New Jersey Schools Insurance Group
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www.njsig.org

Board of Trustees Meeting of September 20, 2017
Action Item
Reserve Study as of June 30, 2017

Representatives from Willis Towers Watson (WTW) will be presenting NJSIG's reserve study at the September 20, 2017 NJSIG meeting.

The first 25 pages of the 06/30/17 WTW Reserve Study draft (dated September 6, 2017) are attached.

The WTW study presents the 06/30/17 actuarially determined liability estimates for:

1. **Estimated Net Unpaid Loss and Allocated Loss Adjustment Expense (ALAE)**
2. **Unallocated Loss Adjustment Expense (ULAE)**

These liabilities are reflected at the 65% confidence level in the financials for NJSIG's 2016/2017 fund year.

Estimated Net Unpaid Loss and Allocated Loss Adjustment Expense (ALAE) liability:

WTW has estimated NJSIG's net unpaid loss and ALAE liabilities in a range for the 2016/2017 fund year. The estimated ultimate liability is shown by confidence levels. The 50% confidence level is $198,156,000. They also opined at the 65%, 75% and 90% levels, which yielded reserves of $210,135,000, $220,666,000 and $243,434,000, respectively. The higher the confidence level the more conservative the estimated ultimate liability.

For the 2016/2017 fund year, NJSIG has chosen the same 65% confidence level from last year. This 65% confidence level at 2016/2017 results in a $210,135,000 ultimate unpaid loss and ALAE liability.

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Unallocated Loss Adjustment Expense (ULAE) liability:

WTW also performed an additional reserving analysis for 2016/2017 to determine NJSIG's liability for unpaid claim adjustment expense and unpaid losses and loss/claim adjustment expense. Their analysis resulted in Unallocated Loss Adjustment Expense (ULAE) liability amounts according to confidence levels. The 50% confidence level is $8,300,000. They also opined at the 65%, 75% and 90% levels, which yielded reserves of $8,800,000, $9,200,000 and $10,200,000, respectively. Again, the higher the confidence level the more conservative the estimated ULAE liability.

NJSIG has chosen a confidence level of 65% for the 2016/2017 year resulting in an $8,800,000 ULAE liability

The 2016/2017 recommendation is to use the WTW's 65% confidence level of $210,135,000 of ultimate unpaid loss and ALAE liabilities and $8,800,000 of ULAE liabilities. These liabilities result in a $7.1 million increase (for the ultimate unpaid loss and ALAE) and a $7.3 million decrease (for ULAE) to NJSIG's 2016/2017 change in position. Prior to any 2016/2017 Safety Grant declarations, the resulting 2016/2017 net change in position will increase NJSIG's surplus from $68.2 million to $87.1 million. (Any Safety Grant allocation will decrease the 2016/2017 surplus by the exact safety grant amount.)

Recommended Resolution: Approve the reserve study as presented in the WTW's draft and presentation at the September 20, 2017 meeting and adopt the 65% confidence level estimates of ultimate unpaid loss and ALAE liability and the ULAE liability from the WTW reserve study of June 30, 2017. The 65% confidence level estimates are $210,135,000 for the unpaid loss and ALAE liability and $8,800,000 for the ULAE liability.

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Michele Carosi

Michele Carosi, Comptroller

Willis Towers Watson

New Jersey Schools Insurance Group

Estimated Net Liabilities as of June 30, 2017

Revised Draft

September 6, 2017

September 6, 2017

Mr. William Mayo
Executive Director
New Jersey Schools Insurance Group
450 Veteran's Drive
Burlington, NJ 08016-1268

Dear Bill:

Enclosed please find our report regarding the loss and allocated loss adjustment expense liabilities as of June 30, 2017 for the New Jersey Schools Insurance Group (NJSIG). This revised draft report includes the estimated ULAE liability.

This draft report is intended for discussion purposes only, and should not be relied upon by NJSIG or referenced or distributed to third parties without Willis Towers Watson's express written consent. We look forward to the opportunity to discuss our analysis and findings with you and will issue a final report shortly thereafter, which will replace this draft.

Attention is called to the *Distribution* section of the final report, which sets out the limits on distribution of the report.

The authors of this report are members of the American Academy of Actuaries and we meet its qualification standards to render the actuarial opinion contained herein.

We have enjoyed working on this analysis for you. Please contact either of us with any questions.

Sincerely,

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Purpose and Scope

Willis Towers Watson was retained by the New Jersey Schools Insurance Group (NJSIG or the Group) to prepare an actuarial analysis of NJSIG's loss and allocated loss adjustment expense (ALAE) experience for the purpose of developing estimates of net unpaid loss and ALAE as of June 30, 2017.

This report was prepared for the internal use of NJSIG management to present our findings with respect to this analysis. It is our understanding that NJSIG management will consider our findings for the purposes of establishing liability estimates for external financial reporting and internal management reporting.

Our report is not intended or necessarily suitable for any other purposes.

The exhibits attached in support of our conclusions are an integral part of this report. These sections have been prepared so that our actuarial assumptions and judgments are documented. Judgments about the analysis and findings presented in this report should be made only after considering the report in its entirety. Our projections are predicated on a number of assumptions as to future conditions and events. These assumptions are documented in subsequent sections of this report, and should be understood in order to place the actuarial estimates in their appropriate context. In addition, the projections are subject to a number of reliances and limitations, as described in subsequent sections of this report.

We are available to answer any questions that may arise regarding this report. We assume that the user of this report will seek such explanation on any matter in question.

In this report, we provide estimates of NJSIG's net unpaid loss and ALAE as of June 30, 2017 on several bases representing various intended measures. These include an actuarial central estimate, as well as estimates above the actuarial central estimate. These estimates were arrived at through the evaluation of the results of various actuarial methods and models applied to NJSIG's experience. As such, the derivation of these estimates does not include consideration of extreme events, which are considered to have a remote possibility of occurring. The higher confidence level estimates are intended to present measures of the Group's unpaid loss and ALAE that consider risk margins or outcomes that may be considered unlikely, but that are not remote. We consider the actuarial central estimate suitable for use in financial reporting contexts. The higher estimates may not be suitable for this purpose.

Our analysis was based on data evaluated as of June 30, 2017. We received additional information as of August 7, 2017. No account whatsoever has been taken in the projections of developments or data received subsequent to August 7, 2017.

As requested by NJSIG, our analysis included the following coverages:

- Workers Compensation (WC)
- General Liability (GL)
- Auto Liability (AL)
- Auto Physical Damage (APD)
- Errors and Omissions (E&O)
- Property

Our analysis was performed net of ceded excess insurance/reinsurance, net of deductibles, and net of future salvage and subrogation. We have assumed that all of NJSIG's ceded excess insurance/reinsurance and other recoveries will be valid and collectible.

All loss amounts are stated on an undiscounted basis as regards future investment income.

Throughout this report, the use of the term loss without modification includes loss and ALAE, but does not include unallocated loss adjustment expense (ULAE).

Distribution

Our report is delivered under the following terms and conditions:

- This report is provided to NJSIG solely for the intended purpose, and may not be referenced or distributed to any other party without our prior written consent
- This report has been prepared for use by persons technically competent in the areas covered and with the necessary background information
- Draft versions of this report must not be relied upon by any person for any purpose
- A copy of this report may be shared with your auditors solely in the context of their performing regular audit activities
- You shall not refer to us or include any portion of this report in any shareholder communication or in any offering materials or fairness opinion provided by your professional advisors prepared in connection with the public offering or private placement of any security
- This report may be shared with your affiliates, provided that you ensure that each such affiliate complies with the terms above and the applicable statement of work as if it were a party to them, and you remain responsible for such compliance

In addition, we understand that NJSIG may wish to provide copies of this report to its broker, Willis Towers Watson, and current or prospective reinsurers or excess insurers and the New Jersey Department of Banking and Insurance (the Recipients). Permission is hereby granted for such distribution on the conditions that:

- The Actuarial Report is distributed in its entirety
- Each Recipient agrees not to reference or distribute the report to any other party
- Each Recipient recognizes that the furnishing of this report is not a substitute for its own due diligence and agrees to place no reliance on this report or the data contained herein that would result in the creation of any duty or liability by Willis Towers Watson to such party
- Each Recipient understands that such RECIPIENT IS DEEMED TO HAVE ACCEPTED THESE TERMS AND CONDITIONS by retaining a copy of this report

We accept no responsibility for any consequences arising from any third party relying on this report. If we agree to provide this report to a third party, you are responsible for ensuring that the report is provided in its entirety, that the third party is made aware of the fact that they are not entitled to rely upon it, and that they may not distribute the report to any other party.

This report contains workpapers, trade secrets, and confidential information of both NJSIG and Willis Towers Watson. Because of the nature of the material contained in the report, it is not intended to be subject to disclosure requirements under any Freedom of Information Act or similar laws.

Background

Overview

In 1983, the New Jersey school districts joined to create a workers compensation partnership under the sponsorship of the New Jersey School Boards Association. Since that time membership has expanded and loss exposures covered by the Group have increased. Beginning in 2014, the Group changed its name to the New Jersey Schools Insurance Group. NJSIG is governed by a Board of Trustees, comprised of superintendents, school board members and business administrators from member districts.

NJSIG retains a portion of the following exposures:

- Workers Compensation
- General Liability
- Auto Liability
- Auto Physical Damage
- Errors and Omissions (7/1/02 through 6/30/08 only)
- Property

We note that for E&O, APD and property, coverage is over a member deductible.

All claims are self-administered by NJSIG.

Changes in Operations and Business Environment

Effective with the July 1, 2015 coverage year, the E&O program is reinsured with QBE and all claims are handled by a third party administrator, Summit. This change should have no impact on the findings herein given that all E&O claims where NJSIG has liability are closed and the change was implemented subsequent to June 30, 2015. Effective July 1, 2017, the claims management system was changed. Based on input from NJSIG, we do not anticipate that this change will impact the findings herein.

Based on discussions with NJSIG management, we are not aware of any other recent changes in its claim, underwriting, reinsurance or any other aspect of the Group's operation or business environment that would be expected to materially affect the methods or assumptions used in this analysis. Consequently, we have not made any adjustments to the data, methods, assumptions or parameters implied by the Group's historical data to account for such changes.

Reinsurance

NJSIG retentions by coverage and year are summarized below.

NJSIG LOSS RETENTIONS ($000s)

Policy Period	WC	GL	E&O	AL	Property
10/83-6/85	$150	--	--	--	--
7/85-6/87	500	$200	--	$200	$250
7/87-6/88	500	250	--	250	250
7/88-6/91	500	250	--	250	150
7/91-6/98	350	250	--	250	150
7/98-6/01	350	100	--	100	150
7/01-6/02	350	100	--	100	1,000
7/02-6/03	500	500	1,000	500	1,000
7/03-6/08	1,000	500	1,000	500	1,000
7/08-6/17	1,000	500	--	500	1,000

These retentions refer to losses only. ALAE is shared pro-rata with NJSIG's reinsurers once the retained limit has been pierced. Deductibles inure to the benefit of the reinsurer/excess insurer. All coverages are written on an occurrence form, except for E&O which is written on a claims-made basis. NJSIG also issues tail liability coverage for E&O business.

APD coverage is unlimited.

NJSIG's retentions are also subject to inner aggregates as follows:

- 7/1/1993 through 6/30/1998 – $250,000 excess of $250,000 for AL, GL and excess of $350,000 for WC losses and ALAE with aggregate of $250,000
- 7/1/1998 through 6/30/2002 – $500,000 excess of $100,000 for AL, GL and excess of $350,000 for WC losses and ALAE with aggregate of $500,000
- 7/1/2002 through 6/30/2003 – $500,000 excess of $500,000 for AL, GL and WC losses and ALAE with aggregate of $500,000
- 7/1/2003 through 6/30/2008 – $500,000 excess of $500,000 for AL and GL losses and ALAE with aggregate of $500,000

Terminology

Accident Year: Includes all claims that occurred during the "accident period", e.g., accident year July 1, 2016 through June 30, 2017 would include all claims occurring during that period, regardless of when they were reported.

Allocated Loss Adjustment Expense (ALAE): ALAE refers to defense, litigation and medical cost containment expenses, whether internal or external (e.g., attorney fees for defense, cost of engaging experts, etc.).

Case Reserves: The estimate of unpaid loss (or loss and ALAE) amounts established by the claim department for unpaid claims that have been reported to NJSIG. Case reserves are established on an individual claim basis.

Earned Premium: The pro rata portion of written premium that represents the earned portion of the insurance contract as of a given point in time.

Exposure: The units in which the insurer's exposure to loss are measured. In NJSIG's case, exposures are defined as payroll, average daily attendance, number of vehicles or total insured value.

Frequency: Claims per unit of exposure.

IBNR: IBNR stands for claims Incurred But Not Reported. In this report, we have used the term in its broader, more general sense, to represent development on outstanding case reserves (also referred to as supplemental or IBNER – Incurred But Not Enough Reported) and unreported claims (also referred to as "pure" IBNR or IBNYR – Incurred But Not Yet Reported).

Loss: The use of the term loss without modification includes loss and ALAE, but does not include ULAE.

Loss Adjustment Expense (LAE): The term LAE includes both allocated and unallocated loss adjustment expense. See definition of unallocated loss adjustment expense below.

Loss Development Factors: Factors used to project losses and/or ALAE to their ultimate value. These factors adjust actual losses to include IBNR and case reserve adequacy, or total unpaid amounts, to produce an estimate of total or ultimate loss (and/or ALAE).

Loss Reserves: A liability item on the entity's balance sheet to provide for unpaid claims. It consists of two components – case reserves and IBNR reserves.

Paid Loss: The amount of money that has been paid by the entity on behalf of insureds to cover claims of the insured.

Pure Premium: Loss (or loss and ALAE) per unit of exposure.

Reported Loss: The total of paid loss and case reserves for known claims.

Report Year: Includes all claims reported during the report period that occurred subsequent to the retroactive date of the coverage, e.g., report year July 1, 2016 through June 30, 2017 with a retroactive date of July 1, 2016 would include all claims arising from accident year 2016/17 that were reported in 2016/17. (Generally used to analyze claims-made policy experience.)

Severity: Average loss per claim.

Unallocated Loss Adjustment Expense (ULAE): Those loss adjustment expenses not included within ALAE (e.g., fees of adjusters, attorney fees incurred in the determination of coverage, etc.).

Written Premium: The total premium that is charged for policies with effective dates during the accounting period.

Findings

Based on our analysis of NJSIG's experience at June 30, 2017, and subject to the considerations set forth in the *Reliances and Limitations* section, we have reached the following conclusions.

Estimated Net Loss and ALAE Liabilities as of June 30, 2017

The actuarial central estimate of net liabilities by coverage and in total is summarized in the table below and in Summary, Exhibit 1, Sheets 1 through 3. We also provide various confidence level estimates as shown below and on Summary, Exhibit A. For example, the 65% confidence level liabilities are $210.1 million, which means that there is an estimated 65% probability that the future payments associated with these liabilities will be less than or equal to $210.1 million. The risk margins presented on Exhibit A are based on a combined accident period and coverage basis and reflect the historical retention levels for each coverage. Had we developed risk margins by coverage and accident period, the results at higher confidence levels would be greater than those shown on Exhibit A.

The various confidence level estimates shown below, and on Summary Exhibit A, are derived using Monte Carlo simulation techniques.

NET UNPAID LOSS AND ALAE ESTIMATES AFTER DEDUCTIBLE AS OF JUNE 30, 2017 ($000s) – CENTRAL ESTIMATE

Coverage	Case Reserves	IBNR	Total Liability
Workers Compensation	$104,178	$58,563	$162,741
General Liability	12,603	12,663	25,265
Auto Liability	2,413	5,832	8,245
Auto Physical Damage	90	(54)	37
Errors and Omissions	0	0	0
Property	1,030	355	1,385
Inner Aggregate	363	120	483
Total	$120,678	$77,478	$198,156
Confidence Levels			
65%			$210,135
75%			220,666
90%			243,434

Comparison with Prior Analysis

A comparison of our current central net ultimate loss and ALAE estimates for the 2015/16 and prior accident years to our analysis as of June 30, 2016 is as follows.

COMPARISON OF NET ULTIMATE LOSSES AND ALAE
($000s)

Accident Year	June 2016	June 2017	Percent Change
2003/04 and Prior	$264,884	$264,403	0%
2004/05	41,560	41,497	0%
2005/06	45,481	45,713	+1%
2006/07	41,919	41,900	0%
2007/08	47,713	46,701	-2%
2008/09	45,812	45,246	-1%
2009/10	58,132	58,491	+1%
2010/11	52,154	50,506	-3%
2011/12	58,635	55,842	-5%
2012/13	55,165	54,073	-2%
2013/14	72,999	70,612	-3%
2014/15	69,546	64,255	-8%
2015/16	63,594	59,447	-7%
Total	$917,594	$898,687	-2%

Overall, the estimated ultimate losses for 2015/16 and prior accident years improved by 2% or about $18.9 million.

Changes in ultimate loss estimates are influenced by several factors which affect the frequency and severity of claims. Frequency can be impacted by general economic factors as well as members' focus on safety and attitude toward loss control. The frequency by year is particularly significant for lines such as E&O, where the volume of claims is low. Severity is influenced by inflation (e.g., medical costs, social inflation, public attitudes), claims handling practices and NJSIG's retention level. Higher retentions generally lead to increased volatility in severity results by accident year. Details of the changes by lines of business are as follows:

- Workers Compensation: Indicated ultimate net loss and ALAE decreased by $14.3 million from our June 2016 analysis for coverage years 2015/16 and prior, driven by favorable severity emergence across most accident years.

- General Liability: In total, ultimate net loss and ALAE decreased by $65,000 since our June 2016 analysis. Unfavorable experience caused by greater than expected loss emergence in 2004/05 and large loss emergence in years 2006/07, 2012/13 and 2013/14 was more than offset by stable or favorable experience in all other years.

- Auto Liability: Results for all years improved approximately 7% or $2.3 million. All years showed favorable or stable loss development since the June 30, 2016 analysis except 2010/11 which was primarily impacted by deterioration on a single large claim. Frequency has been generally declining since 2000/01 through 2011/12 and has been relatively flat from 2011/12 through 2016/17. The average severity increased significantly for the 2008/09 through 2016/17 years but shows considerable volatility by year.

- Auto Physical Damage: Overall our ultimate loss and ALAE estimates decreased by $302,000, driven by the 2012/13, 2014/15 and 2015/16 accident years. The favorable results were partially offset by deterioration in the 2008/09 year. Frequency has been relatively stable over the last five years, which means that variation across these years is severity driven.

- Errors and Omissions: We note that all claims have been closed for the accident years where NJSIG retained liability (2002/03 to 2007/08) since June 30, 2015 and we assume no further IBNR.

- Property: Deterioration in 2012/13 was more than offset by stable or favorable loss emergence in all other years. Both frequency and severity results for all accident years were generally as expected. Overall, ultimate net loss and ALAE decreased by $1.9 million.

- Aggregate: Our estimate for all years remained stable. There was some improvement in the underlying workers compensation experience for 2002/03 which did not impact the aggregate, since the aggregate layer was exceeded on an all coverages combined basis.

Historical Loss Ratios/Pure Premiums/Severity/Frequency

On Exhibit 1, Sheet 2 of each coverage section, we derive various diagnostic ratios of total loss costs based on the central estimate net ultimate losses. For all coverages combined, the net loss ratio increased significantly in 2009/10 and has stayed at the higher level through 2016/17. The 2013/14 and 2014/15 accident year loss ratios were particularly high, driven by unfavorable results for all coverages except auto liability and auto physical damage. Observations by coverage are as follows:

- Workers Compensation – The frequency of claims decreased steadily between 2000/01 and 2016/17, which is consistent with broader industry trends. The estimated ultimate loss ratios have been generally increasing from 2007/08 through 2014/15. The 2015/16 and 2016/17 years are showing considerably improvement over the prior two years which were influenced by winter storm related claims.

- General Liability – Severity for the 2008/09 and subsequent years is significantly higher than the prior levels. Claims frequency is showing improvement in the 2012/13 through 2015/16 accident years. The loss ratio increases are driven primarily by severity. There is also an increase in the frequency and severity of large claims in excess of the historical levels in the 2008/09, 2009/10, 2012/13 and 2013/14 years. The reported claim counts for 2016/17 are unusually high as of June 30, 2017 relative to historical levels. Our ultimate loss estimate for the 2016/17 year reflects historical frequency and severity levels. If these reported claims are consistent with historical claims, our ultimate loss estimate could be understated, perhaps materially.

- Automobile Liability – The frequency of paid claims over the last six years (2011/12 through 2016/17) is relatively flat and significantly lower than for the prior years. The average severity and loss ratio has been volatile across all years. The most recent seven years (2008/09 to 2014/15)

are showing a significant severity increase over the prior levels except for 2012/13, primarily due to large loss activity.

- Auto Physical Damage – The reported claim frequency generally decreased from 2000/01 through 2015/16; the 2016/17 year reported frequency increased significantly. However, the frequency of claims that close with a payment decreased at a much slower rate through 2008/09 and the rate of decrease subsequent to 2008/09 has been similar to the reported frequency decrease. The loss ratios for the 2008/09 through 2012/13 accident years are at a significantly higher level than all other years, driven by rate changes and storm activity (2011/12 and 2012/13 years).

- Property – The average loss ratio for the 2015/16 and 2016/17 years improved significantly from the average 2006/07 through 2014/15 level. This decrease was driven by lower frequencies and severities for both years. The 2007/08, 2009/10, 2011/12 and 2013/14 results reflect both large loss activity and an increased frequency of claims. These large claims are generally due to burst pipes and asbestos abatement. The increase in frequency for claims between $500,000 and $1 million is notable for the 2007/08 year. Subsequent to the 2007/08 coverage year, the coverage document was modified to exclude asbestos abatement losses.

Unallocated Loss Adjustment Expense

We derived ULAE indications for NJSIG based on two commonly used methods: a cost per claim "touched" method and an industry ratio method. Our results are presented on Summary, Exhibit B, sheet 1 and below.

ESTIMATED ULAE LIABILITIES AS OF JUNE 30, 2017 ($000s)

Method	Central Estimate	65% Conf Level	75% Conf Level	90% Conf Level
Cost per claim touched	$8,222	$8,719	$9,156	$10,101
Industry ratio	8,471	8,983	9,433	10,407
Selected ULAE liabilities	$8,300	$8,800	$9,200	$10,200

Details of the ULAE by coverage and accident period at the 65% confidence level are on Summary, Exhibit B, Sheet 2.

Analysis

For each line of coverage reviewed, our analysis consisted of the steps outlined below.

Various projection methods are used to determine unlimited ultimate losses for each year. We adjust the estimated ultimate losses for claims which have pierced the retention. We then subtract limited paid losses from the net ultimate losses to estimate outstanding liabilities. The estimates are developed on a nominal basis and do not contain a provision for adverse experience.

Development Patterns

Our projection of future claim reporting and payment is based on NJSIG's historical experience. Using historical loss development experience provided by NJSIG, we select report-to-report (RTR) development factors.

In lines of business with lengthy development characteristics, loss development will often continue beyond the greatest maturity level reflected in the underlying data. When necessary, we have estimated development tail factors by reviewing comparable benchmarks developed internally by Willis Towers Watson along with the known development progression reflected in NJSIG's experience.

Benchmark patterns are constructed internally by Willis Towers Watson, drawing upon available relevant sources of loss development data. Benchmarks are revised periodically as new information and trends emerge. While each entity's own development can be expected to vary from the benchmark based on individual circumstances, we believe the benchmark is an appropriate supplement to the analysis of entity data, as it represents our current judgment as to the typical emergence of loss that can be expected for that class of coverage.

The selected development patterns are used for both the loss development and Bornhuetter-Ferguson projection methods.

Initial Expected Losses

The selected initial expected losses (IELs) are based on a review of the results of our June 30, 2016 analysis, the 2017/18 rate level analysis and observed trends.

Selected Ultimate Losses

In general, the selected ultimate losses are based on the results of five projection methods: the reported and paid development methods, the reported and paid Bornhuetter-Ferguson methods, and the frequency/severity method. Our selections are based on judgment reflecting the range of estimates produced by the methods and the strengths and weaknesses of each method. These methods are described in the final section of this report. We also calculated the implied severities and pure premiums as a reasonability check.

Estimated Claim Frequency, Severity, Pure Premiums and Loss Ratios

We use our projections of ultimate claim counts and losses to estimate reported claims and claims with payment frequencies (reported claims per exposure unit and claims with payment per exposure unit), claim severity (losses per claim with payment), and pure premium (losses per exposure unit).

Our frequency calculation relies on NJSIG's exposure data. Our selection of ultimate counts is based on projections of both reported claims and claims with payments. These selections are compared to exposures to determine estimated claim frequency. To derive the severity component, we divide the projected ultimate losses by ultimate claims with payment.

We also calculate pure premiums by dividing the net retained ultimate losses by NJSIG exposures and loss ratios by dividing the net retained ultimate losses by net premium.

Estimated Outstanding Net Liabilities as of June 30, 2017

We use our loss estimates and NJSIG's historical payments to estimate outstanding net liabilities as of June 30, 2017. We first adjust the ultimate loss selections to reflect NJSIG's reinsurance, deductibles and other recoveries. Indicated liabilities as of June 30, 2017 are calculated by subtracting the net loss payments from the estimated retention-adjusted ultimate losses.

Using the reported and paid losses and ALAE for workers compensation, auto liability and general liability, we compile claims that fall into the inner aggregate layers and estimate liabilities based on case reserves and the potential for further development of large losses into these layers. Details are shown in Exhibit 2 of the Summary section.

Unallocated Loss Adjustment Expense

We derived ULAE indications based on two commonly used methods: a cost per claim "touched" and an industry ratio method. Our results are presented on Summary, Exhibit B and in the ULAE section.

The cost per claim "touched" method is displayed in ULAE, Exhibit 1. This method models claim run-off activity based on NJSIG's claim development. A historical cost per claim "touched" is developed based on the latest six years of NJSIG ULAE payment per claim data. This cost is trended 1.5% annually.

The industry ratio method applies an average unpaid ULAE ratio to 100% of NJSIG's incurred but not reported (IBNR) losses and to 50% of NJSIG's case reserves. The average unpaid ULAE ratio is based on industry data. See Section ULAE, Exhibit 2, Sheets 1 and 2 for details.

Variation from Expected Results

We use the results of our analysis to estimate NJSIG's experience at various confidence levels. These estimates are derived using computer simulation techniques. Claim frequency is assumed to occur according to a Poisson probability distribution, and the costs associated with these claims (severity) are assumed to follow a lognormal distribution. These distributions are commonly used in the actuarial profession as models for claim frequency and claim severity, respectively.

A simulation model of this type cannot capture all or completely describe all of the dynamic forces that impact property and casualty losses. Such a model can, however, provide considerable insight into the range of potential fluctuations of losses.

The simulation is based on estimates for property and liability of (1) the number of open claims and expected IBNR claims, (2) the estimated average severities, and (3) a coefficient of variation (CV) that measures the severity variability of a probability distribution in relation to its mean. These parameters are based on our analyses of NJSIG's experience through June 30, 2017.

General Overview of Exhibits

Exhibit 1 of the Summary section (Summary, Exhibit 1, Sheets 1 through 4) presents a summary of our analysis. Summary, Exhibit 2, Sheets 1 and 2 show the derivation of the inner aggregate liability by accident year. A comparison of current and prior estimated ultimate losses is found in Summary, Exhibit 3.

Each subsequent section of exhibits (WC, GL, AL, APD, EO, and Property) documents our analysis for each line of coverage. Exhibits are set up similarly for each section except EO.

Exhibit 1: Sheet 1 – Summary of estimated central estimate, net ultimate losses and indicated liabilities as of June 30, 2017

Sheet 2 – Average severities, frequencies, pure premiums and loss ratios, net of reinsurance and recoveries and gross of deductibles

Exhibit 2: WC, GL, AL, APD & Property: Summary of loss projections and selected central estimate ultimate losses by year

EO: Summary of Data

Exhibit 3: WC, GL, AL, APD & Property: Reported loss development method projections

EO: Large loss listing with recoveries by claim

Exhibit 4: WC, GL, AL, APD & Property: Paid loss development method projections

Exhibit 5: WC, GL & AL: Frequency/Severity projection method

APD & Property: Reported count development method projection

Exhibit 6: WC, GL & AL: Reported count development method projection

APD & Property: Claim count with payment development method projection

Exhibit 7: WC, GL & AL: Claim count with payment development method projection

APD & Property: Summary of data

Exhibit 8: WC, GL & AL: Summary of data

APD & Property: Large loss listing with recoveries by claim

Exhibit 9: WC, GL & AL: Large loss listing with recoveries by claim

APD & Property: Actual versus Expected Loss and ALAE

Exhibit 10: WC, GL & AL: Actual versus Expected Loss and ALAE

For ULAE, exhibits are set up as follows.

Exhibit 1: Derivation of the paid ULAE per claim touched based on historical data and application of the average ULAE cost, trended, to the expected claims volume in each subsequent fiscal year (2018 through 2039)

Exhibit 2: Sheet 1 – Estimation of ULAE liabilities based on application of the industry ratio to NJSIG IBNR and case reserves

Sheet 2 – Derivation of industry unpaid ULAE to unpaid loss and ALAE ratios

Exhibit 3: Estimation of newly reported claims and closed claims by calendar year

Reliances and Limitations

Inherent Uncertainty

Projections of loss and ALAE liabilities are subject to potentially large errors of estimation, since the ultimate disposition of claims incurred prior to the financial statement date, whether reported or not, is subject to the outcome of events that have not yet occurred. Examples of these events include jury decisions, court interpretations, legislative changes, changes in the medical condition of claimants, public attitudes, and social/economic conditions such as inflation. Any estimate of future costs is subject to the inherent limitation on one's ability to predict the aggregate course of future events. It should therefore be expected that the actual emergence of loss and ALAE will vary, perhaps materially, from any estimate. Thus, no assurance can be given that NJSIG's actual loss and ALAE will not ultimately exceed the estimates contained herein. In our judgment, we have employed techniques and assumptions that are appropriate, and the estimates presented herein are reasonable, given the information currently available.

The inherent uncertainty associated with loss and ALAE liability estimates is magnified in this case due to the following circumstances.

- NJSIG's mix of business is weighted toward coverages such as workers compensation and general liability for which the estimation of unpaid loss is more uncertain than for shorter-tailed property and casualty lines.
- NJSIG has relatively high per-occurrence retentions, which increases the uncertainty associated with our liability estimates.
- The geographic concentration of NJSIG could cause adverse results due to legislative or judicial changes or catastrophic events (e.g., hurricanes).

Note that a quantification of this uncertainty would likely reflect a range of reasonable favorable and adverse scenarios, but not necessarily a range of all possible outcomes. Further, the proper application of any range is dependent on the context. NJSIG's financial reports are governed by accounting standards, and such standards vary among jurisdictions. Under current accounting standards, the ends of a range that is illustrative of uncertainty would likely not be suitable for financial reporting purposes.

Data Reliance

Throughout this analysis, we have relied on historical data and other quantitative and qualitative information supplied by NJSIG. We have not independently audited or verified this information; however, we have reviewed it for reasonableness and internal consistency. We have assumed that the information is complete and accurate, and that we have been provided with all information relevant to the analysis of NJSIG's ultimate losses and ALAE. The accuracy of our results is dependent upon the accuracy and completeness of the underlying data; therefore, any material discrepancies discovered in this data should be reported to us and this report amended accordingly, if warranted.

We note that there were three items where data was inconsistent or incomplete. We do not believe that the items listed below have a material impact on our estimates.

- Net premium for the 2000/01 year for several of the coverages appears unusual compared to subsequent years and reported exposures. Also the 2003/04 year premium for E&O is not consistent with the exposures and premium for other coverage years. Both years' premiums are consistent with data provided for our prior analysis.
- Net premium for 2009/10 and subsequent years for GL was provided net of reinsurance med pay premiums. Prior to 2009/10, GL net premiums included this amount. The impact of this change is approximately 5% of premium.

Complete and consistent data is a critical component of actuarial analyses; incomplete and/or inconsistent data increases the uncertainty associated with our estimates.

Risk Margins

The mathematical techniques underlying our estimate of the risk margin are intended to provide a rough approximation of the potential variations in losses. This estimate reflects only the potential "process" risk (defined as the risk associated with the projection of future contingencies that are inherently variable, even when the parameters are known with certainty) and some portion of the "parameter risk" (where "parameter" risk is defined as the risk that the parameters used in the methods or models are not representative of future outcomes) based on the assumed loss model and the selected parameters and our selected model for estimating parameter risk. Additional "parameter" and "model" risk (i.e., "Model" risk is the risk that the methods are not appropriate to the circumstances or the models are not representative of the specified phenomenon) exists and is not reflected by the risk margins estimated in our model.

Extraordinary Future Emergence

We have not anticipated any extraordinary changes to the legal, social, or economic environment that might affect the cost, frequency, or future reporting of claims. In addition, our estimates make no provision for potential future claims arising from loss causes not represented in the historical data (e.g., new types of mass torts or latent injuries, terrorist acts, etc.) except insofar as claims of these types are included but not identified in the reported claims and are implicitly analyzed.

Excess Insurance/Reinsurance Collectibility

Our estimates are presented net of excess insurance/reinsurance. Based solely on inquiries made of senior management, we understand that none of NJSIG's reinsurance is considered uncollectible. An independent evaluation of the quality of security provided by NJSIG's excess insurers/reinsurers is outside the scope of our engagement. We have assumed that all of the entity's excess insurance/reinsurance protection will be valid and collectible. Contingent liability may exist for any excess insurance/reinsurance recoveries that may prove to be uncollectible. Should such liabilities materialize, they would be in addition to the net liability estimates contained herein.

Underlying Assets

We have not examined the assets underlying NJSIG's outstanding liabilities and we have formed no opinion as to the validity or value of these assets. We have assumed throughout the analysis that NJSIG's outstanding loss liabilities are backed by valid assets with suitably scheduled maturities and/or adequate liquidity to meet cash flow requirements.

Self-Insurance Risk

When reviewing our findings, it is important to note certain implications of a self-insurance group. The entire retained risk remains with the members of the self-insurance group, which likely exposes the members to greater potential fluctuations in financial experience than does a first dollar insurance program. The members of NJSIG should have sufficient financial capacity to reserve for and withstand those fluctuations. Actual losses in excess of projected losses will have to be paid by NJSIG members. It is not possible to estimate such fluctuations completely accurately; however, the effects of such fluctuations can be reduced by the funding of a provision for contingencies (a margin for the risk of adverse deviation from the expected loss levels).

An important factor bearing on a self-insured group's financial capacity is the existence of an excess insurance/reinsurance program. Excess insurance/reinsurance is generally considered an integral part of programs with the potential for catastrophic losses; workers compensation, property and liability losses are characterized by this potential.

Nothing in this report should be construed as recommending that NJSIG members should or should not self-insure these coverages. Many factors other than the outstanding liability level should be considered in that decision.

Data and Information

NJSIG provided the following data and information for use in this analysis:

- For each line of coverage, gross paid and reported loss and ALAE development data, evaluated as of each coverage year-end through June 30, 2017
- For each line of coverage, reported and claims with payment count development data, evaluated as of each coverage year-end through June 30, 2017
- For each line of coverage, recoveries (salvage, subrogation and excess insurance) as June 30, 2017
- Gross and net earned premium information for each calendar year by coverage
- Exposure data for each accident year by coverage
- History of claims handling procedures
- Calendar year ULAE costs for 2011-12 through 2016-17
- Claims detail for each coverage as of June 30, 2017
- A description of NJSIG's excess insurance/reinsurance agreements

Description of Projection Methods

The choice of method to estimate ultimate losses should consider, among other things, the line of coverage, the number of years of experience, and the age of the accident year being developed. In general, these methods can be applied to losses, ALAE, and various measures of claim count.

Reported Loss Development Method

The reported development method is based upon the assumption that the relative change in a given year's reported loss estimates from one evaluation point to the next is similar to the relative change in prior years' reported loss estimates at similar evaluation points. In utilizing this method, actual annual historical reported loss data is evaluated. Successive years can be arranged to form a triangle of data.

RTR development factors are calculated to measure the change in cumulative reported costs from one evaluation point to the next. These historical RTR factors and comparable benchmark factors form the basis for selecting the RTR factors used in projecting the current valuation of losses to an ultimate basis. In addition, a tail factor is selected to account for loss development beyond the observed experience. The tail factor is based on trends shown in the data and consideration of external benchmarks.

This method's implicit assumption is that the relative adequacy of case reserves has been consistent over time, and that there have been no material changes in the rate at which claims have been reported or paid.

Paid Loss Development Method

The paid development method is similar to the reported development method; however, case reserves are excluded from the analysis. While this method has the disadvantage of not recognizing the information provided by current case reserves, it has the advantage of avoiding potential distortions in the data due to changes in case reserving methodology.

This method's implicit assumption is that the rate of payment of claims has been relatively consistent over time.

Reported Bornhuetter-Ferguson Method

The reported Bornhuetter-Ferguson (B-F) method is essentially a blend of two other methods. The first method is the loss development method whereby actual reported losses are multiplied by an expected loss development factor. For slow reporting coverages, the loss development method can lead to erratic and unreliable projections because a relatively small swing in early reportings can result in a large swing in ultimate projections. The second method is the expected loss method whereby the future IBNR reserve equals the difference between a predetermined estimate of expected losses and actual reported losses. This has the advantage of stability, but it does not respond to actual results as they emerge.

The reported B-F method combines these two methods by setting ultimate losses equal to actual reported losses plus expected unreported losses. As an experience year matures and expected unreported losses become smaller, the initial expected loss assumption becomes gradually less important.

Two parameters are needed to apply the B-F method: the initial expected losses and the expected reporting pattern. The initial expected losses are selected as described in the *Analysis* section, while the expected reporting pattern is based on the incurred loss development analysis described above.

This method is often used for long-tail lines and in situations where the reported loss experience is relatively immature or lacks sufficient credibility for the application of other methods.

Paid Bornhuetter-Ferguson Method

The paid Bornhuetter-Ferguson method is analogous to the reported B-F method using paid losses and development patterns in place of reported losses and patterns.

Frequency/Severity Method

The frequency/severity method calculates ultimate losses by separately projecting ultimate claim frequency (claims per exposure) and ultimate claim severity (cost per claim) for each experience period. Typically, loss development methods are used to project ultimate frequency and severity based on historical data. Ultimate losses are calculated as the product of the two items. This method is intended to avoid distortions that may exist with the other methods for the most recent years as the result of changes in case reserve levels, settlement rates, etc. In addition, it may provide insight into the drivers of the loss experience.