient to fund benefit payments associated with these claims, when due.

Table 8A   Total Claim Cost of Unreported Claims by Year of Emergence
Undiscounted for Investment Income
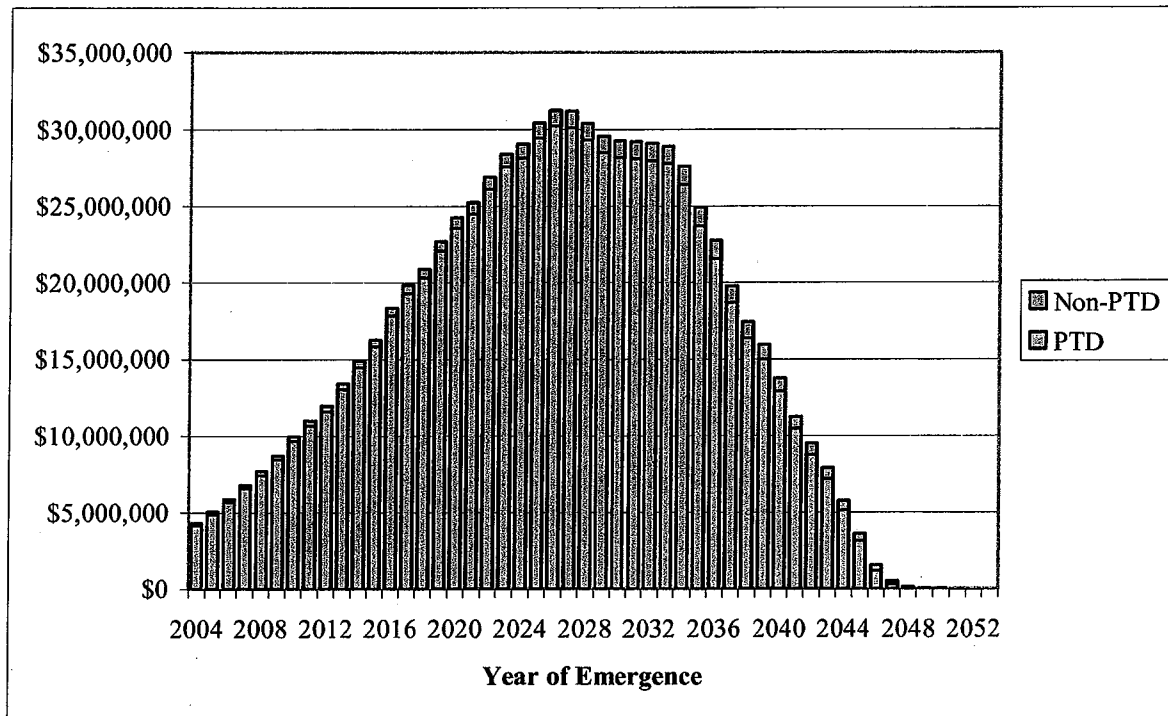
Table 8B   Total Claim Cost of Unreported Claims by Year of Emergence
5.0% Annual Interest Rate Discounted to June 30, 2004
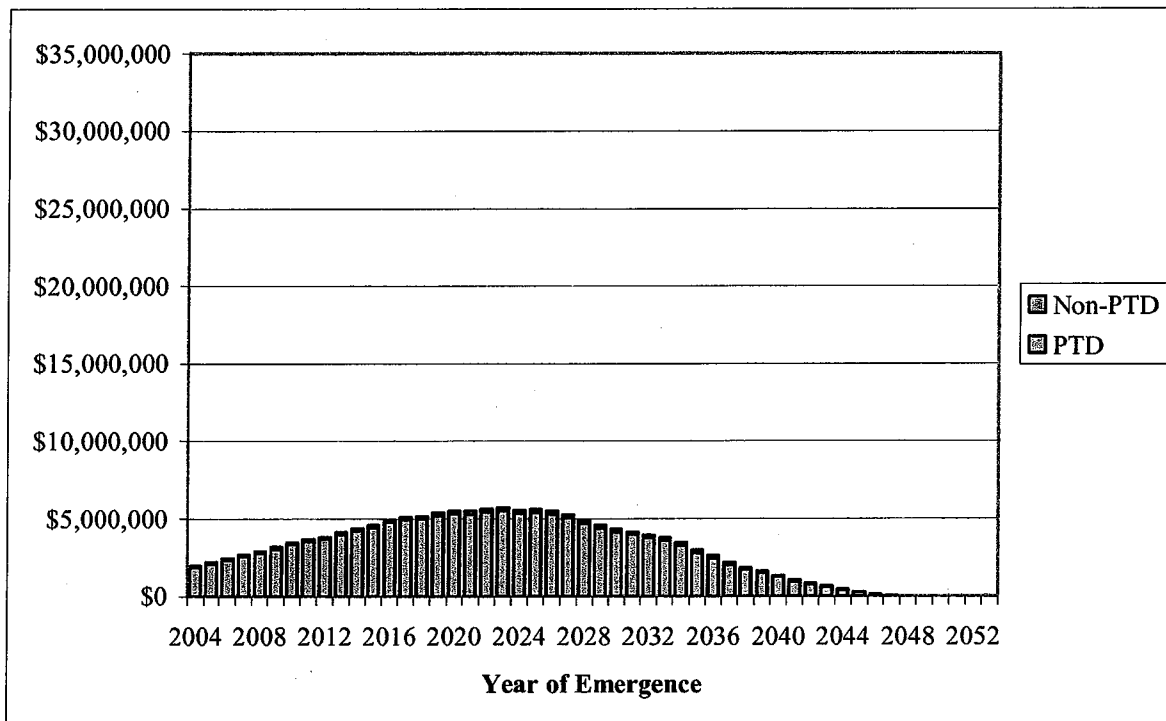
Considerations

General Approach: Low End Estimate

At the outset of this assignment, the Cities and Mercer discussed different approaches to the project. Agreement was reached that the approach and goal of the study should be to produce a "low end" estimate of the outstanding costs of benefits under the HLH Statutes. As a result, all actuarial judgments and assumptions in this study were made in this context. Therefore, it is imperative that readers of this study understand that the results and observations presented in this report reflect the low end of a reasonable range of results, and that the potential for actual results to exceed the published results of this study is significant. The following is a discussion of important considerations that apply to the results of this study, and how judgments and assumptions related to these considerations were made so as to produce results that reflect the low end of a reasonable range of estimates.

Frequency of PTD Claims

Active Employees Only: We have assumed that only active employees will generate PTD claims. This is based on data and conversations with the Cities. To the extent that retired employees generate PTD claims, costs will be greater than estimates presented in this study.

Impact of Occupation: We have determined that there is a material difference between the expected frequency of PTD claims filed by firefighters as compared to police officers. Our analysis shows that the number of PTD claims filed by firefighters is expected to be between five and six times the number filed by police officers. It is not clear as to whether this is due to differences in claims consciousness, occupational hazards, or a combination of both. For the purpose of this study, we have assumed that the relatively low frequency of PTD claims for police officers will continue into the future.

Severity of PTD Claims

Indemnity Component

Average PTD claim cost is composed of an indemnity component and a medical component. As respects the indemnity component, the following considerations apply:

Outstanding Indemnity Costs for Reported Claims: For the purpose of this report, we assume that current case reserves for indemnity benefits on reported PTD claims are adequate estimates of expected future costs for reported cases, and that IBNR is zero. It is not clear as to what impact this assumption has on outstanding costs for reported claims, as we do not have details regarding case reserving philosophy for each of the cities. We have also assumed no discount for

investment income for reported cases. All else being equal, this assumption will increase outstanding costs. However, the impact on total outstanding costs is minimal, given the very small percentage that case reserves for reported claims bear to total outstanding benefit costs.

The following items impact estimates of outstanding indemnity costs for unreported claims:

Wage Inflation: We have assumed, on the advice of the Cities, that PTD awards for public safety employees will be based on the maximum benefit for total disability benefits.[11] For the one year period beginning July 1, 2004, the maximum annual benefit is $34,272. The maximum benefit in Nevada is increased based on changes in the statewide average wage. Therefore, to forecast the cost of first year of benefits of future PTD claims, a wage inflation assumption is necessary. We have assumed that wages in Nevada, and therefore the maximum benefit, will increase at an annual rate of 3.0%.[12,13] This is an optimistic assumption, in the sense that actual wage inflation in Nevada has been higher, over the longer term. Table 9 (following page) displays the maximum monthly total disability benefit in Nevada since 1990. We note that while the five year average annual change is approximately 3.0%, longer term trends are significantly higher. The ten year average annual trend is 3.7%, while the 15 year average annual trend is 3.5%. The impact of even a half percentage point to wage inflation assumptions is significant, as illustrated in the prior section.

Female Employees / Survivor Benefits: To determine the cost of future PTD claims, we assumed that the gender of future claimants will be exclusively male. This assumption was made because male gender results in lower life expectancy, and therefore lower overall cost. Additionally, we have not considered the impact of widow benefits, that is, that the claimant's spouse will be entitled to survivor benefits if the claimant dies of the condition that generated the PTD claim. The potential cost of widow benefits is significant. For example, for a 60 year old male awarded PTD benefits July 1, 2004, expected future indemnity benefits could increase by 50% undiscounted, 35% discounted, if survivorship benefits are considered.[14]

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[11] This is equivalent to assuming public safety employees, at the time they file for a PTD claim under the HLH statutes, will have earned at least the maximum wage allowed to calculate disability benefits. Effective July 1, 2004, this wage is $51,408 annually. Any employee in the state earning this wage or higher will receive total disability benefits limited to the maximum allowable benefit, currently $2,856 per month, or $34,272 per year. The maximum allowable benefit is 66.67% of the maximum allowable wage.

[12] Therefore, the maximum annual benefit will increase at 3.0% annually. Employees who file for and receive PTD claims under the HLH statutes during the one year period beginning July 1, 2005 will receive, their first year, an annual benefit of $35,300 (= $34,272 x 1.03).

[13] It is important not to confuse the 3.0% annual wage inflation assumption with subsequent cost of living adjustments. The annual 3.0% wage inflation assumption permits a forecast of first year indemnity disability benefits for PTD claims filed in future years. Once a claim is filed and awarded, annual benefits for that claim are increased annually by a 2.3% cost of living adjustment. The 2.3% cost of living adjustment is fixed by Nevada statute.

[14] This calculation assumes that the surviving spouse receives the same benefit and future COLA as the employee. This assumption is based on discussions with the Cities. It is not clear at this point in time how recently awarded COLA benefits to PTD claims (January 1, 2004) will impact survivorship benefits. The Division of Industrial Relations was contacted and stated that the impact, at this point in time, is not known. If survivorship benefits are less and revert to the maximum weekly benefit at the date of loss with no COLA adjustments, the impact will

Table 9   Maximum Monthly Compensation

Fiscal Year
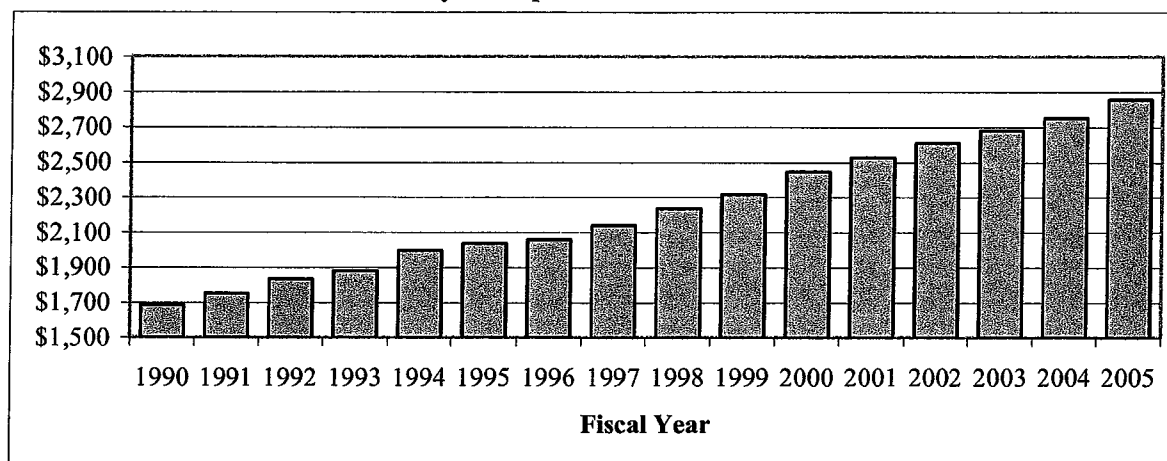
Impact of Improving Life Expectancy: Life expectancies used in this study are based on general population tables published by the United States Center for Disease Control.[15] This is the same source for life tables used for unit statistical reporting purposes in states where the National Council on Compensation Insurance[16] (NCCI) is the licensed/approved rating organization. The life tables used in this report are published for 2002, and represent a "snapshot" of current death rates by age. They do not consider expected improvement to life expectancies.

Medical Component

Outstanding Medical Costs for Reported Claims: For the purpose of this report, we assume that current case reserves for medical benefits on PTD claims are adequate estimates of expected future cost for reported cases, and that IBNR is zero. Therefore, we have based our estimates of the average medical cost per PTD case on reported medical losses (paid costs plus case reserves) as of June 30, 2004. This assumption is extremely optimistic, especially as respects medical costs. As claims age into their life cycles, more information becomes available to the administrator regarding the expected future outcome of individual cases, and case reserves are adjusted accordingly. Inevitably, as claims age, costs will increase. This is not necessarily because the claims administrator is reserving inadequately, though this occasionally may be an issue. Usually, growth in expected cost on individual cases is due to case deterioration, which can only be reflected in case reserves after the fact, that is only after the additional information has become available. As discussed earlier, case estimates of future medical costs are especially

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be less than the percentages quoted in the text. The impact on an undiscounted basis would be approximately 35%, while on a discounted basis the impact would be approximately 25%.

[15] United States Life Tables, 2002. NVSR Volume 53, Number 6. 39 pp. (PHS) 2005-1120.

[16] NCCI collects workers compensation data and files, on behalf of members and subscribers, loss cost and rate recommendations in the states where NCCI is licensed to do so. Currently, NCCI provides advisory ratemaking and statistical services in 34 jurisdictions, including Nevada.

uncertain. For a case with lifetime medical exposure, it is possible to reserve for the future cost of annual, repetitive, medical services. But the claims administrator cannot know that a specific claimant will need heart surgery in three years, and therefore cannot reserve for that additional cost. Furthermore, claims administrators typically do not provide for the impact of inflation on medical costs in case reserves. This is usual industry practice. As such, reserves for the future cost of annual, repetitive, medical services, even if based on life expectancy, are generally inadequate because of the impact of medical inflation on costs.

The following items impact estimates of outstanding medical costs for unreported claims:

Case Reserve Adequacy on Reported Claims: The basis of forecasts of unreported claim costs is forecasts of reported claim costs. As discussed above, we have assumed that for reported claims, current case reserves for medical benefits on PTD claims are adequate estimates of expected future cost, and that IBNR is zero. Therefore, our forecast of medical costs for unreported claims is optimistic (in the low cost sense) because we based this forecast on optimistic forecasts of medical costs for reported claims.

Impact of Investment Income: We assume a 20 year payout of medical losses for the purpose of discounting.

Medical Inflation: An assumption regarding medical inflation is required to forecast the cost of unreported PTD claims by year of emergence. We have assumed long term medical inflation of 7.0% per year. This is an extremely optimistic assumption based on our experience. Annual inflation rates between 9% and 10% for more severe PTD claims are reasonable based on our experience.

Frequency of non-PTD Claims[17]

Active and Retired Employees: We have assumed that both active and retired employees will generate non-PTD claims. This is based on data and conversations with the Cities.

Impact of Occupation: We have determined that there is a not a material difference between the expected frequency of non-PTD claims filed by firefighters as compared to police officers, except for Metro Police. Analysis of data indicates that Metro Police has a non-PTD claim frequency approximately 50% greater than the other Cities. The frequency relativity of non-PTD filings from Metro Police was adjusted accordingly.

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[17] Claims of insignificant cost (that is, below a specified threshold) were excluded from frequency calculations. Non-PTD claim frequency refers only to claims above the specified threshold. See the methodology section for more details.

Severity of non-PTD Claims[18]

Indemnity Component

Average non-PTD claim cost is composed of an indemnity component and a medical component. As respects the indemnity component, the following considerations apply:

Outstanding Indemnity Costs for Reported Claims: For the purpose of this report, we assume that current case reserves for indemnity benefits on reported non-PTD claims are adequate estimates of expected future costs for reported cases, and that IBNR is zero. It is not clear as to what impact this assumption has on outstanding costs, as we do not have details regarding case reserving philosophy for each of the cities. We have also assumed no discount for investment income for reported cases. All else being equal, this assumption will increase outstanding costs. However, the impact on total outstanding costs is minimal, given the very small percentage that case reserves for reported claims bear to total outstanding benefit costs.

The following items impact estimates of outstanding indemnity costs for unreported claims:

Case Reserve Adequacy on Reported Claims: The basis of forecasts of unreported claim costs is forecasts of reported claim costs. As discussed above, we have assumed that for reported claims, current case reserves for indemnity benefits on non-PTD claims are adequate estimates of expected future cost, and that IBNR is zero. Therefore, our forecast of indemnity costs for unreported non-PTD claims is optimistic (in the low cost sense) because we based this forecast on optimistic forecasts of medical costs for reported claims.

Impact of Investment Income: We assume a 20 year payout of medical losses for the purpose of discounting.

Exclusion of Large Claims: Current non-PTD reported claim data shows nine extraordinarily large reported non-PTD claims. These claims are tabulated below:

City	Date of Loss	Total Reported Cost
North Las Vegas	11/19/2001	483,474
Reno	11/08/2001	580,500
North Las Vegas	10/31/2002	1,071,253
Metro Police PO	12/23/2000	1,039,049
Reno	01/13/2004	1,379,883
Henderson	07/08/2001	1,270,097
Reno	11/08/2003	1,393,162
Reno	07/07/2003	1,629,591
Reno	06/14/2003	1,768,499

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[18] Claims of insignificant cost (that is, below a specified threshold) were excluded from severity calculations. Non-PTD claim severity refers only to claims above the specified threshold. However, adjustments were made to factor in the cost contribution of claims less than the specified threshold. These claims generated less than 3% of total estimated non-PTD claim cost. See the methodology section for more details.

These nine claims represent more than half of the reported non-PTD costs as of June 30, 2004. For the purpose of this analysis, the impact of these claims was only marginally considered when forecasting unreported non-PTD claim severity, and materially reduces the forecast of non-PTD claim costs. The underlying assumption is that these nine claims are exceptional, and will not repeat in the future.

Wage Inflation: The same assumption regarding wage inflation for PTD claims was made for non-PTD claims as well.

Medical Component

Outstanding Medical Costs for Reported Claims: For the purpose of this report, we assume that current case reserves for medical benefits on non-PTD claims are adequate estimates of expected future cost for reported cases, and that IBNR is zero. The same issues regarding this assumption as respects PTD claims apply to non-PTD claims as well.

The following items impact estimates of outstanding medical costs for unreported claims:

Case Reserve Adequacy on Reported Claims: The basis of forecasts of unreported claim costs is forecasts of reported claim costs. As discussed above, we have assumed that for reported non-PTD claims current case reserves for medical benefits are adequate estimates of expected future cost and that IBNR is zero. Therefore, our forecast of medical costs for unreported claims is optimistic (in the low cost sense) because we based this forecast on optimistic forecasts of medical costs for reported claims.

Impact of Investment Income: We assume a 20 year payout of medical losses for the purpose of discounting.

Exclusion of Large Claims: The same large claims that were excluded for forecasting future indemnity benefit cost for non-PTD claims were excluded for the purpose of forecasting future medical benefit costs for non-PTD claims.

Medical Inflation: As discussed for PTD claims, we have assumed long term medical inflation of 7.0% per year. The same concerns apply.

Interest Expense and Discounting

On an annual basis, there is an interest expense associated with discounting. The interest expense is due to the "unwinding" of the discount as the time between the valuation date of outstanding losses and the expected date of payment of losses decreases. For example, assume that there is a $1,000 payment due in ten years. The discounted value of that amount today, ten years from the expected date of payment, is $613.91 using an interest rate of 5.0% to discount. Next year, the discounted value of the same payment, but only nine years from the expected date of payment, is $644.61, again using an interest rate of 5% to discount. This represents an interest expense of $30.70. The accrual of interest expenses over time with respect to discounted outstanding losses is expected and is equivalent to the investment income that would have been earned (or is earned, if there are real assets generating investment income) at the interest rate used to discount. That is, $30.70 = 5% x $613.91. Alternatively, interest expense may be viewed as the incremental annual increase to the value of discounted outstanding losses due to the passage of time. That is, as the expected date of payment draws closer, the value of the payment due, expressed in current dollars, increases.

The impact of interest expense on discounted outstanding losses for payments expected to be made over a long term time horizon, such as HLH claims, is significant. For example, the discounted outstanding benefit cost as of 6/30/04 for one city is estimated to be approximately $107 million dollars, using an interest rate of 5%. As of 6/30/05, assuming $1 million paid over the prior year, the value of the liability will be $111.35 million[19], an increase of $4.35 million over the prior year period. The $111.35 million is calculated as follows:

	$107.0 million	Liability as of 6/30/04
+	$5.35 million	Interest earned at 5.0% from 6/30/04 to 6/30/05. Equal to 5% of $107.0 million
-	$1.0 million	Payments during 6/30/04 to 6/30/05
	$111.35 million	Liability as of 6/30/05

Las Vegas should be aware that while discounting reflects the economic reality that losses paid years from now are not worth the same as losses paid today, discounted liabilities will increase as the valuation date of the liability approaches the dates losses are eventually paid. The increase in liabilities is the interest expense. The impact of interest expense is magnified by the nature of the HLH liabilities, given that the payments are expected to be made over a long term time horizon. Additionally, the impact of interest expense increases significantly with the interest rate used to discount. All else being equal, the interest expense associated with an interest rate of 6% is twice the interest expense associated with an interest rate of 3%.

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[19] Actual liability, assuming payments made evenly throughout the 6/30/04 to 6/30/05 period is $111.325 million. Simplified calculation is provided to illustrate the impact of interest expense.

DATA UTILIZED FOR THIS STUDY

Data Provided by the Cities

Note: The following list is not exhaustive, and not all Cities provided all data elements.

For Active Employees, the following key data items were provided:
    Name (or other identifier)
    Gender
    Occupation
    Date of Birth
    Date of Hire

For Terminated Employees, the following key data items were provided:
    Name (or other identifier)
    Gender
    Occupation
    Date of Birth
    Date of Hire
    Date of Termination

For Claimants, the following key data items were provided:
    Name (or other identifier)
    Gender
    Occupation
    Date of Birth
    Date of Hire
    Date of Injury
    Indemnity Payments to Date
    Medical Payments to Date
    Indemnity Case Reserves
    Medical Case Reserves
    Claim Status (Open/Closed)
    Employee Status at Filing

Date of Self-Insurance

Mercer supplemented the data supplied by the Cities with the National Vital Statistics Report, Volume 53, Number 6: United States Life Tables, 2002.

Other Data Utilized for This Study

Mercer supplemented the data supplied by the Cities with the following:

Information from the 2004 Annual Statistical Bulletin published by the National Council on Compensation Insurance, Inc. This information included:

> Current workers compensation benefits in Nevada.
> Information on loss development.
> Information state average weekly wages.

Information from the 2004 Analysis of Workers' Compensation Laws published by the U.S. Chamber of Commerce, Statistics and Research Center.

National Vital Statistics Report, Volume 53, Number 6: United States Life Tables, 2002.

Information from the Division of Industrial Relations.
> http://dirweb.state.nv.us/
> Telephone Contacts

Miscellaneous internal and external information.

METHODOLOGY AND ANALYSIS

Outstanding Cost for Reported Claims

As explained in the text of the report, we accepted case reserves for reported claims as estimates of outstanding cost for PPD and non-PPD claims. No discounting was applied.

Outstanding Cost for Unreported PTD Claims

The basic methodology is a claim count / claim cost approach. The methodology consists of the following steps:

1. Determine Expected Claim Frequency by Age
2. Determine Expected Claims by Employee by Year
3. Determine Expected Indemnity Cost by Employee by Year
4. Determine Expected Medical Cost by Employee by Year
5. Determine Total Expected Cost by Employee by Year
6. Consideration of Investment Income

Each step is discussed individually below:

1. Determine Expected Claim Frequency by Age

We assume that all PTD claims are generated only by active employees. This assumption is supported by data supplied by the Cities, and by conversations with the Cities. Frequency is measured as claims reported against exposure to loss. For the purpose of this analysis, exposure to loss is measured as the years worked by active workers at a particular age. Employees are assumed to be eligible for benefits under the HLH statute after working two years.[20] Data for all cities combined is used. So, for example, if we determine from the employee census data for all active and retired employees a total of 2,589 employees were active at age 35, then the exposure at age 35 is 2,589. If one PTD claim was filed at age 35, the initial raw PTD claim frequency is 1 / 2589, meaning that one out of every 2,589 active employees will file a PTD HLH claim while at age 35. This process is repeated at every age, resulting in a raw frequency distribution. The raw distribution is smoothed by using weighted averages of adjacent ages. The raw frequency and smoothed frequency is displayed earlier in this report on Table 3A. The smoothing process has no impact on overall frequency. The resulting frequency distribution provides the expected number of claims per employee by age. A total of 51 claims were used to determine the distribution of frequency by age. Additionally, the relative claim frequency of firefighters and police officers was calculated.

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[20] This is somewhat conservative, in the low-end sense, because the eligibility requirement is 2 years of continuous service for lung claims, but 5 years of continuous service for heart and hepatitis claims. The impact of this assumption is not material.

Average relativities for each City were calculated based on the current distribution of active employees between the two occupations. The average frequency distribution was adjusted by the average relativity for each City to generate a frequency distribution for each City that reflects each City's own specific workforce characteristics. In addition to the overall frequency, the number of unreported PTD claims depends on the age distribution of the current work force. The distribution of active employees by age for Las Vegas is displayed in Table 10 (below):

Table 10: Current Distribution of Active Employees – City of Las Vegas
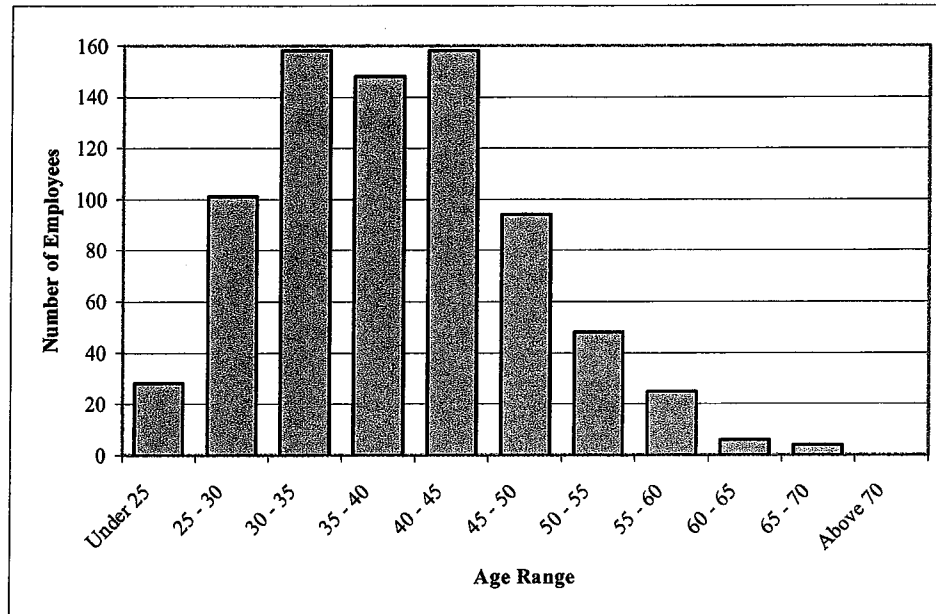
2. Determine Expected Claims by Employee by Year

Using the frequency distribution determined in Step 1 and current mortality tables, the expected number of claims for each employee at each age over the next 50 years is determined.

3. Determine Expected Indemnity Cost by Employee by Year

The indemnity cost of a PTD claim is determined by the age of employee at the time the claim is filed, and the year that the claim is filed. The first year benefit is equal to the first year benefit for claims filed between July 1, 2004 and June 30, 2005, $34,272, inflated to the year of filing. For example, the first year benefit for a claim filed between July 1, 2014 and June 30, 2015 is equal to $34,272 multiplied by 1.03^{10}, if we assume 3.0% inflation per year. The indemnity claim cost is equal to the calculated first year claim cost multiplied by a life annuity based on the employee's age at filing, incorporating a 2.3% COLA, as per Nevada statute. The expected indemnity cost for a specific employee in a specific year is equal to the expected frequency of a PTD claim from an employee at that age multiplied by the indemnity claim cost.

4. Determine Expected Medical Cost by Employee by Year

The medical cost of a PTD claim was selected to be $150,000 at a 2004 cost level. The value was selected based on an examination of reported medical costs of PTD claims, adjusted to a July 1, 2004 to June 30, 2005 cost level, using a 7.0% annual cost adjustment from the date of loss. As discussed earlier, this value is based on data with no provision for IBNR. In order to give some credit for payment of medical costs over time, we assume a payout over twenty years. This payment pattern is based entirely on judgment, as sufficient data does not exist from which to accurately forecast a reasonable payout of medical costs for these claims. The impact of discount is significant, approximately 43% at a 5% annual interest rate. Medical costs for claims filed in later years are estimated by applying the 7.0% annual medical inflation factor to the selected $150,000 medical 2004 cost. For example, the medical cost for a claim filed between July 1, 2014 and June 30, 2015 is equal to $150,000 multiplied by 1.07^{10}, if we assume 7.0% inflation per year. The same payment assumption is used for all claims. There is not sufficient information in the underlying data to determine variation of medical cost by age of claimant.

5. Determine Total Expected Cost by Employee by Year

The total expected cost by employee is the expected claim frequency for that employee multiplied by the sum of the expected indemnity cost and the expected medical cost. This process is calculated for every active employee, for every future year, beginning with the 12 month period beginning July 1, 2004, until the active employee reaches age 70, beyond which there are no expected PTD claims.

6. Consideration of Investment Income

Investment income is incorporated in a two step process for every claim. The first step is to discount claim costs to the December 31 of the year of occurrence. For the indemnity portion, this is accomplished through the annuity calculation process. For the medical portion, we assume a twenty year level payout of the expected medical component. The second step is to discount the results of step one to June 30, 2004. So, for example, if the expected claim cost for the 12 month period beginning July 1, 2014 is $1,000,000, discounted to December 31, 2014, step two applies an additional discount representing 10.5 years of investment income from June 30, 2004 to December 31, 2014. At 5.0% annual interest, the impact is to reduce the $1,000,000 to approximately $600,000.

Outstanding Cost for Unreported non-PTD Claims

The basic methodology is a claim count / claim cost approach. The methodology consists of the following steps:

1. Determine Expected Claim Frequency by Age
2. Determine Expected Claims by Employee by Year
3. Determine Expected Indemnity Cost by Employee by Year
4. Determine Expected Medical Cost by Employee by Year
5. Determine Total Expected Cost by Employee by Year
6. Consideration of Investment Income

Each step is discussed individually below:

1. Determine Expected Claim Frequency by Age

We assume that non-PTD claims are generated by active and retired employees. This assumption is supported by data supplied by the Cities, and by conversations with the Cities. Frequency is measured as claims reported against exposure to loss. For the purpose of this analysis, exposure to loss is measured as the years lived since eligibility, until death or until a claim is filed. Employees are assumed to be eligible for benefits under the HLH statute after working two years.[21] Data for all cities combined is used. The process is analogous to that used for PTD claims. Of the 240 reported non-PTD claims reported in data supplied by the Cities, 181 claims were excluded because they were of exceptionally small size. Average claim costs used in this analysis were increased to incorporate the costs of these claims (discussed in greater detail in item 3. below). Therefore, a total of 59 non-PTD claims were used to determine the distribution of claim frequency by age. We determined that there is a not a material difference between the expected frequency of non-PTD claims filed by firefighters as compared to police officers, except for Metro Police. Analysis of data indicates that Metro Police has a non-PTD claim frequency approximately 50% greater than the other Cities. The frequency relativity of non-PTD filings from Metro Police was adjusted accordingly.

2. Determine Expected Claims by Employee by Year

Using the frequency distribution determined in Step 1 and current mortality tables, the expected number of claims for each employee at each age over next 50 years is determined.

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[21] This is somewhat conservative, in the low-end sense, because the eligibility requirement is 2 years of continuous service for lung claims, but 5 years of continuous service for heart and hepatitis claims. The impact of this assumption is not material.

3. Determine Expected Indemnity Cost by Employee by Year
   (Discussed in combination with Step 4.)

4. Determine Expected Medical Cost by Employee by Year

The indemnity cost and medical cost of a non-PTD claim is based on an analysis of average non-PTD reported claim costs. Data for 240 non-PTD claims was provided by the Cities. Claims were adjusted to a July 1, 2004 cost level by trending claim costs from date of loss to December 31, 2004, the average date of loss for the 12 month period beginning July 1, 2004. 3.0% and 7.0% annual trends were used for indemnity and medical benefits, respectively. An analysis of trended claim costs showed that 181 claims were of exceptionally low value and accounted for less than 3.0% of total trended claim costs. Additionally, as discussed earlier, there are nine claims of exceptionally large value which accounted for approximately 57% of the total trended claim costs. 50 claims were of substantial value, but not exceptionally large. To determine average indemnity claim cost and average medical claim cost at a July 1, 2004 cost level, we calculated the weighted average claim cost of the 50 substantial claims. This average was increased to incorporate the total indemnity cost of the 181 claims of exceptionally low value. This way, we reflect the cost of the 181 claims by increasing the average claim cost used, but we avoid having to incorporate these claims into the expected claim frequency. To incorporate the cost of the nine exceptionally large claims, we assumed each of the nine claims would contribute a cost equal to twice the average claim cost calculated for the 50 substantial claims. This way, we incorporate a portion of the impact of these large claims without distorting the selected overall claim cost. The selected average indemnity and medical claim costs at the July 1, 2004 cost level are $72,000 and $136,000, respectively, for a total selected claim cost of $208,000 for 59 claims. It is important to note that had the full impact of the nine large claims been reflected, the selected average indemnity and medical claim costs at the July 1, 2004 cost level would have been approximately $250,000 and $105,000, respectively, for a total selected claim cost of $355,000 for 59 claims. This is 70% larger than the actual selected average claim cost.

In order to give credit to payout of claim costs over time, we assume a payout over twenty years. Information on payment over time is limited; however, the data indicates that claim costs are paid over a period of at least 10 years. The twenty year payout is assumed in order to reflect the maximum impact of investment income over time. Given that the average age at which the non-PTD claims are filed is 51, a twenty year payout is close to life expectancy.

5. Determine Total Expected Cost by Employee by Year

The total expected cost by employee is the expected claim frequency for that employee multiplied by the sum of the expected indemnity cost and the expected medical cost. This process is calculated for every active and retired employee eligible for benefits under the HLH Statutes, for every future year, beginning with the 12 month period beginning July 1, 2004, until age 70, beyond which non-PTD claims are not expected to be filed.

6. Consideration of Investment Income

Investment income is incorporated in a two step process for every claim. The first step is to discount claim costs to the December 31 of the year of occurrence. For the indemnity portion, a twenty year level payout of benefits is assumed. For the medical portion, a twenty year payout, weighted by the expected impact of medical inflation (this pushes more costs towards the end of the payment stream and therefore increases the impact of discount). The second step is to discount the results of step one to June 30, 2004. So, for example, if the expected claim cost for the 12 month period beginning July 1, 2014 is $1,000,000, discounted to December 31, 2014, step two applies an additional discount representing 10.5 years of investment income from June 30, 2004 to December 31, 2014. At 5.0% annual interest, the impact is to reduce the $1,000,000 to approximately $600,000.

CAVEATS AND LIMITATIONS

1. The study conclusions are developed in the accompanying text and tables, which together comprise the report.

2. The context of this study is to develop a low end estimate of a range of reasonable estimates of outstanding benefit costs due to claims filed under the HLH Statutes. As such, actuarial judgments and assumptions in this study were made in this context. As such, the potential for actual results to exceed forecasts is greater, perhaps significantly, than the potential for actual results to fall below forecasts.

3. The valuation dates of the data provided by the Cities are at different dates during 2004. For the purpose of this analysis, we have assumed a constant valuation date of June 30, 2004. Given the context of this study to provide a low end estimate of a reasonable range of results, as well as the inherent uncertainty underlying the results of this study, our expectation is that this assumption will not materially impact results.

4. The conclusions are predicated on the assumptions that the selected reporting, reserving and payment patterns, frequency assumptions, severity assumptions, mortality assumptions, trends and claims distributions apply and will continue to apply to the program, within the context of this study. The risk exposure covered by the self-insured group for workers' compensation, as well as the claim reserving, management, and settlement practices, are assumed to be consistent over time, except as noted.

5. All excess insurance purchased to date was considered to be valid and fully collectible. We made no assessment, and do not express any opinion, concerning the appropriateness of this assertion. Additionally, we have assumed that data provided by the Cities reflects the impact of excess insurance, based on discussions with the Cities. Data provided supports this assertion, but we have not verified it. Within the context of this study, we have assumed that the impact of excess insurance on future claims will be immaterial.

6. All information concerning the program structure, risk exposure, including historical exposures and claims data, was provided by the Cities. In this study, Mercer relied on the accuracy and completeness of this information without independent verification. In some cases, due to information that was not available, assumptions were made in order to produce complete data and use the partial information that was provided. If any information is inaccurate or incomplete, Mercer's findings and conclusions may need to be revised, perhaps materially.

7. Unanticipated changes in factors such as judicial decisions, legislative actions, claim consciousness, claim management, claim settlement practices, and economic conditions may significantly alter the conclusions of this study. This is a significant risk for the exposure examined in this study. Changes in any of the factors above could accelerate claim filings, increase the number of claim filings, and/or increase claims costs. For example, it is not yet clear as to how the implementation of cost of living adjustments for PTD claims in 2004 will

impact survivorship benefits. As discussed in the text, claim costs could be increased materially, or not at all, depending on final rulings. Another example is a law change increasing the COLA currently provided to PTD claimants.

8. The conclusions and results of this study are based on analysis of the available data and on the estimation of many contingent events. As reported in the text, cost forecasts are over a period of 50 years. The conclusions are projections of the financial consequences of future contingent events and are subject to uncertainty. This is especially so given the high severity, low frequency nature of HLH claims. There may have been abnormal statistical fluctuations in the past and there may be such fluctuations in the future. Due to the inherent uncertainties in the estimation of future costs, it cannot be guaranteed that the estimates set forth in the report will not prove to be inadequate or excessive; actual costs may vary significantly from Mercer's estimates.

9. Some numbers quoted in the text and tables of this report may be recorded to more significant digits than their accuracy suggests. There are wide ranges of possible outcomes for the quantities calculated, the apparent number of significant digits notwithstanding.

10. Mercer's estimates include a provision for losses as provided by the HLH Statutes, as described in the text of this report. No other costs, including, but not limited to, administrative and defense costs, are included in Mercer's estimates.

11. The report was prepared for the sole use of the Cities, and distribution to others without Mercer's prior written consent is unauthorized.

12. In addition to the assumptions stated in the report, numerous other judgments and assumptions underlie the calculations and results presented herein.

13. The investment income assumptions presented in this report are assumed to be annual returns net of investment expenses and taxes, on the assets needed to secure the reserve and on the required program funding. Mercer made no assessment of the quality of the supporting assets or of their ability to earn the assumed rate. Additionally, as described in the text of the report, the impact of interest expense is significant.

14. These caveats and limitations notwithstanding, the conclusions represent Mercer's estimate of the actuarial status and funding requirements of the program as of the date of this report.