



# Ohio Bureau of Workers' Compensation Comprehensive Study

Financial Provisions: Net Asset Level

Financial Provisions: Excess Insurance and  
Reinsurance

Report 2.4

Deloitte Consulting LLP

Group 2

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Audit • Tax • Consulting • Financial Advisory.

# Contents

- Executive Summary ..... 1**
  - Introduction..... 1
  - Conclusions..... 1
- The Situation ..... 3**
  - Methodology ..... 3
  - Primary Constituents..... 4
- Information and Data Gathered ..... 5**
  - Interviews..... 5
  - Information/Data Request..... 5
- Review and Analysis ..... 6**
  - BWC Financial Risks and Peer Comparison ..... 6
  - Funding Ratio for the State Insurance Fund ..... 11
- Conclusions ..... 16**
  - Findings..... 16
  - Performance Assessment ..... 16
  - Recommendations..... 18
- Appendix A – Deliverable Matrix ..... 20**
- Appendix B – Net Asset Modeling Assumptions ..... 26**

# Executive Summary

## Introduction

Insurers require a prudent level of surplus (henceforth referred to as “net assets”) due to the financial risks associated with their operations. Regulators in the insurance industry devote considerable resources to analyzing net asset levels. Insurers’ financial strength ratings are highly dependent upon their actual net assets relative to indicative levels produced by various regulatory models of required capital based on the insurer’s characteristics.

The Bureau of Workers’ Compensation (“BWC”) shares many of the financial risks typical of the property and casualty insurance industry. Workers’ compensation claims are paid over many years, leading to uncertainty in the amount and timing of these payments. Investment returns of assets held to support these reserves are similarly uncertain. It is this uncertainty which gives rise to the need for net assets.

Unlike most insurance entities, the BWC has the authority to assess its policyholders. While this provides a certain degree of protection in the event that the BWC’s financial soundness becomes weakened, assessments place an added burden on policyholders and are likely to discourage employers from operating in Ohio. This is clearly counter to the goals of the BWC. As such, Deloitte Consulting has adopted the position that the ability to assess should not be considered in our recommendations. Assessments to preserve financial soundness should be viewed as a last measure of defense. Effective management of the BWC’s net asset level is a far superior goal, and is the focus of Deloitte Consulting’s analysis and recommendations.

## Conclusions

### Findings

The BWC has been less successful than its peers in maintaining stability in its operational results, and has been weak in maintaining prudent levels of net assets. The BWC is highly leveraged in its ratios of annual premium and loss reserves to net assets, indicating limited ability to maintain stability in pricing when adverse events occur and to absorb adverse emergence in loss reserves. Also, while there is little difference between the discount rate used for loss reserves and the investment return in recent years, there is little tolerance for shortfalls in the anticipated investment returns contemplated in the discount factor. There can be significant investment risk associated with using a discount rate which contemplates investment returns in excess of the risk-free rate unless there are prudent net assets to absorb the impact of adverse investment results. This has been demonstrated recently, as the BWC’s net assets deteriorated from \$2.5 billion as of June 30, 2008 to \$0.2 billion as of October 31, 2008 and \$0.9 billion as of November 30, 2008, due primarily to fluctuations in investment returns.

We recommend that the BWC adopt a policy to maintain prudent funded net assets to support the financial strength of the State Insurance Fund and to help maintain stability in premium costs for its policyholders. We do not recommend that the BWC adopt an insurance industry metric or a static measure, such as a fixed amount of net assets. Rather, we believe that a more customized approach is needed that is dynamic and self-adjusting. An example of this approach is to develop guidelines that are driven by a few key metrics, in particular a range of funded net assets to liability ratios (“funding ratios”) with appropriate recommended actions, depending on how recent, current and projected funding ratios compare to that range. The range of funding ratios should be selected so as to be responsive to changes, and to maintain a degree of stability in the BWC’s operating results over time. The policy should incorporate appropriate options for premium credits or surcharges if the funding ratios indicate excessive or inadequate financial reserves.

The development of an appropriate funding ratio measure is described in this Report. Included in this is consideration of a reserve risk margin in the actuarial reserves and use of a risk-free discount rate in the calculations.

The BWC has not historically purchased excess insurance and/or reinsurance. Many insurance entities, including state workers' compensation funds, use reinsurance to different degrees primarily as part of their risk management against adverse and extreme events. A key component of whether reinsurance is needed for the BWC is an evaluation of the BWC's financial strength and the potential adverse impact of shock events that could be covered by reinsurance. While the cost of reinsurance is not normally prohibitive, the benefit is mainly in providing financial protection against the impact of very rare or unlikely events. The purchase of reinsurance can provide relief in avoiding a cost recovery burden to employers if an extreme event occurs for a small reinsurance charge that can be loaded into the annual premium rates. We recommend that the BWC test the reinsurance market from time to time to determine if catastrophic reinsurance protection can be purchased at reasonable terms for a reasonable cost.

## Recommendations

Deloitte Consulting's primary recommendations for the BWC's management of its net assets are shown below. Our focus of this analysis is the State Insurance Fund, which includes the vast majority of the BWC's funded liabilities. Similar recommendations apply to the remainder of the BWC's Funds to the extent the liabilities are funded rather than pay-as-you-go:

- **Adopt a "Funding Policy":** The BWC should adopt a policy to maintain prudent funded net assets to support the financial strength of the State Insurance Fund and to help maintain stability in premium costs. The BWC should develop a customized approach, based on guidelines driven by a few key metrics, that is dynamic and self-adjusting.
- **Target a Funding Ratio Range:** The BWC should develop a funding ratio range, with appropriate recommended actions depending on how recent, current and projected funding ratios compare to that range.
- **Include Guidance in the Funding Policy:** If funding ratios indicate excessive or inadequate financial reserves, the BWC's funding policy should include appropriate guidance with respect to options such as premium credits or surcharges.
- **Consider Purchasing Catastrophic Reinsurance:** Limiting the impact of a catastrophic event to 5% to 10% of net assets would be consistent with industry practice. Deloitte Consulting recommends that the BWC periodically test the reinsurance market to determine whether catastrophic reinsurance can be purchased at reasonable terms for a reasonable cost.

The Deloitte Consulting team appreciates the considerable time and effort dedicated by BWC constituents over the course of this engagement.

# The Situation

RFP Task Reference	RFP Task Description	Task Category
<b>Section 5.1.2 #26, page 14</b>	Conduct a study on the amount of surplus/net assets that should be held by the BWC. This study should compare the BWC to industry standards and recommend appropriate methods of setting target surplus for the BWC and the appropriate discount rate.	<b>Net Assets &amp; Reinsurance</b>
<b>Section 5.1.2 #31, page 14</b>	Conduct an evaluation on the excess insurance or reinsurance requirements for the BWC including the need for excess coverage or reinsurance in the event of a catastrophic event. This evaluation should include the cost effectiveness of excess coverage or reinsurance, the ability of the BWC to handle a catastrophic event, and the stability in rates provided by excess insurance or reinsurance coverage. This study should include an evaluation of reinsurance requirements and a possible reinsurance program for the BWC.	<b>Net Assets &amp; Reinsurance</b>

The level of BWC's net assets currently appears to be very weak, and has varied significantly over the years. Linked closely with this variability is the fact that the ratio of the net assets to the reserves for claims and adjustment expense (actuarial audit reserves) is quite low in comparison to peers and industry standards. The ratio would be significantly lower if the reserves were not discounted to reflect the time value of money. In addition, not all of BWC's assets produce investment income, but instead there are significant assets for unbilled premiums that reflect future premiums to be charged when existing unfunded liabilities are projected to pay out (pay-as-you-go funding). Therefore, the present level of net assets provides little or no margin for various contingencies, such as the risk that the loss and loss expense reserves carried on the BWC's financial statement are underestimated or the risk that investment returns will yield less than the discount rate. For example, if the actuarial audit reserves are underestimated by 5%, then 6/30/08 net assets could be overstated by approximately 40%. If investment returns are 1% less than contemplated in the discount rate, then net assets as of 6/30/08 would be reduced by approximately 80%. BWC presently lacks a policy that addresses the financial strength of the BWC's funding, in terms of the level of the net assets or other measures to ensure appropriate financial security for the Ohio workers' compensation system.

As part of the BWC Comprehensive Study, this Report comprises Deloitte Consulting's deliverable of Section 5.1.2 Task #26 and #31 of the BWC's Request for Proposal (RFP).

## Methodology

Our approach to the study includes a comparison of BWC to its peers and analyses of the impact of specific scenarios and outcomes based on statistical analysis, with the objective of recommending methods of setting prudent net assets for BWC. There are some limitations in comparing BWC to other entities due to differences in organizational form, accounting standards, etc. We considered the major risks facing many insurance entities, including reserve risk, investment risk, extreme event risk, and pricing risk. The analysis leads to a recommended range of funding ratios based on these risks.

Please refer to the "Information & Data Gathered Section" of this Report for a list of information and data utilized by Deloitte Consulting.

## Primary Constituents

- **BWC Administrator, Chief Financial Officer and Chief Actuarial Officer** - Responsible for management of the BWC's financial strength;
- **BWC Actuarial Department** – Responsible for assessing reasonableness of the BWC's third party actuary's estimates of loss reserves as well as the third party actuary's rate recommendations; and
- **BWC Board of Directors and Actuarial Committee** – Responsible for approving rate changes, also the likely party to set and/or approve a policy for net assets.

# Information and Data Gathered

## Interviews

Deloitte Consulting practitioners presented initial findings related to the peer comparison and stochastic modeling of the BWC's SIF in July. Follow-up discussions were conducted with BWC leadership and staff. The following individuals were very helpful in answering our questions and responding to requests for information and data.

- Chief Actuary – Actuarial Department
- Director - Actuarial Department
- Assistant Director - Actuarial Department
- BWC Financial Officer
- BWC Director of Accounting

## Information/Data Request

Deloitte Consulting was provided financial information by responsible officers and employees of the BWC. Specifically, we were provided with the following:

### Provided by the BWC

- Unaudited financial statement for the year ending June 30, 2008;
- Audited financial statements for the years ending June 30, 2007, June 30, 2006, June 30, 2005, June 30, 2004, and June 30, 2003; and
- Allocation of invested assets among various asset classes as of June 30, 2008.

In addition, Deloitte Consulting researched peer and industry financial results, including the following:

- U.S. Competitive Funds;
- U.S. Monopolistic Funds;
- Australian Monopolistic Funds; and
- Canadian Monopolistic Funds

Lastly, Deloitte Consulting incorporated certain results from the analysis of the BWC's loss reserves into this study, specifically with respect to the BWC's funding ratio and recommended range of funding ratios. The data associated with the analysis of the BWC's loss reserves is shown in a separate Report. The key elements of the reserve analysis include the undiscounted and discounted actuarial central estimates of the SIF's funded liabilities, as well as the volatility of these estimates.

# Review and Analysis

## BWC Financial Risks and Peer Comparison

The BWC is subject to financial risks common to the insurance industry, including:

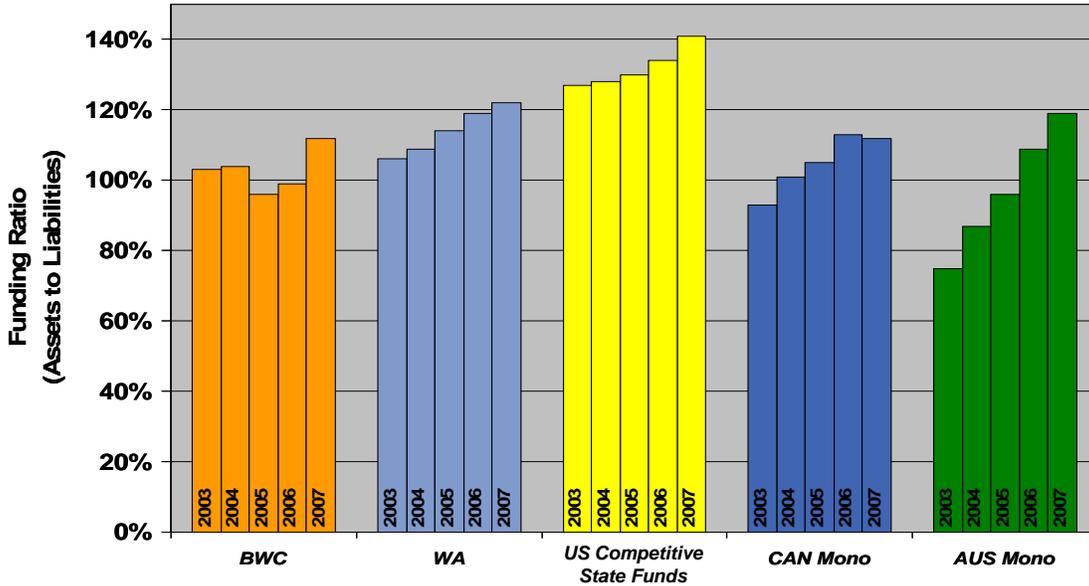
- **Reserve Risk** – the risk that the ultimate value of claims will differ from those projected in BWC’s financial statements;
- **Investment Risk** – the risk that the actual return from BWC’s investments will differ from those contemplated in the asset values;
- **Payment Pattern Fluctuations** – the risk that the timing of payments will differ from the expected pattern;
- **Frequency and Severity Trends** – the risk of unanticipated shifts in the number or cost of claims, including medical inflation;
- **Payroll Trend** – the risk of unanticipated decreases in the premium rate base;
- **Pricing Risk – the risk of delays in changing premium rates in reaction to trends;**
- **Catastrophe (“CAT”) Event Risk** – the risk of rare catastrophic events occurring which cause large losses to the BWC from a single event;
- **Economic Downturns** – the risk that macroeconomic conditions will cause simultaneous shocks, such as lower investment returns, lower payrolls, higher claim frequency, higher medical inflation, and faster payment patterns; and
- **Operational Risk** – the risk of failure of controls on claim payments, investment operations, expenses, inability to estimate reserve or premium needs, fraud or abuse from claimants or providers, judicial decisions, legislative changes, litigation settlements, etc.

Deloitte Consulting compared the BWC’s ability to withstand fluctuations resulting from these risks to various peers. The key metrics used for this purpose include:

- **Funding Ratio – the ratio of assets to liabilities;**
- **Operating Ratio** – the ratio of losses, loss expenses, and underwriting expenses, reduced for investment income, to earned premium;
- **Investment Yield** – the return on invested assets;
- **Reserve Leverage Ratio** – the ratio of loss reserves to net assets;
- **Risk-Based Capital Ratio** – the ratio of actual net assets to net assets representing Authorized Control Level as indicated by the National Association of Insurance Commissioner’s Risk-Based Capital formula;

## Funding Ratio

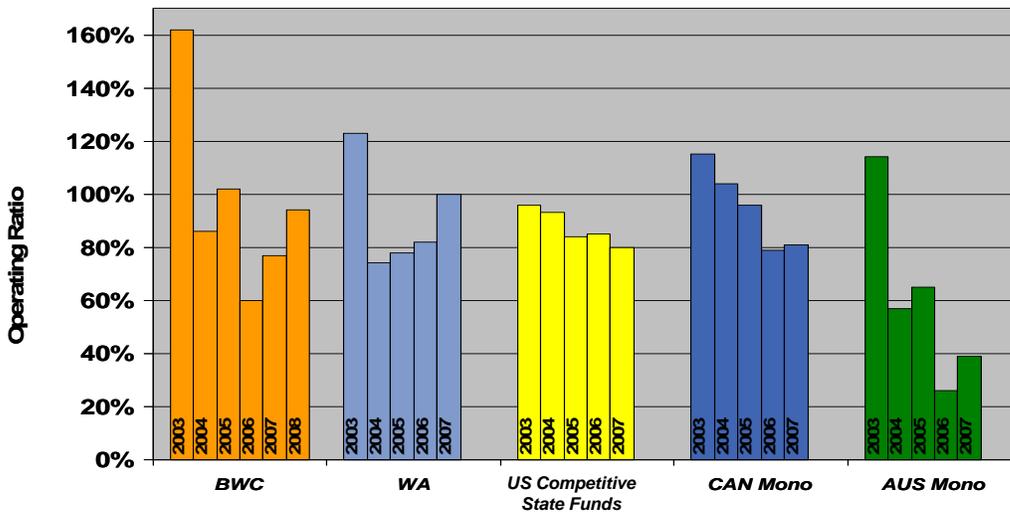
The chart below compares the BWC's funding ratio for the past several years to that of the peer group:



This chart shows the ratio of assets to liabilities for the 2003 to 2007 years for the BWC, as well as the peer group, which includes the state of Washington, US Competitive State Funds, Canadian monopolistic funds, and Australian monopolistic funds. It can be observed that the BWC's funding ratio is lower than that of its counterparts, and that while funding ratios have generally increased from 2003 to 2007, BWC's has remained relatively flat. This indicates that BWC is not as financially strong as its peers. Later in this report, we will focus on a more customized funding ratio for the BWC as a means of managing its financial strength.

## Operating Ratio

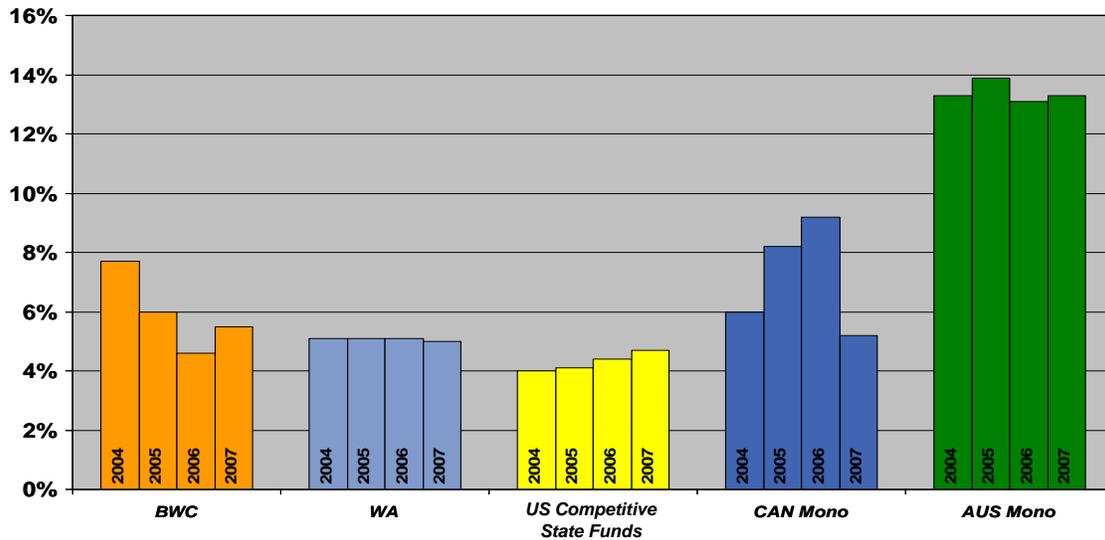
The chart below displays the BWC's operating ratio for the past six years in comparison to the peer group from the 2003 to 2007 period.



The operating ratio helps measure the success in maintaining stable operational results over the long term to support the workers' compensation system. The chart above indicates that the BWC has been less successful than its peers in maintaining stability in its operational results. The BWC appears to be exposed to significant risk from variability in operational results.

## Investment Yield

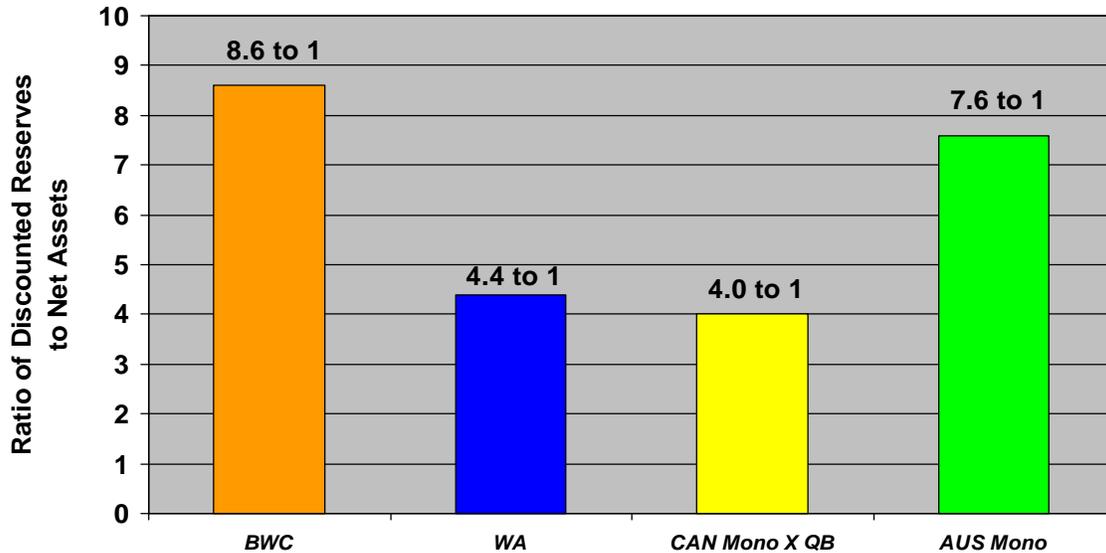
The chart below displays the BWC's investment yield from 2003 to 2007 in comparison to the peer group.



The annual investment return measures the ability to generate a consistent level of investment income to supplement and complement the insurance operations. For the BWC, the investment yield has been slightly higher than that of its peers on average. The BWC's historical returns have also been more unstable than its peers. While the investment yield is an important component for all workers compensation insurers, it is of particular significance to the BWC due to the fact that the BWC, unlike most insurers, discounts all of its loss and loss expense reserves. Discounting all loss and loss expense reserves relies on an implicit assumption that the discount rate will be recognized in the investment yield on the assets supporting the reserves over the life of the reserves. As the following charts will demonstrate, this assumption is critical to the BWC given the degree of leverage in the BWC's net assets relative to the loss and loss expense reserves.

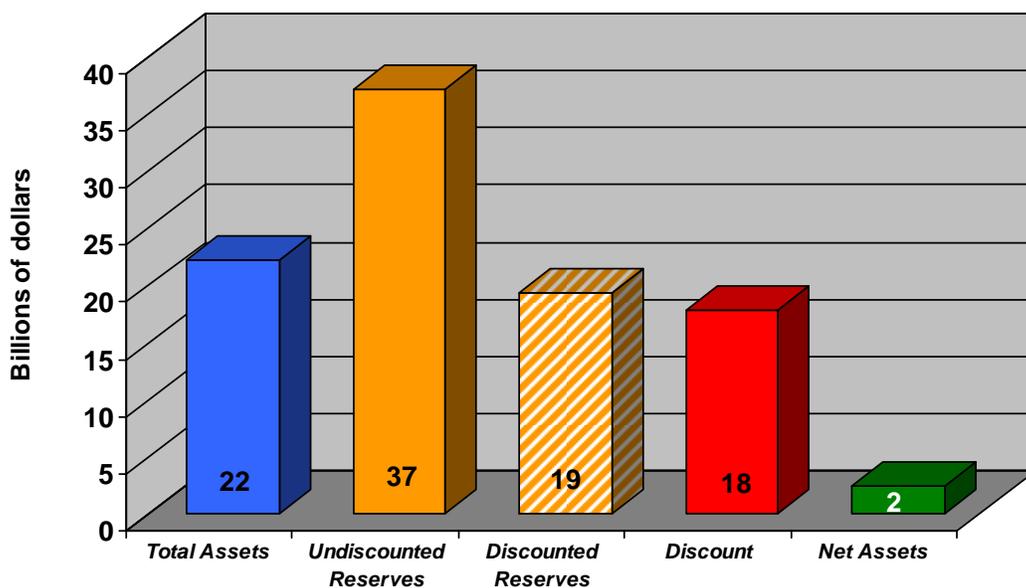
## Reserve Leverage Ratio

The chart below displays the ratio of discounted loss and loss expense reserves to net assets for the BWC and the peer group.



The ratio of loss and loss expense reserves to net assets helps measure the ability of an entity to withstand unexpected adverse loss development, acceleration in claims payments, and unanticipated changes in interest rates that vary from underlying assumptions. A high ratio of reserves to net assets indicates less ability to absorb such unexpected events. As can be seen above, the BWC's ratio of loss and loss expense reserves to net assets is higher than that of its peers, in most cases by a considerable margin. This is a strong indicator that the BWC's financial strength is relatively weak. The ratio of reserves to net assets for the workers compensation industry as a whole is much lower, less than 2.5 to 1, as of December 31, 2007.

Another means of viewing the BWC's leverage is shown in the table below.

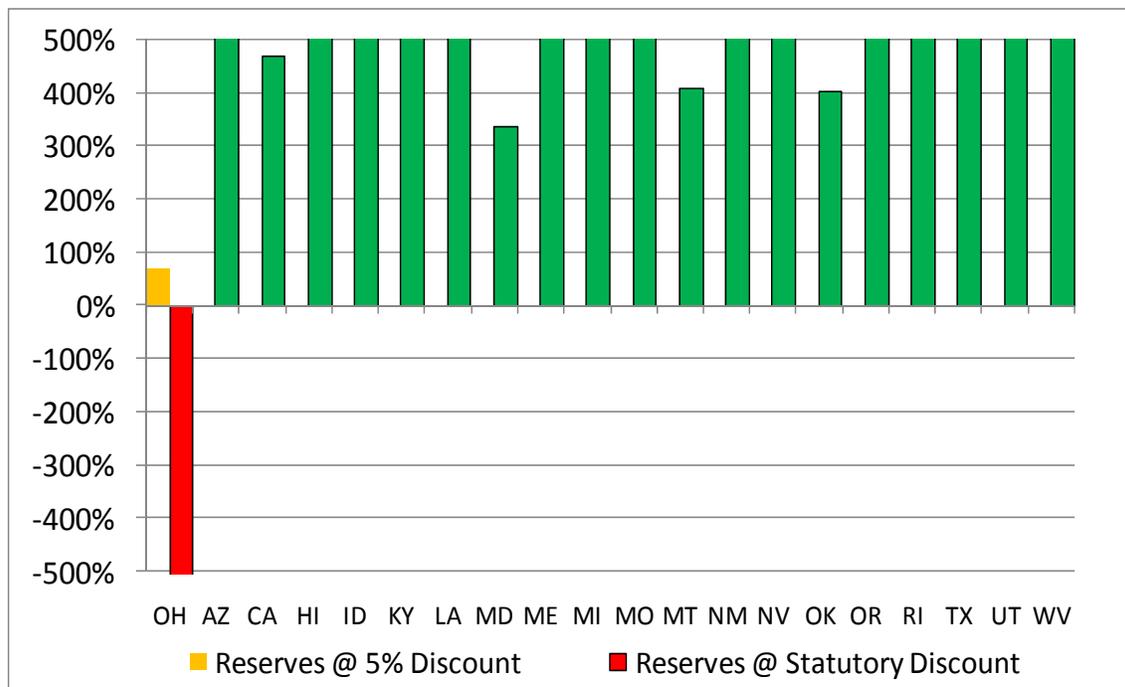


The table above compares the BWC's net assets (bar on the far right) to total assets, undiscounted reserves, discounted reserves, and reserve discount. The high degree of leverage is demonstrated by comparing the magnitude of the net assets to the other columns; a relatively small change to any of these items would have a pronounced effect on the net assets.

## Risk-Based Capital (“RBC”) Ratio

RBC is a tool used by the National Association of Insurance Commissioners (“NAIC”) to help gauge the financial strength of insurance companies. RBC is a formulaic approach to determining indicated capital needs based on various risks, including reserve risk, underwriting risk, and asset risk. If an insurer’s actual net assets fall below the level indicated by RBC, various actions may be taken, including potential regulatory control of the company. A key metric in RBC is Authorized Control Level (“ACL”) – this is the amount of capital below which the regulator has the option to take control of the company. The RBC ratio is the ratio of a company’s adjusted net assets to ACL. The most significant difference between adjusted net assets and actual net assets shown on the balance sheet for the BWC is non-tabular discount. Non-tabular discount refers to discount associated with reserves that are not life-time claims, and therefore do not have as predictable a payout stream as lifetime claims. Non-tabular discount is removed from the company’s net assets in determining adjusted net assets. The BWC discounts all reserves; the majority of this discount would be considered non-tabular for an NAIC-regulated company.

The BWC is not regulated by the NAIC, and as such is not subject to RBC requirements. However, RBC is a useful means of comparing the BWC’s financial strength to other insurers. The chart below displays the BWC’s RBC ratio (the ratio of net assets to RBC at the Authorized Control Level).



The orange bar at the far left of the chart shows the BWC’s estimated RBC ratio as of June 30, 2007 without adjusting net assets for non-tabular discount; in other words, net assets are not adjusted at all from those in the BWC’s actual financial statements. The red bar shows the BWC’s RBC ratio if net assets were to be adjusted by removing the estimated non-tabular reserve discount. We assumed that 75% of BWC’s reserve discount is non-tabular. This equates to a reduction to net assets of approximately \$13 billion. This adjustment reduces the BWC’s adjusted net assets from approximately \$2 billion to (\$12) billion, resulting in negative adjusted net assets. The BWC would be considered technically insolvent, and subject to mandatory regulatory control based on the NAIC’s approach. The chart above caps results at +/-500%. The chart above is a strong indication that the BWC’s financial strength significantly lags its peers.

# Funding Ratio for the State Insurance Fund

## Introduction

The BWC carried approximately \$19.4 billion of discounted loss reserves as of June 30, 2008. The majority of these loss reserves are provided for on a fully funded basis, consistent with typical property and casualty insurance industry practice. Certain liabilities, however, relate to programs which by statute are pay-as-you-go. These programs include the public state agencies (part of the State Insurance Fund), the Disabled Workers Relief Fund (although this fund was fully funded for a time, the majority of the liabilities are unfunded), and the Administrative Cost Fund. BWC's unfunded liabilities are offset by receivables in BWC's financial statements. The receivables are classified as unbilled future premiums and assessments. The total unbilled future premiums and assessments in BWC's financial statements as of June 30, 2008 are approximately \$3.3 billion.

Without a statute change, the BWC is unable to control the funding ratio associated with pay-as-you-go liabilities; it is maintained at 1:1 in BWC's financial statements. We therefore focused on BWC's funding ratio related to funded liabilities in the State Insurance Fund, the largest fund, with approximately \$15.7 billion of discounted loss and loss expense reserves as of June 30, 2008.

## BWC's SIF Funding Ratio as of June 30, 2008

For the BWC, we define the Funding Ratio as:

$$\frac{\text{Funded Assets}}{\text{Funded Liabilities}}$$

Funded Assets consist of cash, investments and current receivables less deposits and current payables. Funded assets can be viewed as those assets which are expected to generate investment income.

Funded Liabilities include reserves for funded unpaid claims and claim expenses, excluding any risk margin, discounted at a risk free discount rate.

Preliminary SIF results and Deloitte's estimates as of June 30, 2008 indicate:

<u>Funded Assets</u> (available to pay unpaid claims obligations)	<u>millions</u>
Cash and invested assets	15,809
Premium in course of collection	798
Accounts receivable less reserve for uncollectible	156
Retro premium receivables	282
Investment trade receivable	72
Accrued investment income	184
<u>Deductions</u>	
Premium payment security deposits	(88)
Warrants payable (outstanding checks)	(37)
Inter-fund receivables minus payables	(132)
<b>FUNDED ASSETS</b>	<b>17,044</b>

<b>Unpaid Claims Estimates</b>	
(undiscounted actuarial central estimate)	<b>millions</b>
PA (Funded)	19,094
PEC (Funded)	2,880
HPP Expense (Funded portion – PA & PEC)	1,175
<b>Undiscounted Liabilities (Funded)</b>	<b>23,149</b>
Discount factor @ risk-free rate (4%)	0.64
Discounted Liabilities (Funded)	14,714
<b>FUNDED LIABILITIES</b>	<b>14,714</b>

<b>Funded Assets</b>	<b>17,044 million</b>
<b>Funded Liabilities</b>	<b>14,714 million</b>
<b>Funding Ratio</b>	<b>1.158</b>

The funded assets of \$17.044 billion are taken directly from the BWC's preliminary June 30, 2008 financial statement. The funded liabilities above consist of several components estimated by Deloitte Consulting. These include:

- **Undiscounted actuarial central estimates of unpaid claims and claim expenses** for private employers ("PA") and public taxing districts ("PEC"), as well as the unpaid expenses associated with the PA and PEC portion of the Hospital Partnership Program ("HPP"). These estimates came from Deloitte Consulting's analysis of the actuarial audit reserves as part of Task 21 of this RFP and are described in the report for this task.
- **Discount factor applied to the undiscounted funded liabilities** based on Deloitte Consulting's estimated payout pattern of the unpaid claim and claim expenses and a risk-free discount rate, which was estimated to be 4.0%. The reason for using a risk-free discount rate is that there is risk in the timing and amount of cash flows. A higher rate, such as the BWC's 5-6% yield on invested assets on average over recent years, would result in a lower discount factor (i.e. more discount), but would not reflect the risk of the cash flows.

Deloitte Consulting's estimate of SIF funded liabilities is \$14.714 billion as of June 30, 2008. The BWC's actual SIF funded reserves in the audited June 30, 2008 financial statements is nearly identical to this amount, \$17.056 billion. However, this is based on undiscounted reserves that are higher than Deloitte Consulting's actuarial central estimate, and discounted at 5% leading to a higher amount of discount. These differences offset to yield similar results.

The estimated funding ratio for the SIF as of June 30, 2008 is therefore 17.044/14.714, or 1.158. We will next discuss a means for gauging the strength of this funding ratio.

## Developing a Targeted Range of Funding Ratios

Deloitte Consulting’s recommended approach to managing the BWC’s net assets is to develop a funding ratio range, with appropriate recommended actions depending on how recent, current and projected funding ratios compare to that range. In this section, we provide an example of how the funding ratio range could be developed. We emphasize that the BWC will need to make its own determination of the appropriate funding ratio range and actions when the actual funding ratio is near or beyond the extremes of the funding ratio range.

Deloitte Consulting’s approach to developing a funding ratio range considered the following risks:

- Reserve Risk:** risk that the unpaid claims and claim expenses will differ from those recorded in the BWC’s financial statements. Deloitte Consulting estimated unpaid claims and claim expenses at various confidence levels, including the 75th, 95th, and 99th percentiles as a means of quantifying the reserve risk of the SIF’s funded liabilities. In order to estimate reserves at these percentiles, Deloitte Consulting used a variation of bootstrapping, a simulation technique, based on variations in BWC’s past loss development patterns.
- Other Risks:** Deloitte Consulting estimated the impact of various scenarios on future funding ratios. The factors considered includes yield on invested assets, loss trends, exposure trends, and frequency trends. Deloitte Consulting included scenarios reflecting economic downturns and shock losses as a means of quantifying the estimated impact of such events on future funding ratios. Deloitte Consulting modeled the BWC’s funding ratios over a five year period. Deloitte Consulting simulated results by estimating a distribution for each of these variables and simulating, with and without the economic downturn. As with the reserve risk, the 75th, 95th, and 99th percentiles were considered. The assumptions underlying this analysis are shown in Appendix B.

The results of this analysis of BWC’s risks are shown below.

Percentile	75 <sup>th</sup>	95 <sup>th</sup>	99 <sup>th</sup>
Reserve Risk	1.05	1.10	1.15
Other Risks (combined) (no economic downturn vs. simulated downturns)	1.05 – 1.20	1.10 -1.25	1.15-1.30
<b>Overall Funding Ratio – Target Range</b>	<b>1.20 to 1.50</b>		

The Reserve Risk and the Other Risks are combined to produce an overall indicated funding ratio range of 1.20 to 1.50. As mentioned above, the indicated SIF funding ratio is approximately 1.158 as of June 30, 2008, which is slightly below the low end of the indicated funding ratio range. The BWC would need to increase net assets by approximately \$0.6 billion in order to reach the low end of the indicated range of 1.20. The BWC would need to increase net assets by approximately \$5.0 billion in order to reach the high end of the indicated range of 1.50. The derivation of these figures is shown below.

	Preliminary 6/30/08	Target Funding Ratio	Target Funding Ratio
Funding Ratio	1.158	1.20	1.15
Funded Liabilities	14,714 million	14,714 million	14,714 million
Target Assets		17,656 million	22,071 million
Funded Assets	17,044 million		
Additional Net Assets Needed		612 million	5,027 million

## Conclusions

Overall, this analysis supports the conclusion that the BWC's current financial strength is relatively weak, although the picture is not as bleak as that which was suggested by the peer company comparison, particularly the RBC analysis.

## Excess Insurance and Reinsurance

The BWC has not historically purchased excess insurance and/or reinsurance. Many insurance entities, including state workers' compensation funds, use reinsurance to different degrees primarily as part of their risk management against adverse and extreme events. A key component of whether reinsurance is needed for the BWC is an evaluation of the BWC's financial strength and the potential adverse impact of shock events that could be covered by reinsurance. While the cost of reinsurance is not normally prohibitive, the benefit is mainly in providing financial protection against the impact of very rare or unlikely events. The purchase of reinsurance can provide relief in avoiding a cost recovery burden to employers if an extreme event occurs for a small reinsurance charge that can be loaded into the annual premium rates.

A small reinsurance cost, as a percent of premium, should not unduly affect premium rates, but would provide some reinsurance protection against major catastrophic events. If a major event occurs, reinsurance will lessen the financial stress on BWC's financial strength and reduce the need to increase premium rates. Based on information from the industry, the reinsurance premium for coverage above high per occurrence limits such as \$100 or \$200 million is generally about 1-2% of the limit provided by the reinsurer in excess of the retention. To the extent similar terms are available to the BWC, this would represent a relatively small cost when spread to the BWC's policyholders.

Our analysis of the BWC's risks associated with future funding ratios included consideration of the impact of an extreme event, specifically a terrorist attack. We estimated the impact of such an event to the BWC to be approximately \$0.8 billion in undiscounted losses. While the BWC has not historically sustained catastrophic losses, there is a risk, however slight, that such a loss could occur. Our analysis indicates that one catastrophic loss could significantly impact the BWC's net assets as of June 30, 2008.

We recommend that the BWC test the reinsurance market from time to time to determine if catastrophic reinsurance protection can be purchased at reasonable terms for a reasonable cost. Limiting the impact of a catastrophic event to 5% to 10% of net assets would be consistent with industry practice.

# Conclusions

## Findings

The BWC lacks a policy on managing net assets. We understand that the BWC is currently engaged in developing such a policy, which we highly recommend. In this report, we have discussed a methodology that can be used for developing a key metric, the funding ratio, as a tool for evaluating the BWC’s financial strength and reacting in accordance with this evaluation.

Based on our comparison of the BWC to a peer group and our review of the BWC’s funding ratio relative to an indicative range of targeted funding ratios derived by Deloitte Consulting, we believe that the BWC is relatively weak in terms of its financial strength. We recommend that the BWC develop its own view of an appropriate range of funding ratios and take appropriate action as a result. The BWC may wish to consider the impact of purchasing catastrophic reinsurance protection as one tool to help manage the funding ratio prospectively.

## Performance Assessment

We assessed the performance of the Ohio workers’ compensation system compared to these four overarching themes: Effectiveness & Efficiency; Financial Strength & Stability; Transparency; and Ohio Economic Impact. Each broad study element (Ohio Benefit Structure; Pricing Process; Cost Controls; Financial Provisions; and Actuarial Department Functions & Resources) is reviewed with these themes in mind to develop a performance assessment of the current state. Our performance assessment is made on each element in the context of its contribution to supporting the overarching themes.

For these performance assessments, the following scoring method applies:

-  Strongly supports system performance
-  Supports system performance
-  Some support for system performance
-  Some opportunity for system performance change/enhancement
-  Significant opportunity for system performance change/enhancement

Based on this scoring method, the performance assessment for the net assets is as follows:



**Peers and Industry Standards Considered**

State workers' compensation funds, Canadian provincial funds, Australian funds.

The performance assessment for reinsurance is as follows:



**Peers and Industry Standards Considered**

US Competitive State Funds, US Monopolistic Funds where information was available, information from reinsurance market on catastrophic reinsurance of workers' compensation.

# Recommendations

The following comprise Deloitte Consulting's recommendations for the BWC's management of its net asset level and its reinsurance needs.

- **Adopt a “Funding Policy”** - The BWC should adopt a policy to maintain prudent funded net assets to support the financial strength of the State Insurance Fund and to help maintain stability in premium costs.
- **Develop a Customized Approach** – The BWC should develop an approach that is dynamic and self-adjusting, driven by a few key metrics.
- **Target a Funding Ratio Range** – The BWC should develop a funding ratio range, with appropriate recommended actions depending on how recent, current and projected funding ratios compare to that range.
- **Include Guidance in the Funding Policy** – If funding ratios indicate excessive or inadequate financial reserves, the BWC’s funding policy should include appropriate guidance with respect to options such as premium credits or surcharges.
- **Limit the Impact of a Catastrophic Event to 5-10% of Net Assets** - The BWC should consider purchasing catastrophic reinsurance as a means of limiting its exposure to single events.
- **Consider Purchasing Catastrophic Reinsurance** - Limiting the impact of a catastrophic event to 5% to 10% of net assets would be consistent with industry practice. Deloitte Consulting recommends that the BWC periodically test the reinsurance market to determine whether catastrophic reinsurance can be purchased at reasonable terms for a reasonable cost

## Impact

The impact (high, moderate, or low) of these net asset level recommendations as they relate to the overarching themes is shown in the following table:

	Effectiveness & Efficiency	Financial Strength & Stability	Transparency	Ohio Economic Impact
Adopt a Funding Policy with Guidelines & Metrics				
Target a Funding Ratio Range & Recommended Actions				
Policy Guidance with Premium Options based on Funding Ratio				

The impact (high, moderate, or low) of the recommendations for excess insurance/reinsurance as they relate to the overarching themes is shown in the following table:

	Effectiveness & Efficiency	Financial Strength & Stability	Transparency	Ohio Economic Impact
Limit impact of CAT event to 5-10% of Net Assets				
Test Reinsurance Market for CAT Protection				

**Legend**

High Impact	Moderate Impact	Low Impact	No Impact	Adverse Impact

The Deloitte Consulting team is available to clarify or amplify any issues raised in this report. We express our appreciation for BWC process constituents' time, effort, and guidance in completing this integral task of our comprehensive study.

# Appendix A – Deliverable Matrix

## Group 2 Study Elements

<b>Ohio Benefit Structure</b>
<b>Award Categories</b>
1) Compensation Types
2) Benefit and Compensation Levels
3) Number of Benefit Types

<b>Pricing Process</b>
<b>Statewide Rate Level</b>
1) Administrative Cost Calculation

<b>Cost Controls</b>
<b>MCO Effectiveness</b>
<b>Medical Payments to Providers</b>

<b>Financial Provisions</b>
<b>Loss Reserves</b>
1) Current Actuarial Audit Reserve Methodology
2) Independent Review
3) Expected Payments Established by Independent Actuarial Consultant
4) Loss Reserve Margins and Discount Factor
5) Performance Assessment Implications
<b>Net Asset Level</b>
1) Methods for Setting Net Asset Targets
2) Risk Margins
3) Disclosure
<b>Excess Insurance and Reinsurance</b>
1) Cost Effectiveness, Catastrophic Events, and Rate Stability

Ohio Benefit Structure Areas

Award Benefit Types	Tasks Involved
1) Compensation Types	23. Conduct a study of the benefits and compensation paid by the BWC compared to industry peers. This study would include an analysis of all compensation types and their application by the BWC.
2) Benefit and Compensation Levels	
3) Number of Benefit Types	

Pricing Process Areas

Statewide Rate Level	Tasks Involved
1) Administrative Cost Calculation	27. Conduct a study on the administrative cost calculation used in employer rates. This evaluation should include a review of the allocated and unallocated loss adjustment expenses of the BWC.

Cost Controls Areas

MCO Effectiveness	Tasks Involved
MCO Effectiveness	30. Conduct a study on the effectiveness of Managed Care Organizations (MCO) in the workers' compensation system. This analysis would include an evaluation of the effectiveness of the use of MCOs, the payments to MCOs relative to the benefits received, the advantages and disadvantages of the MCO approach, the medical cost trends since MCO implementation, and a comparison to industry standards.
Medical Payments to Providers	Tasks Involved
Medical Payments to Providers	25. Conduct a study on the medical payments to providers in Ohio and provide a comparison to industry peers. This study should recommend changes/improvements to BWC's medical payment structure in line with industry standards.

## Financial Provisions Areas

Loss Reserves	Tasks Involved
1) Current Actuarial Audit Reserve Methodology	21. Review the actuarial audit reserves established by the BWC's independent actuarial consultant to establish objective quality management principles and methods by which to review the performance of the workers' compensation system.
2) Independent Review	
3) Expected Payments Established by Independent Actuarial Consultant	15. Evaluate the methodology and reasonability of the expected payments established by the BWC's independent actuarial consultant.
4) Loss Reserve Margins and Discount Factor	
5) Performance Assessment Implications	21. See above.

Net Asset Level	Tasks Involved
1) Methods for Setting Net Asset Targets	26. Conduct a study on the amount of surplus/net assets that should be held by the BWC. This study should compare the BWC to industry standards and recommend appropriate methods of setting target surplus for the BWC and the appropriate discount rate.
2) Risk Margins	
3) Disclosure	

Excess Insurance and Reinsurance	Tasks Involved
1) Cost Effectiveness, Catastrophic Events, and Rate Stability	31. Conduct an evaluation on the excess insurance or reinsurance requirements for the BWC including the need for excess coverage or reinsurance in the event of a catastrophic event. This evaluation should include the cost effectiveness of excess coverage or reinsurance, the ability of the BWC to handle a catastrophic event, and the stability in rates provided by excess insurance or reinsurance coverage. This study should include an evaluation of reinsurance requirements and a possible reinsurance program for the BWC.

Pricing Process Areas – continued

Ancillary Funds	Tasks Involved
1) Coal Workers Pneumoconiosis	7. Review and make written recommendations with regard to the Coal-Workers Pneumoconiosis Fund. This review would include a complete analysis of the rating program. This analysis should compare the methodology used in BWC's rating calculation to industry standards the actuarial standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries.
2) Marine Industry Fund	10. Review and make written recommendations with regard to the Marine Industry Fund. This analysis should compare the methodology used in BWC's rating calculation to industry standards and the Actuarial Standards of Practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries.
3) Disabled Workers' Relief Fund	13. Review and make written recommendations with regard to the Disabled Workers' Relief Funds. This analysis would include a complete analysis of the funds including but not limited to the loss information, payroll information, and other rating calculations. This analysis should compare the methodology used in BWC's rating calculation to industry standards and the Actuarial Standards of Practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries.

# Appendix B – Net Asset Modeling Assumptions

**OHIO BUREAU OF WORKERS' COMPENSATION  
NET ASSET STOCHASTIC MODELING - STATE INSURANCE FUND  
Model Input and Underlying Assumptions**

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;"><b>Lognormal</b></td></tr> <tr><td style="text-align: center;">6.0%</td></tr> <tr><td style="text-align: center;">3.0%</td></tr> </table>	<b>Lognormal</b>	6.0%	3.0%	<p><b>Reserve Variation as of 6/30/08</b> Distribution Assumption (Process Risk) Medical CV assumption Compensation CV assumption</p>			
<b>Lognormal</b>							
6.0%							
3.0%							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;"><b>Standard Normal</b></td></tr> <tr><td style="text-align: center;">(1+ x%) * paid %</td></tr> <tr><td style="text-align: center;">2.0%</td></tr> <tr><td style="text-align: center;">2.0%</td></tr> </table>	<b>Standard Normal</b>	(1+ x%) * paid %	2.0%	2.0%	<p><b>Payment Pattern Variation</b> Distribution Assumption Stochastic Variation (Multiplicative factor applied to expected incremental payment pattern) (Factor x expected incremental paid % of unpaid)</p> <p><b>Medical Compensation</b></p>		
<b>Standard Normal</b>							
(1+ x%) * paid %							
2.0%							
2.0%							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;"><b>Lognormal</b></td></tr> <tr><td style="text-align: center;">(1+ x%) * severity</td></tr> <tr><td style="text-align: center;">6.0%</td></tr> <tr><td style="text-align: center;">3.0%</td></tr> </table>	<b>Lognormal</b>	(1+ x%) * severity	6.0%	3.0%	<p><b>Variation in Projected Annual Severities</b> Distribution Assumption Stochastic Variation (Multiplicative factor applied to expected annual average severity) Medical CV assumption Compensation CV assumption</p>		
<b>Lognormal</b>							
(1+ x%) * severity							
6.0%							
3.0%							
<p>1 in X # of Years</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">100</td></tr> <tr><td style="text-align: center;">200</td></tr> <tr><td style="text-align: center;">100</td></tr> <tr><td style="text-align: center;">200</td></tr> <tr><td style="text-align: center;">200</td></tr> </table>	100	200	100	200	200	<p><b>Extreme Event Modeling (CAT/Terrorism Loss)</b> <u>Assumed Probability of a City being Hit based on a Binomial Distribution Stochastic Modeling</u> Akron-Cleveland Cincinnati Columbus Dayton Toledo</p>	
100							
200							
100							
200							
200							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">300</td></tr> <tr><td style="text-align: center;">154</td></tr> <tr><td style="text-align: center;">420</td></tr> <tr><td style="text-align: center;">70</td></tr> <tr><td style="text-align: center;">150</td></tr> </table>	300	154	420	70	150	<p><u>Assumed City Labor Force Populations in thousands</u> Akron-Cleveland Cincinnati Columbus Dayton Toledo</p>	
300							
154							
420							
70							
150							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">0.5%</td></tr> <tr><td style="text-align: center;"><b>Lognormal</b></td></tr> <tr><td style="text-align: center;">1.0%</td></tr> </table>	0.5%	<b>Lognormal</b>	1.0%	<p><u>Assumed % of a City's Labor Force being affected by a Single Event that are insured by BWC</u> Assumed % of a City's Labor Force being affected by a Single Event that are insured by BWC Distribution Assumption Standard Deviation Assumption</p>			
0.5%							
<b>Lognormal</b>							
1.0%							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">5%</td></tr> <tr><td style="text-align: center;">30%</td></tr> <tr><td style="text-align: center;">30%</td></tr> <tr><td style="text-align: center;">20%</td></tr> <tr><td style="text-align: center;">10%</td></tr> <tr><td style="text-align: center;">5%</td></tr> </table>	5%	30%	30%	20%	10%	5%	<p><u>Assumed Labor Force Distribution by Age</u> 15-20 20-30 30-40 40-50 50-60 60</p>
5%							
30%							
30%							
20%							
10%							
5%							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">80</td></tr> <tr><td style="text-align: center;">500</td></tr> <tr><td style="text-align: center;">200%</td></tr> </table>	80	500	200%	<p><u>Assumed Benefits per Employee Affected by Extreme Event</u> Average Age of Death 2009 Average Weekly Compensation Benefit Average Medical Benefit as a % of Average Indemnity Benefit</p>			
80							
500							
200%							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">5%</td></tr> </table>	5%	<p>Post-Event Maximum Additional CAT Load in Future Premiums</p>					
5%							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">250,000</td></tr> <tr><td style="text-align: center;">250,000</td></tr> <tr><td style="text-align: center;">1.14%</td></tr> <tr><td style="text-align: center;">2,849</td></tr> <tr><td style="text-align: center;">1</td></tr> </table>	250,000	250,000	1.14%	2,849	1	<p><u>Reinsurance Assumptions</u> Retention (000) Limit (000) Assumed Rate on Line Assumed Annual Premium Number of Reinstatements per Annum</p>	
250,000							
250,000							
1.14%							
2,849							
1							

**OHIO BUREAU OF WORKERS' COMPENSATION  
NET ASSET STOCHASTIC MODELING - STATE INSURANCE FUND  
Model Input and Underlying Assumptions**

**Reinsurance Cost (% of Subject Premium)**

		Retention			
		100,000	150,000	200,000	250,000
Limit	50,000	2.00%	1.70%	1.50%	1.35%
	100,000	1.85%	1.60%	1.43%	1.29%
	150,000	1.73%	1.52%	1.36%	1.24%
	200,000	1.64%	1.45%	1.30%	1.19%
	250,000	1.56%	1.38%	1.25%	1.14%

**TRIA (Terrorism Event)**

**Trigger and Limit**

100,000	Industry Event Trigger (000)
100,000,000	Industry Limit (000) = \$100 Billion
27,500,000	Event less than this = Surcharges included in Premium subsequent to the event to pay back Federal Government
30.0%	Assumed % of the Event Losses that are WC
30,000	Industry Event Trigger adjusted to reflect WC Only Trigger
30,000,000	Industry Event Limit adjusted to reflect WC Only Limit
8,250,000	Event less than this = Surcharges included in Premium subsequent to the event to pay back Federal Government

**Trigger and Limit**

20.0%	Retention = % of Prior Year's Gross Premiums
85.0%	Government Coinsurance up to the point of the WC Only Limit

10.0%	Estimated % of Extreme Events that are Terrorism
-------	--

**Surcharges included in Premium subsequent to the event to pay back Federal Government**

3.0%	Maximum Annual Percent of Premium
------	-----------------------------------

**Underlying Return Assumptions**

**Risk Free Rate (Assumptions) - Cox, Ingersoll, and Ross Approach**

3.6%	Expected Long Term Rate
3.0	Speed of adjustment to long term average in Years
0.4%	Standard error of residuals

**Fixed Income - Government Bond - Investment Return**

4.6%	Expected Long Term Rate
85.0%	Slope (from regression with risk free rate)
1.5%	Y-intercept (from regression with risk free rate)
0.6%	Standard error of residuals

**Fixed Income - Corporate Bond - Investment Return**

5.5%	Expected Long Term Rate
70.0%	Slope (from regression with risk free rate)
3.0%	Y-intercept (from regression with risk free rate)
1.0%	Standard error of residuals

**Equity (Stock) Investment Return**

6.5%	Expected Long Term Rate
55.0%	Slope (from regression with risk free rate)
4.5%	Y-intercept (from regression with risk free rate)
2.0%	Standard error of residuals

**Estimated Mix of Invested Assets ( Based on Investment Policy )**

**Distribution Assumption**

**Government Bonds**

Normal	Mean
57.0%	Standard Deviation
3.0%	

**Corporate Bonds**

22.0%	Mean
3.0%	Standard Deviation

**Equities**

20.0%	Mean
3.0%	Standard Deviation

**Cash & All Other**

1.0%	Mean
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## OHIO BUREAU OF WORKERS' COMPENSATION NET ASSET STOCHASTIC MODELING - STATE INSURANCE FUND Model Input and Underlying Assumptions

### Underlying Inflationary Trend Assumptions

<b>General Inflation = Payroll Trend</b>	
3.5%	Expected Long Term Trend
85.0%	Slope (from regression with risk free rate)
0.4%	Y-intercept (from regression with risk free rate)
1.0%	Standard error of residuals

<b>Medical Trend</b>	
7.0%	Expected Long Term Trend
55.0%	Slope (from regression with risk free rate)
5.0%	Y-intercept (from regression with risk free rate)
2.0%	Standard error of residuals

<b>Compensation Trend</b>	
0.0%	Expected Gap from Payroll Trend

<b>Loss Reserve Discount Rates</b>	
5.0%	Medical
5.0%	Compensation

<b>Frequency Trend net of Payroll Trend</b>	
0.0%	Expected Long Term Trend
1.0%	Standard error of residuals used in Stochastic Analysis

### Other Assumptions associated with Financial Statements

<b>Cash Flow</b>	
1.2%	Underwriting Expenses Paid as % of Premium Collected in determining Underwriting Cash Flow

<b>Income Statement</b>	
3.0%	Provision for Uncollectibles as a % of Premium
0.5%	Other Operating Income as a % of Premium
4.0%	Other Administrative as a % of Premium
0	Premium Reductions & Refunds
0	Operating Transfers Out

<b>Balance Sheet</b>	
35.0%	Uncollected Premium % of Premium
175.0%	Other Assets % of Premium
25.0%	Other Liabilities % of Premium

### Economic Down Turn

<b>Probability of Occurrence</b>	
35.0%	Probability of Occuring in Years 2009 through 2011
7.5%	Probability of Occuring in Years 2012 - 2020 if not occur in 2009-2011
20.0%	Absolute Percentage Increase in Probability of Occurrence after a CAT Year

<b>Impacts</b>	
2.0%	Percentage Drop in Annual Investment Returns
5.0%	Percentage Drop in Exposures ( Payroll )
5.0%	Increase in Claim Frequency after Exposure Trend
3.0%	Increase in Medical Inflation
10.0%	Acceleration in Claim Payments

<b>Recovery Time</b>	
3	Length of Time in Years to Recover to Normal

### Cap on Overall Premium Rate Changes

10.0%	Maximum Annual Increase
-10.0%	Maximum Annual Decrease

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