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Report to
National Association of Insurance Commissioners
Property/Casualty Risk-Based Capital (E) Working Group:

2016 Update to
Property and Casualty Risk-Based Capital
Underwriting Factors

Presented by the American Academy of Actuaries¹
Property and Casualty Risk-Based Capital Committee

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¹ The American Academy of Actuaries is an 18,500+ member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policy makers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

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Executive Summary

At the request of the National Association of Insurance Commissioners' (NAIC) Property/Casualty Risk-Based Capital Working Group (Working Group), the American Academy of Actuaries' Property/Casualty Risk-Based Capital Committee (Committee) examined the underwriting risk charges used in the NAIC Risk-Based Capital (RBC) formula. These factors are in line 4 of the PR016 and PR017 pages of the RBC Formula; we will refer to these factors as the "Reserve Risk Factor" (or "RRF") and the "Premium Risk Factor" (or "PRF").

The Committee's scope was limited to:

- 1) **The current RBC formula structure**—While indicated underwriting risk factors vary by line of business volume, the scope of this report is limited to a single factor for each Line of Business ("LOB"). In addition, this recommendation does not address the effect of the proposed R6 and R7 charges.
- 2) **Proposed Underwriting Risk Factors (PRFs/RRFs)**—Our scope does not include an evaluation or recommendation of changes to the investment income offset.
- 3) **Data available**—The Committee does not have the data necessary, and therefore our scope does not include estimating the effect that unwinding workers' compensation tabular reserve might have on the indicated RBC factors.

Committee Recommendation

The Committee recommends that the Working Group consider adopting factors resulting from the revised methodology outlined in this report. The Committee has calculated these factors with three different capping scenarios, as defined later in this report. The resulting factors are shown in Table 1.

Table 1 – Summary of Proposed Capped Factors²

	PRFs				RRFs			
	Current	Scenario			Current	Scenario		
		1	2	3		1	2	3
(1) H/F	0.937	0.955	0.964	0.964	0.201	0.213	0.213	0.213
(2) PPA	0.969	0.969	0.969	0.969	0.192	0.181	0.179	0.179
(3) CA	0.988	1.005	1.010	1.010	0.230	0.243	0.256	0.276
(4) WC	1.033	1.044	1.044	1.044	0.324	0.336	0.344	0.344
(5) CMP	0.921	0.910	0.901	0.901	0.465	0.494	0.494	0.494
(6) MPL Occ.	1.822	1.778	1.734	1.668	0.431	0.417	0.404	0.383
(7) MPL C-M	1.092	1.103	1.114	1.130	0.306	0.297	0.289	0.276
(8) SL	0.904	0.914	0.924	0.938	0.257	0.270	0.284	0.304
(9) OL	1.042	1.027	1.013	1.013	0.511	0.531	0.531	0.531
(11) Spec. Prop.	0.941	0.923	0.905	0.879	0.191	0.207	0.222	0.246
(12) APD	0.843	0.836	0.836	0.836	0.112	0.121	0.129	0.143
(10) Fidelity / Surety	0.883	0.875	0.867	0.854	0.325	0.338	0.351	0.371
(13) Other	0.893	0.906	0.919	0.935	0.172	0.186	0.200	0.220
(15) International	1.169	1.187	1.206	1.234	0.327	0.336	0.345	0.359
(16) Reins. Prop. / Fin.	1.349	1.295	1.241	1.240	0.286	0.304	0.321	0.348
(17) Reins. Liab.	1.507	1.449	1.392	1.322	0.769	0.711	0.656	0.656
(18) PL	1.214	1.228	1.242	1.263	0.643	0.688	0.734	0.802
(14) Financial / Mortgage	1.482	1.515	1.548	1.598	0.200	0.194	0.188	0.179
(19) Warranty	0.883	0.875	0.867	0.854	0.325	0.338	0.351	0.371
Average risk factor ³	0.971	0.971	0.968	0.966	0.364	0.371	0.372	0.375

Notes:

Scenario 1, 2, and 3 represent the risk factors if changes in risk charges are generally capped at 10%, 20% and 35%, respectively, as described later in this report.⁴

The effect of these changes on total RBC at the Authorized Control Level (ACL) is 1.3%, 1.6%, and 1.9%, respectively. With the indicated risk factors, before capping (not shown here), the effect on total RBC at the ACL level is 5.3%.

The Committee is available to work with the Working Group to address the Working Group’s questions and/or to test further alternatives.

² Indicated factors do not apply an adjustment for the proposed catastrophe risk factors.

³ References to “Average” in this report means the weighted average of all PRFs/RRFs, weighted by the AY 2014 NEP/CY 2014 Net Unpaid Loss & LAE. This would represent the average factor for a company with the same distribution as the industry distribution of NEP/Reserves by line, prior to adjustments for the company’s own experience, prior to loss/premium concentration factors, and with no other adjustments.

⁴ With risk charge changes capped at lower levels for lines of business with limited data, as described on page 19 and illustrated in Table 12.

Prior Research and Reports

Over the past decade, the Committee has issued a number of reports proposing updates to Underwriting Risk Factors. These included:

- A report issued in September 2007 proposing a new set of factors based on a number of refinements to the methodology used in the original 1991 actuarial analysis.⁵
- A report issued in December 2008 proposing an update to the factors based on updated capping of indicated factors from the September 2007 analysis.⁶
- A report issued in March 2010 proposing an update to the factors based on updated data.⁷

The current methodology of estimating the Underwriting Risk Factors (“Current Calibration Method” or “CCM”) is described in the reports referenced above and summarized in this report in the “Current Methodology” section below.

In 2013 and 2014, the Casualty Actuarial Society (CAS) Dependency and Calibration Working Party (DCWP) published research regarding improvements to the CCM.⁸ On March 13, 2015, the Committee issued a letter to the Working Group providing a summary of our plans to propose a new calibration methodology based on the DCWP research. This letter is attached as Appendix 6. This report details our findings and proposed methodology, considering the analysis and conclusions put forth by the DCWP.

⁵An Update to P/C Risk-Based Capital Underwriting Factors: September 2007 Report to the National Association of Insurance Commissioners P/C Risk-Based Capital Working Group, American Academy of Actuaries’ P/C Risk-Based Capital Committee.

http://www.actuary.org/files/publications/CPC_Report_on_RBC_Underwriting_Factors_to_NAIC_Property_RBC_Working_Group_092507.pdf

⁶ 2009 Update to P/C Risk-Based Capital Underwriting Factors Presented to National Association of Insurance Commissioners’ P/C Risk-Based Capital Working Group December 2008, American Academy of Actuaries’ P/C Risk-Based Capital Committee.

http://www.actuary.org/files/publications/CPC_PC_RBC_Committee_Update_to_Underwriting_Risk_Factors_to_NAIC_Property_RBC_Working_Group_120908.pdf

⁷ 2010 Update to P/C Risk-Based Capital Underwriting Factors Presented to the National Association of Insurance Commissioners’ Property Risk-Based Capital Working Group March 2010, American Academy of Actuaries’ P/C Risk-Based Capital Committee.

https://actuary.org/pdf/casualty/rbc_update_mar10.pdf

⁸ Reports specifically referred to in this report are:

Risk Based Capital (RBC) Premium Risk Charges – Improvements to Current Calibration Method Report 6 of the CAS Risk Based Capital (RBC) Research Working Parties Issued by the RBC Dependencies and Calibration Working Party (DCWP), CAS E-Forum, Fall 2013 (“DCWP Report 6”).

<https://www.casact.org/pubs/forum/13fforum/01-Report-6-RBC.pdf>

Risk-Based Capital (RBC) Reserve Risk Charges – Improvements to Current Calibration Method Report 7 of the CAS Risk-based Capital (RBC) Research Working Parties Issued by the RBC Dependencies and Calibration Working Party (DCWP), CAS E-Forum, Winter 2014 (“DCWP Report 7”).

<https://www.casact.org/pubs/forum/14wforum/Report-7-RBC.pdf>

Current Methodology (CCM)

Reserve Risk Factor (RRF)

The reserve risk charge reflects the risk that currently reported reserves for loss and defense and cost containment expense (DCCE)⁹ net of reinsurance develop adversely from the initial reserve date to ultimate.^{10, 11}

The RRF is derived from a review of the historical Reserve Runoff Ratios for each company in the NAIC database (subject to filtering described below), using the ten years of Schedule P data from only one annual statement year. The numerator of the Reserve Runoff Ratio is the incurred development for all accident years (AYs) combined from a particular evaluation date to the latest evaluation date. These data come from Schedule P, Part 2. The denominator is the held loss reserves at the initial evaluation date. This data point is calculated for all accident years combined using Schedule P, Part 2 and Part 3 in a single annual statement.¹² The ratio is then calculated for each of the nine¹³ evaluation dates, by individual company, and by Schedule P line of business. The result is a matrix of data points (number of rows equal to number of companies and number of columns equal to nine evaluation dates) of these ratios. The runoff data is net of reinsurance, and the factor derived from the data is applied to reserves net of reinsurance.¹⁴ An example of how the runoff ratio is calculated is provided in Appendix 7.

The current methodology applies the following filters to remove anomalous data points:

- Exclude data points where, for a particular company and LOB, there are negative cumulative paid values in any accident year at any evaluation date;
- Exclude data points where, for a particular company and LOB, there are negative reserves in any accident year at any evaluation date (use below -\$5,000 to account for rounding errors between Parts 2 and 3);
- Exclude data points where, for a particular company and LOB, there are negative incurred loss and DCCE in any accident year at any evaluation date;
- Exclude data points where, for a particular company and LOB, there is not a full ten years of accident year data; and
- Runoff ratios capped at -100% and +400%.

⁹ Unless noted otherwise, references to “reserves” in this report mean reserves for net loss and defense and cost containment expense.

¹⁰ The development to ultimate is often referred to as a “runoff” time horizon, in contrast to a “one year” time horizon that considered adverse development over a one-year period.

¹¹ This charge does not measure the adequacy of a company’s carried reserves, as noted in Feldblum, Sholom, “NAIC Property/Casualty Insurance Company Risk-Based Capital Requirement,” *Proceedings of the Casualty Actuarial Society (PCAS) LXXXIII*, 1996.

¹² For short tail lines, the 10-year history from company RBC filings is used.

¹³ The Schedule P displays reserves evaluated at 10 evaluation dates. The reserve runoff ratios reviewed in the CCM use the latest evaluation date and compare that to each of the other nine evaluation dates. For example, for Annual Statement Year 2014, the CCM would compare the change in ultimate incurred evaluated at 2005 with 2014, 2006 with 2014, and so on.

¹⁴ The runoff data is loss and DCCE only. The factor is applied to loss and all loss adjustment expense.

The indicated RRF is the 87.5th percentile of the data points after filtering.

Premium Risk Factor (PRF)

The premium risk charge reflects the risk that a company's future business could be unprofitable. As pointed out in Feldblum's paper, the premium charge captures the potential underwriting losses that may occur from premium written during the following year.

The PRF is derived from a review of loss and loss adjustment expense (LAE) ratios, net of reinsurance, using the 10 years of Schedule P data from only one annual statement year. For each company, the loss and LAE ratios are determined using net earned premium ("NEP"), net incurred loss, and net incurred LAE by accident year and by line of business, from Schedule P, Part 1. For short tail lines, the 10-year history from company RBC filings is used.

The current methodology applies the following filters to the loss ratios¹⁵ to remove anomalous data points:

- Exclude data points where, for a particular company and LOB, the average accident year NEP is less than \$500,000;
- Exclude data points where, for a particular company and LOB, there is a loss ratio of 0% for any accident year;
- Exclude data points where, for a particular company and LOB, there is not a full 10 years of NEP;
- Exclude data points where, for a particular company and LOB, there exists NEP for any accident year of less than 20% of the average NEP for all accident years (as this indicated too much fluctuation in premium volume); and
- Limitation of loss ratios to 300% maximum.

The indicated risk charge is the 87.5th percentile of the data points after filtering.

Proposed Methodology

Summary of Proposed Methodology

Consistent with the DCWP research, the Committee proposes a new calibration of RRFs and PRFs which:

Uses data from Annual Statements 1997–2014, and calculates the 87.5th percentile subject to the following filtering:

- **Survivorship**—Include data points where, for a particular company and LOB, there is no NEP (reserves) in the latest accident year(s).

¹⁵ In this report, the term "loss ratio" means "Net Loss and LAE ratio" and the terms are used interchangeably.

- **LOB Size**—Exclude data points where, for a particular LOB, NEP (reserves) are less than the 15th percentile for that Accident Year (“AY”) or Reserve Year.¹⁶
- **Pooling**—Combine data points from intercompany pool participants into a single pool-wide data point.
- **Minor Lines**—Exclude data points where the NEP for the LOB represents a small portion of the company’s total NEP, as defined below (“Minor Lines”).
- **Years of LOB NEP > 0 (Age)**—Exclude data points where, for a particular company and LOB, there is less than five years of NEP.
- **Maturity**—Remove the least mature data points, as defined below.
- **Anomalous Values**—Exclude data points with anomalous values, i.e., negative loss ratios, negative initial reserves, and reserve runoff ratios over/under 500%/-500%.

The impact of this proposed methodology is summarized in the table below, which displays the average increase in Authorized Control Level (“ACL”) using the proposed factors with various capping scenarios¹⁷ (as defined later in this report). This was calculated by the NAIC, using the Committee’s proposed factors to recalculate the ACL for each company.

Table 2—Average Impact on ACL with Proposed Factors

Scenario 1	Scenario 2	Scenario 3	Uncapped
1.3%	1.6%	1.9%	5.3%

The subsections that follow discuss the details of this proposed methodology, organized as follows:

- 1) A discussion of the indicated factors under the proposed methodology;
- 2) A discussion of the data set used under the proposed methodology;
- 3) A discussion of each filtering component summarized above;
- 4) A comparison of the Current Calibration Method (“CCM”) to the proposed methodology; and
- 5) An analysis of the effects of the indicated factors under different capping scenarios.

Indicated Factors

Table 3 shows the current PRFs/RRFs and compares to the indicated factors under the proposed methodology with no capping, and the indicated factors under Scenario 2 (as defined later in this report). The shaded lines represent factors that are based on a limited amount of data.¹⁸ For these factors, we propose an alternative capping approach. In addition, the Medical Professional

¹⁶ Except for International, Financial Guaranty, and Warranty lines of business. For these lines, due to lack of data, the threshold is based on the total (all years combined) 15th percentile.

¹⁷ Scenarios 1, 2, and 3 represent the risk factors if changes in risk charges are generally capped at 10%, 20%, and 35%, respectively, but with risk charge changes capped at lower levels for lines of business with limited data, as described on page 19 and illustrated in Table 12.

¹⁸ Less than \$50 million in NEP or less than \$50 million in reserves.

Liability lines are in italics as we propose alternative capping on these lines as well. An analysis of the effect of these changes on total RBC values, along with proposed capping scenarios, is provided later in this report.

Table 3—Current and Indicated Risk Factors

Line	PRF			RRF		
	Current	Indicated	Scenario 2	Current	Indicated	Scenario 2
(1) H/F	0.937	0.964	0.964	0.201	0.213	0.213
(2) PPA	0.969	0.969	0.969	0.192	0.179	0.179
(3) CA	0.988	1.010	1.010	0.230	0.348	0.256
(4) WC	1.033	1.044	1.044	0.324	0.344	0.344
(5) CMP	0.921	0.901	0.901	0.465	0.494	0.494
<i>(6) MPL Occ.</i>	<i>1.822</i>	<i>1.490</i>	<i>1.734</i>	<i>0.431</i>	<i>0.296</i>	<i>0.404</i>
<i>(7) MPL C-M</i>	<i>1.092</i>	<i>1.176</i>	<i>1.114</i>	<i>0.306</i>	<i>0.089</i>	<i>0.289</i>
(8) SL	0.904	0.949	0.924	0.257	0.431	0.284
(9) OL	1.042	1.013	1.013	0.511	0.531	0.531
(11) Spec. Prop.	0.941	0.831	0.905	0.191	0.428	0.222
(12) APD	0.843	0.836	0.836	0.112	0.155	0.129
(10) Fidelity / Surety	0.883	0.680	0.867	0.325	0.917	0.351
(13) Other	0.893	0.935	0.919	0.172	0.375	0.2
(15) International	1.169	1.638	1.206	0.327	0.695	0.345
(16) Reins. Prop. / Fin.	1.349	1.240	1.241	0.286	0.415	0.321
(17) Reins. Liab.	1.507	1.322	1.392	0.769	0.656	0.656
(18) PL	1.214	1.285	1.242	0.643	1.345	0.734
(14) Financial / Mortgage	1.482	2.513	1.548	0.200	0.060	0.188
(19) Warranty	0.883	1.028	0.867	0.325	0.316	0.351
Average	0.971	0.970	0.968	0.364	0.395	0.372

Data Set

The CCM uses data from the latest annual statement available, while the proposed methodology uses data from all annual statements available.

The DCWP research showed the significance of including underwriting cycles by reviewing PRFs/RRFs by AY/Reserve Year. DCWP research suggests, and our work confirms, that using a data set with more years will produce PRFs/RRFs that are more stable over time than a calibration approach that only uses one annual statement year of data with only 10 AYs and 9 initial reserve date reserve development years.

Thus, the Committee’s proposed factors use data from as many years as can be provided by the NAIC through 2014,¹⁹ which are data from Annual Statements 1997-2014.

¹⁹ Note that due to the timing of our analyses, we did not include data from the 2015 Annual Statements, which are now available.

Table 4 below shows the volume of NEP/reserves used in the proposed filtered data set compared to the total. This table shows that the proposed filtered data set uses the majority of NEP and reserve volume available in the data.

Table 4—Data Used in Filtered Data Set

PRF—% NEP	RRF—% Reserves
93%	80%

Safety Level

Consistent with the CCM and guidance from the Working Group, the indicated factors are based on the 87.5th percentile. The RRF is based on the 87.5th percentile of observed reserve runoff ratios across companies and initial reserve dates. The PRF is based on the 87.5th percentile of observed loss ratios across companies and Accident Years. This safety level is based on a “company²⁰ view” of insolvency risk. It means that 12.5 percent of runoff ratios or loss ratios are higher than the indicated RRF or PRF, respectively, across companies and years.

Survivorship

The CCM, based on data from only one Annual Statement, does not include any data from companies that did not file Annual Statements in the most recent year. The Committee’s proposed factors use data for any years in which Annual Statements were filed, even if a company is no longer filing Annual Statements, i.e., including data for companies that are no longer in operation. The Committee has researched and reviewed this effect, and the results are summarized in Table 5 below, which compares factors that only include companies that have filed an Annual Statement in 2014 to the proposed factors. This table shows that for many LOBs, the indicated factors are higher than what would be determined when only including companies that have filed an Annual Statement in 2014.

²⁰ This reference to “Company” means individual company or intercompany pool, as appropriate.

Table 5—Indicated Risk Factors Including/Excluding Survivorship Effect

Line	PRF		RRF	
	Indicated	No Survivorship	Indicated	No Survivorship
(1) H/F	0.964	0.947	0.213	0.178
(2) PPA	0.969	0.955	0.179	0.152
(3) CA	1.010	0.966	0.348	0.445
(4) WC	1.044	1.019	0.344	0.373
(5) CMP	0.901	0.867	0.494	0.502
(6) MPL Occ.	<i>1.490</i>	<i>1.441</i>	<i>0.296</i>	<i>0.214</i>
(7) MPL C-M	<i>1.176</i>	<i>1.100</i>	<i>0.089</i>	<i>0.096</i>
(8) SL	0.949	0.949	0.431	0.466
(9) OL	1.013	0.969	0.531	0.475
(11) Spec. Prop.	0.831	0.817	0.428	0.378
(12) APD	0.836	0.829	0.155	0.028
(10) Fidelity / Surety	0.680	0.636	<i>0.917</i>	<i>0.576</i>
(13) Other	0.935	0.918	0.375	0.276
(15) International	<i>1.638</i>	<i>1.876</i>	<i>0.695</i>	<i>1.927</i>
(16) Reins. Prop. / Fin.	1.240	1.247	0.415	0.482
(17) Reins. Liab.	1.322	1.307	0.656	0.729
(18) PL	<i>1.285</i>	<i>1.196</i>	1.345	1.142
(14) Financial / Mortgage	2.513	2.724	0.060	-0.957
(19) Warranty	1.028	1.060	0.316	N/A
Average	0.970	0.952	0.395	0.356

The shaded/italics lines represent factors that are based on a limited amount of data as discussed for Table 3.

LOB-Size

For PRFs, the CCM was calibrated to sizes over \$500,000 in NEP. For RRFs, no filter exists for LOB-size.

The Committee proposes removing data points with low premium/reserve volume. However, rather than a fixed dollar amount, we propose an approach that eliminates all data points that fall below the 15th percentile by accident/reserve year.²¹ This recommendation is consistent with the DCWP research, which demonstrated that PRF/RRF results from companies with the smallest premium/reserve volume in a particular LOB were not representative of the majority of the data points. The committee also researched this issue and confirmed the DCWP’s findings.

Appendix 1 shows the selected thresholds and further details on the methodology. Table 6 shows our proposed PRFs/RRFs and compares them to our proposed methodology with no filter for LOB-size. This table shows that for many LOBs, this filtering decreases the PRFs and RRFs that would be determined with no exclusion based on LOB-Size.

²¹ Except for International, Financial Guaranty, and Warranty lines of business. For these lines, due to lack of data, the threshold is based on the total 15th percentile. DCWP research used a size filter based on the smallest 15th percentile for all accident years/initial reserve dates combined; we recommend an approach that reviews percentile by accident/reserve year to account for the effects of inflation.

Table 6—Indicated Risk Factors With and Without Size Filter

Line	PRF		RRF	
	Indicated	No Size Filter	Indicated	No Size Filter
(1) H/F	0.964	0.995	0.213	0.252
(2) PPA	0.969	0.998	0.179	0.214
(3) CA	1.010	1.029	0.348	0.375
(4) WC	1.044	1.066	0.344	0.380
(5) CMP	0.901	0.918	0.494	0.552
(6) MPL Occ.	<i>1.490</i>	<i>1.549</i>	<i>0.296</i>	<i>0.386</i>
(7) MPL C-M	<i>1.176</i>	<i>1.212</i>	<i>0.089</i>	<i>0.128</i>
(8) SL	0.949	0.956	0.431	0.473
(9) OL	1.013	1.046	0.531	0.577
(11) Spec. Prop.	0.831	0.849	0.428	0.508
(12) APD	0.836	0.860	0.155	0.239
(10) Fidelity / Surety	0.680	0.701	<i>0.917</i>	<i>0.904</i>
(13) Other	0.935	0.947	0.375	0.378
(15) International	<i>1.638</i>	<i>1.719</i>	<i>0.695</i>	<i>0.631</i>
(16) Reins. Prop. / Fin.	1.240	1.288	0.415	0.416
(17) Reins. Liab.	1.322	1.342	0.656	0.708
(18) PL	<i>1.285</i>	<i>1.390</i>	1.345	1.330
(14) Financial / Mortgage	2.513	2.858	<i>0.060</i>	<i>0.090</i>
(19) Warranty	<i>1.028</i>	<i>0.954</i>	0.316	0.339
Average	0.970	1.000	0.395	0.435

The shaded/italics lines represent factors that are based on a limited amount of data as discussed for Table 3.

Pooling

In the CCM, data points from each company that is part of an intercompany pooling arrangement are treated as independent data points. Treating such interrelated data points as independent has the potential to cause distortion because the same loss ratio value (or reserve runoff ratio) would appear multiple times, reducing the apparent variability in the loss ratios (or reserve runoff ratios) across companies.²²

The proposed factors combine the data from intercompany pool participants into a single pool-wide data point. The methodology for this mapping is provided in Appendix 2.²³

²² See DCWP Report 6 and DCWP Report 7 for a complete discussion of this feature.

²³ Note that our methodology is approximate, and may not necessarily identify all intercompany pooling arrangements and/or may combine some companies that are not actually pooled.

Minor Lines

Consistent with the DCWP research, the Committee recommends the removal of data on “minor lines”—data points where the NEP for the LOB represents a small portion of the company’s total NEP. The DCWP noted, and we agree, that “For [certain specialty] LOBs failure to exclude the minor lines data points appears to result in PRFs that are not representative of risk for companies writing the bulk of the industry LOB premium.”²⁴

For PRFs, the DCWP defined a minor line data point as one where NEP for the LOB and AY represents less than 5% of the company’s all-line total NEP for that AY. For RRFs, the DCWP defined a minor line data point as one where the LOB NEP for all AYs combined is less than 5% of the all-lines total NEP for all AYs combined.²⁵

We recommend a threshold equal to 5%, except for LOBs where the majority of records would be excluded if this filtering methodology was applied. The following table shows the percentage of NEP (reserves) excluded using a 2.5% filter and a 5% filter.

Table 7—Percent Excluded with Minor Lines Filter

Line	% NEP		% Reserves	
	5%	2.5%	5%	2.5%
(1) H/F	3%	1%	6%	3%
(2) PPA	1%	0%	3%	1%
(3) CA	19%	8%	16%	7%
(4) WC	4%	1%	4%	1%
(5) CMP	8%	3%	6%	3%
(6) MPL Occ.	20%	16%	21%	19%
(7) MPL C-M	19%	9%	25%	17%
(8) SL	49%	20%	60%	24%
(9) OL	8%	3%	9%	3%
(11) Spec. Prop.	15%	4%	11%	4%
(12) APD	3%	1%	9%	3%
(10) Fidelity / Surety	45%	21%	64%	42%
(13) Other	23%	7%	27%	11%
(15) International	68%	53%	77%	76%
(16) Reins. Prop. / Fin.	16%	10%	23%	21%
(17) Reins. Liab.	12%	8%	16%	15%
(18) PL	73%	45%	89%	70%
(14) Financial / Mortgage	73%	69%	96%	96%
(19) Warranty	28%	26%	83%	82%

²⁴ DCWP Report 6, Page 5.

²⁵ DCWP also considered a threshold based on reserves, but found that it was “problematic because (a) short tail lines were too often categorized as minor lines because reserves were low, even though premium was significant; and (b) while certain aspects of management attention reflect reserve size, other aspects of management attention would relate to premium size.” DCWP Report 7, page 13.

The LOBs in bold and italics in Table 7 are those for which the majority of premium or reserve records would be excluded if the 5% filtering methodology were applied, either for PRF or RRF.

Based on a review of these results we recommend the following filtering:

- 1. Apply no minor lines exclusion for the International and Financial Guarantee/Mortgage Guarantee lines of business.** No exclusion is recommended for these lines, because the majority of premiums (or reserves) pertain to data points where the NEP for these lines of business represent 0%-2.5% of the total NEP.
- 2. Apply 2.5% filter for the Special Liability, Fidelity/Surety, and Warranty lines of business.** A 2.5% filter is recommended for these lines, because a 5% filter for either PRFs or RRFs would exclude the majority of premiums (or reserves), but with a 2.5% filter, the majority of premium (or reserves) for these lines of businesses would be included.²⁶
- 3. Exclude data points where the combined Other Liability and Products Liability NEP is less than 5% of total NEP.** This filtering was selected because the majority of products liability premiums (reserves) pertain to data points where the NEP for these lines of business represent 0%-5% of the total NEP, and the correlation between premium in Other Liability and premium in Products Liability was high.²⁷
- 4. Apply 5% filter for all other lines.** For all other lines, the majority of premium pertains to data points where the NEP for these lines of business represents at least 5% of total NEP.

Table 8 shows our proposed PRFs/RRFs and compares them to our proposed methodology with no filter for Minor Lines. This table shows that for many LOBs, especially certain specialty lines, this filtering decreases the PRFs and RRFs that would be determined with no exclusion based on minor lines.

²⁶ Note that for Warranty, a 2.5% filter was chosen due to lack of data.

²⁷ Correlation between NEP for PL and OL lines, for baseline PRF data with no minor lines exclusion was 0.66.

Table 8—Indicated Risk Factors With and Without Minor Lines Filter

Line	PRF		RRF	
	Indicated	No Minor Lines Filter	Indicated	No Minor Lines Filter
(1) H/F	0.964	0.977	0.213	0.261
(2) PPA	0.969	0.975	0.179	0.195
(3) CA	1.010	1.012	0.348	0.356
(4) WC	1.044	1.054	0.344	0.364
(5) CMP	0.901	0.934	0.494	0.521
(6) MPL Occ.	<i>1.490</i>	<i>1.785</i>	<i>0.296</i>	<i>0.414</i>
(7) MPL C-M	<i>1.176</i>	<i>1.236</i>	<i>0.089</i>	<i>0.170</i>
(8) SL	0.949	1.006	0.431	0.477
(9) OL	1.013	1.014	0.531	0.549
(11) Spec. Prop.	0.831	0.847	0.428	0.469
(12) APD	0.836	0.848	0.155	0.237
(10) Fidelity / Surety	0.680	0.777	<i>0.917</i>	<i>1.165</i>
(13) Other	0.935	0.971	0.375	0.491
(15) International	<i>1.638</i>	<i>1.638</i>	<i>0.695</i>	<i>0.695</i>
(16) Reins. Prop. / Fin.	1.240	1.458	0.415	0.638
(17) Reins. Liab.	1.322	1.440	0.656	0.810
(18) PL	<i>1.285</i>	<i>1.308</i>	<i>1.345</i>	<i>1.379</i>
(14) Financial / Mortgage	2.513	2.513	<i>0.060</i>	<i>0.060</i>
(19) Warranty	1.028	1.062	0.316	2.105
Average	0.970	0.989	0.395	0.432

The shaded/italics lines represent factors that are based on a limited amount of data as discussed for Table 3.

Years of LOB NEP > 0 (Age)

In its research, the DCWP concluded that for most LOBs, PRFs/RRFs are lowest for data points from companies with the longest experience period for a particular LOB.²⁸ A statistical analysis by the Committee has shown results consistent with the DWCP's conclusions, both for PRFs and RRFs. In its analysis, the Committee reviewed PRFs/RRFs for each LOB at various age brackets and the number of records/volume of data points in each bracket. This analysis is shown in Appendix 3. The analysis shows that the differential is most pronounced when comparing PRFs/RRFs with a filter of age equal to 5+ when compared with less than 5. In addition, very few data points are removed with a filtering that removes ages less than 5.

Thus, we propose to remove data points where, for a particular company and LOB, there is less than 5 years of experience, thus eliminating larger indicated risk factors from immature companies in the 1–4 years range, while keeping the data pool as large as possible to promote stability in PRF/RRF calibration.

Table 9 shows our proposed PRFs/RRFs and compares that to our proposed methodology with a 10-year filter for age (what was used in the CCM). This table shows that, in general for most LOBs, this filtering has a small effect on the PRFs and RRFs that would be determined with excluding all companies with less than 10 years of experience for a particular LOB.

²⁸ DCWP Report 6, Section 7; DCWP Report 7, Section 7.

Table 9—Indicated Risk Factors: Age Filter at 5 Years and 10 Years

Line	PRF		RRF	
	5 Years	10 Years	5 Years	10 Years
(1) H/F	0.964	0.960	0.213	0.200
(2) PPA	0.969	0.964	0.179	0.176
(3) CA	1.010	1.001	0.348	0.324
(4) WC	1.044	1.034	0.344	0.338
(5) CMP	0.901	0.894	0.494	0.488
(6) MPL Occ.	<i>1.490</i>	<i>1.476</i>	<i>0.296</i>	<i>0.285</i>
(7) MPL C-M	<i>1.176</i>	<i>1.184</i>	<i>0.089</i>	<i>0.068</i>
(8) SL	0.949	0.927	0.431	0.398
(9) OL	1.013	1.004	0.531	0.515
(11) Spec. Prop.	0.831	0.828	0.428	0.412
(12) APD	0.836	0.831	0.155	0.129
(10) Fidelity / Surety	0.680	0.677	<i>0.917</i>	<i>0.926</i>
(13) Other	0.935	0.916	0.375	0.359
(15) International	<i>1.638</i>	<i>1.565</i>	<i>0.695</i>	<i>0.583</i>
(16) Reins. Prop. / Fin.	1.240	1.239	0.415	0.422
(17) Reins. Liab.	1.322	1.330	0.656	0.615
(18) PL	<i>1.285</i>	<i>1.290</i>	1.345	1.313
(14) Financial / Mortgage	2.513	2.695	<i>0.060</i>	<i>0.151</i>
(19) Warranty	1.028	1.111	0.316	<i>-0.174</i>
Average	0.970	0.967	0.395	0.385

The shaded/italics lines represent factors that are based on a limited amount of data as discussed for Table 3.

Maturity

In the CCM, the data set includes data points of varying development maturities. DCWP research found that PRFs and RRFs based on data grouped by age of development can increase as the age of development increases; the effect varies by LOB, but is especially pronounced for LOBs such as WC and MPL-Occurrence.

DCWP research did not study this effect further, but proposed two possible maturity adjustments. The most direct approach proposed would simply discard data points that were not sufficiently mature. The more complex method proposed would adjust individual loss ratio and reserve runoff ratio data points for expected development and uses the adjusted data in all-year PRF and RRF calculations.

The Committee performed and reviewed the more complex method identified by the DCWP. Rather than directly using the adjusted data points, as suggested in the DCWP reports, we decided to use the more simplistic approach used by the DCWP (which removes data points that are not sufficiently mature). However, we used the results of the development analysis to inform our decision in determining maturity filters by LOB. This analysis is described in more detail in

Appendix 4. Table 10 below shows our proposed filtering methodology, which excludes data points with less than the number of years of maturity shown in the table.²⁹

Table 10 – Maturity Filtering

Line	PRF	RRF
(1) H/F	0	3
(2) PPA	0	3
(3) CA	0	3
(4) WC	0	4
(5) CMP	0	5
(6) MPL Occ.	5	4
(7) MPL C-M	0	5
(8) SL	0	3
(9) OL	0	4
(11) Spec. Prop.	0	0
(12) APD	0	0
(10) Fidelity / Surety	0	0
(13) Other	0	0
(15) International	4	0
(16) Reins. Prop. / Fin.	0	3
(17) Reins. Liab.	4	4
(18) PL	5	4
(14) Financial / Mortgage	4	0
(19) Warranty	5	0

Table 11 shows our proposed PRFs/RRFs and compares them to our proposed methodology with no maturity filter. This table shows that in general, for most LOBs where filtering is applied, this filtering increases the PRFs and RRFs that would be determined with no exclusion based on maturity.

²⁹ Note that the indicated filters are capped at 5 years. This cap affected Medical Professional Liability lines only, as the indicated filters for these lines were likely biased by trends in the underwriting cycles.

Table 11—Indicated Risk Factors With and Without Maturity Filter

Line	PRF		RRF	
	Indicated	No Maturity Filter	Indicated	No Maturity Filter
(1) H/F	0.964	0.964	0.213	0.212
(2) PPA	0.969	0.969	0.179	0.180
(3) CA	1.010	1.010	0.348	0.340
(4) WC	1.044	1.044	0.344	0.320
(5) CMP	0.901	0.901	0.494	0.450
(6) MPL Occ.	<i>1.490</i>	<i>1.498</i>	<i>0.296</i>	<i>0.289</i>
(7) MPL C-M	<i>1.176</i>	<i>1.176</i>	<i>0.089</i>	<i>0.105</i>
(8) SL	0.949	0.949	0.431	0.421
(9) OL	1.013	1.013	0.531	0.493
(11) Spec. Prop.	0.831	0.831	0.428	0.428
(12) APD	0.836	0.836	0.155	0.155
(10) Fidelity / Surety	0.680	0.680	<i>0.917</i>	<i>0.917</i>
(13) Other	0.935	0.935	0.375	0.375
(15) International	<i>1.638</i>	<i>1.614</i>	<i>0.695</i>	<i>0.695</i>
(16) Reins. Prop. / Fin.	1.240	1.240	0.415	0.408
(17) Reins. Liab.	1.322	1.282	0.656	0.586
(18) PL	<i>1.285</i>	<i>1.217</i>	1.345	1.215
(14) Financial / Mortgage	2.513	2.591	<i>0.060</i>	<i>0.060</i>
(19) Warranty	<i>1.028</i>	<i>0.921</i>	<i>0.316</i>	<i>0.316</i>
Average	0.970	0.970	0.395	0.371

The shaded/italics lines represent factors that are based on a limited amount of data as discussed for Table 3.

Unexpected Data Values

Consistent with the DCWP research, our factors exclude data points with the following anomalous values:

- For PRFs: negative loss ratios
- For RRFs: negative reserves,³⁰ reserve runoff ratios over/under +/-500%

Comparison of CCM to Proposed Methodology

In summary, the proposed methodology has certain similarities to the CCM, refines certain features of the CCM, and adds other features to promote stability and remove bias from the resulting factors.

Similarities:

- **Safety Level:** Both the CCM and the proposed methodology determine PRFs/RRFs based on the 87.5th percentile of reviewed data points.
- **Anomalous Values:** Both the CCM and the proposed methodology filter anomalous values.

³⁰ If total reserve of all AYs combined for the LOB is negative, the data point is excluded.

Refinements:

- **Data/Survivorship:** The CCM uses data from the latest annual statement available, and only when there was a full 10 years of data. The proposed methodology uses data from all annual statements available and includes data points where, for a particular company and LOB, there is no NEP (reserves) in the latest accident year.
- **LOB Size:** The CCM, for PRFs, excludes data points where, for a particular company and LOB, the average accident year NEP is less than \$500,000. There is no LOB size filter for RRFs. The proposed methodology excludes data points where, for a particular LOB, NEP (reserves) is less than the 15th percentile for that accident/reserve year.³¹
- **Years of LOB NEP > 0 (Age):** The CCM excludes all data points where, for a particular company and LOB, there is less than **ten** years of NEP. The proposed methodology excludes data points where, for a particular company and LOB, there is less than **five** years of NEP.

Additional Features Not Present in CCM:

- **Pooling:** The proposed methodology combines data points from intercompany pool participants into a single pool-wide data point.
- **Minor Lines:** The proposed methodology excludes data points where the NEP for the LOB represents a small portion of the company's total NEP, as defined previously.
- **Maturity:** The proposed methodology removes the least mature data points, as defined previously.

Capping

The indicated factors are, at times, a significant change from the factors currently in use. In these cases, the Committee recommends that the Working Group consider capping, in order to control the change in indicated industry charge to a specified amount for each line of business. The Committee also recommends, to the extent possible, to allow the caps to increase from year to year, eventually reaching the indicated values. We believe that is the best way to cap year-to-year impact but ultimately achieve a consistent reflection of risk by line.

The Committee recommends that the cap be applied to the actual result of the charge shown in formulas (1) and (2) below.

Formula (1): Reserve Risk

$$\text{Reserve Risk Charge \% Change} = \frac{(1 + \text{Proposed RRF}) \times IIO - 1}{(1 + \text{Current RRF}) \times IIO - 1} - 1$$

³¹ Except for International, Financial Guaranty, and Warranty lines of business. For these lines, due to lack of data, the threshold is based on the total 15th percentile.

Formula (2): Premium Risk

$$\begin{aligned} & \text{Premium Risk Charge \% Change} \\ = & \frac{\text{Proposed PRF} \times \text{IIO} + \text{Industry UW Expense Ratio} - 1}{\text{Current PRF} \times \text{IIO} + \text{Industry UW Expense Ratio} - 1} - 1 \end{aligned}$$

The actual impact will often be less than the cap. The effect of different LOBs will be offsetting, and the underwriting risk charges are only a portion of the totality of RBC. For this reason, a fairly wide band of capping can be used. We have shown the effects of the new factors under four different scenarios, for consideration:

1. Scenario 1: 10% cap
2. Scenario 2: 20% cap
3. Scenario 3: 35% cap
4. Scenario 4: Uncapped

In addition, certain indicated PRFs/RRFs are determined based on a limited volume of data. These are indicated as the shaded PRFs/RRFs shown in the tables throughout this report. Due to the lack of data, we propose tighter capping on these lines of business. Our proposed capping uses half the capping used for the other factors. For example, for a 20% cap these factors are capped at 10%. For Warranty, due to lack of data, our capping scenarios set Warranty factors equal to Fidelity/Surety factors, consistent with the CCM.

Also, for Medical Professional Liability lines, unlike many of the other lines of business, the indicated factors include only one-and-a-half underwriting cycles. This may have a distorting effect on the indicated factors. Thus, the Committee proposes capping the indicated factors at half of the capping used for the other factors.

We also checked whether the factors achieved a minimum risk charge of at least 5%. That was the case for all LOBs.

Table 12 below shows the percentage change from the current factors to the indicated factors, and shows the proposed capping under Scenario 2.

Table 12—Proposed Capping Under Scenario 2 (20% cap)

Line	PRF					RRF				
	Curr. Factor	Ind. Factor	Ind. Change	Capped Change	Capped Factor	Curr. Factor	Ind. Factor	Ind. Change	Capped Change	Capped Factor
(1) H/F	0.937	0.964	15%	15%	0.964	0.201	0.213	9%	9%	0.213
(2) PPA	0.969	0.969	0%	0%	0.969	0.192	0.179	-11%	-11%	0.179
(3) CA	0.988	1.010	13%	13%	1.010	0.230	0.348	89%	20%	0.256
(4) WC	1.033	1.044	7%	7%	1.044	0.324	0.344	17%	17%	0.344
(5) CMP	0.921	0.901	-18%	-18%	0.901	0.465	0.494	9%	9%	0.494
(6) MPL Occ.	1.822	<i>1.490</i>	<i>-38%</i>	<i>-10%</i>	1.734	0.431	<i>0.296</i>	<i>-49%</i>	<i>-10%</i>	0.404
(7) MPL C-M	1.092	1.176	39%	10%	1.114	0.306	0.089	-125%	-10%	0.289
(8) SL	0.904	0.949	46%	20%	0.924	0.257	0.431	131%	20%	0.284
(9) OL	1.042	1.013	-19%	-19%	1.013	0.511	0.531	6%	6%	0.531
(11) Spec. Prop.	0.941	0.831	-62%	-20%	0.905	0.191	0.428	152%	20%	0.222
(12) APD	0.843	0.836	-8%	-8%	0.836	0.112	0.155	49%	20%	0.129
(10) Fidelity / Surety	0.883	0.680	-247%	-20%	0.867	0.325	<i>0.917</i>	<i>227%</i>	<i>10%</i>	0.351
(13) Other	0.893	0.935	32%	20%	0.919	0.172	0.375	147%	20%	0.200
(15) International	1.169	<i>1.638</i>	<i>127%</i>	<i>10%</i>	1.206	0.327	<i>0.695</i>	<i>201%</i>	<i>10%</i>	0.345
(16) Reins. Prop. / Fin.	1.349	1.240	-20%	-20%	1.241	0.286	0.415	73%	20%	0.321
(17) Reins. Liab.	1.507	1.322	-32%	-20%	1.392	0.769	0.656	-20%	-20%	0.656
(18) PL	1.214	<i>1.285</i>	<i>25%</i>	<i>10%</i>	1.242	0.643	1.345	155%	20%	0.734
(14) Financial / Mortgage	1.482	2.513	156%	10%	1.548	0.200	<i>0.060</i>	<i>-117%</i>	<i>-10%</i>	0.188
(19) Warranty	0.883	1.028	177%	10%	0.867	0.325	0.316	-3%	-3%	0.351
Average	0.971	0.970	-5%	-2%	0.968	0.364	0.395	14%	6%	0.372

The shaded/italics lines represent factors that are based on a limited amount of data as discussed for Table 3.

The capped factors for all scenarios are shown in Appendix 5.

Effects

In order to determine the impact of the proposed factors, we submitted a request to the NAIC to determine the total change to the R4 charge, the R5 charge, and the total RBC at the ACL.³² The results of this analysis for each capping scenario are summarized in Table 13 below.

Table 13—Impact on RBC Charges With Proposed Factors

	Scenario 1	Scenario 2	Scenario 3	Uncapped
R4 Charge	2.9%	3.5%	4.9%	14.4%
R5 Charge	-0.3%	-1.6%	-2.8%	-4.4%
ACL	1.3%	1.6%	1.9%	5.3%

We also requested that the NAIC compute the percentage change by type of company.³³ The percentage change in the ACL by company type for each capping scenario is shown in Table 14 below.

Table 14—Impact of ACL with Proposed Factors, by Type of Company

Change in ACL	Scenario 1	Scenario 2	Scenario 3	Uncapped
Commercial	2.6%	3.1%	3.8%	10.7%
Personal	0.3%	0.5%	0.5%	0.9%
Reinsurance	-1.3%	-2.6%	-2.5%	-1.3%
Medical Professional Liability	-2.6%	-5.4%	-9.3%	-34.3%
Other	0.7%	1.0%	1.8%	21.6%
Total	1.3%	1.6%	1.9%	5.3%

For most company types, the impact to the ACL is relatively low for the capped scenarios.

We also requested that the NAIC compute the percentage change by size of company.³⁴ The percentage change in the ACL by size of company is shown in Table 15 below.

³² Note that the change in ACL is computed based on the NAIC RBC formula as of June 30, 2016, and does not reflect the effect of various proposals currently being developed.

³³ For each company, the company type was assigned to one of five categories—Personal Lines, Commercial Lines, Medical Professional Liability, Reinsurance, or Other—by determining the amount of premium plus reserves (net written premium plus loss & LAE unpaid) for each of the five categories (using the table shown in Appendix 5), and then determining the category with the highest amount of premium plus reserves.

³⁴ Company size is determined by the sum of net written premium and net L&LAE Reserves on the all lines combined basis (excluding 22 companies with negative NWP+LLAE and 506 companies with zero NWP+LLAE).

Table 15—Impact of ACL With Proposed Factors, by Size of Company

Percentile of Companies	Size of Company (\$M)	Scenario 1	Scenario 2	Scenario 3	Uncapped
0%-10%	0 – 2	0.1%	0.1%	0.0%	0.1%
10%-20%	2 – 6	0.1%	-0.2%	-0.6%	-0.9%
20%-30%	6 – 14	0.5%	0.4%	0.3%	-0.3%
30%-40%	14 – 28	1.2%	1.4%	1.2%	1.8%
40%-50%	28 – 48	0.9%	0.9%	0.6%	1.1%
50%-60%	48 – 79	1.2%	1.2%	1.1%	3.6%
60%-70%	79 - 152	1.6%	1.7%	1.7%	3.9%
70%-80%	152 - 293	1.4%	1.5%	1.5%	3.0%
80%-90%	293 - 860	1.5%	1.6%	1.8%	5.8%
90%-100%	860 +	1.3%	1.6%	1.9%	5.5%
Total		1.3%	1.6%	1.9%	5.3%

Finally, we requested the NAIC to provide us a distribution of all companies by the percentage change in ACL under the four scenarios. The results are displayed in Table 16 below.

Table 16—Distribution of Companies by Change in ACL

	Scenario 1	Scenario 2	Scenario 3	Uncapped
Less Than -50%	0	0	0	22
-50% to -25%	0	0	6	116
-25% to -15%	0	9	50	49
-15% to -5%	60	173	174	113
-5% to 5%	2,116	1,816	1,718	1,475
5% to 15%	312	465	487	425
15% to 25%	1	26	46	108
25% to 50%	4	4	12	130
Over 50%	1	1	1	56
Total	2,494	2,494	2,494	2,494

Further information on the effects and the methodology used to estimate these effects is shown in Appendix 5.

Own Company Experience Adjustment

The RBC formula includes an adjustment for the company loss ratio (or runoff ratio) in relation to the industry loss ratio (or runoff ratio) in PR0016 and PR0017 lines 1, 2, and 3.

Consistent with the proposed calibration of premium and reserve risk factors, the Working Group should consider changes to the calculation of the industry loss ratio and/or reserve ratio (line 1 on

PR0016 and PR0017) to reflect the features of the risk factor calibration discussed above. This could include:

1. Excluding data points when premiums (reserves) are below the 15th percentile for that AY/LOB.
2. Combining data points from intercompany pool participants into a single pool-wide data point.
3. Excluding data points where the NEP for the LOB represents a small portion of the company's total NEP ("minor lines").
4. Excluding data points from companies with less than five years of NEP for a particular LOB.
5. Removing the least mature data points.

Other Considerations

1. Catastrophe Loss Adjustment: Factors shown in this report are computed on a gross of catastrophe basis. The Working Group might consider updating the catastrophe adjustment factors if these factors are adopted.
2. Other Proposed/Pending Changes to RBC Formula: In addition, the Working Group might also consider the impact of these changes in combination with other changes to the RBC formula including bond and common stock charges, reinsurance credit risk charges, and the possibility of the new operational risk charge.
3. Future Updates: The factors shown in this report reflect the results using the methodology proposed with annual statement data from 1997 through 2014. It is further recommended that the Working Group consider periodic updates, which would apply the proposed methodology using the most current available data.
4. Safety Level: As discussed earlier in this report, the 87.5th percentile "safety level" is based on a "company³⁵ view" of insolvency risk. It means that 12.5 percent of runoff ratios or loss ratios are higher than the indicated RRF or PRF, respectively, across companies and years. An alternative view is one based on a "policyholder view" or, as a more practical proxy, premium plus reserves. The DCWP has performed research in this area. However, we have not provided the implied safety level using this alternative view as part of this report.

³⁵ Or intercompany pool.

Appendix 1—Selected LOB-Size Thresholds

In order to determine the size thresholds, we used data from Annual Statements 1997–2014, subject to the following filtering:

- Combine data points from intercompany pool participants into a single pool-wide data point.
- Exclude Minor Lines.
- Exclude data points from companies with less than five years of NEP for a particular LOB.
- Exclude data points with negative loss ratios/negative initial reserves.

From this data, the 15th percentile by each LOB and accident/reserve year was determined. In order to remove large discontinuities by year, we capped each point to be within 10% of the prior and subsequent years. For the first accident/reserve year (1988), we capped to be within 10% of the three-year average (1989–1991) and the subsequent year (1989). For the last accident/reserve year (2013/2014), we capped to be within 10% of the three-year average (2011–2013/2010–2012) and the prior year (2013/2012).

LOB-Size Thresholds for Premium Risk Factors by Line of Business and Accident Year (\$000s)

Sch P	Name	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
A	Homeowners/Farmowners	452	480	495	538	595	547	552	480	533	637	690	714	625	632	670	877
B	Priv. Passeng Auto Liability	1,092	1,201	1,123	1,259	1,223	1,346	1,398	1,428	1,614	1,544	1,389	1,477	1,329	1,512	1,807	1,643
C	Comml Auto Liab.	597	565	600	650	648	576	587	623	661	649	714	584	569	696	633	666
D	Workers Comp	1,711	1,251	1,126	1,110	1,009	1,071	1,304	1,533	1,432	1,139	1,151	1,266	1,220	1,380	1,556	2,083
E	Comm Multiperil	400	376	356	405	446	476	475	456	489	551	595	655	543	560	617	897
F1	Medical Mal - Occurrence	988	1,505	1,368	1,226	1,328	728	801	409	299	316	348	336	502	810	761	855
F2	Medical Mal - Claims made	1,430	1,731	1,587	1,605	1,513	1,395	1,421	697	604	657	671	612	759	853	946	969
G	Special Liability	281	309	265	294	477	528	517	513	677	695	552	580	598	538	636	633
H	Other Liab	298	239	256	261	365	332	369	423	469	516	421	354	393	489	538	489
K	Fidelity & Surety	511	562	394	355	669	749	881	1,078	1,081	1,189	713	584	520	427	474	467
I	Spec Property	441	444	417	392	397	379	374	361	398	394	440	411	384	371	468	425
J	Auto Physical Damage	1,720	1,138	893	947	849	943	972	1,047	1,114	945	944	886	900	1,021	995	1,035
L	Other	528	832	915	741	783	705	833	839	790	711	795	741	1,273	1,222	1,135	1,112
M	International	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
N&P	Reinsurance A & C	975	751	834	917	715	779	882	1,261	1,314	1,445	835	752	1,243	1,993	2,214	2,435
O	Reinsurance B	2,194	1,601	1,519	1,070	754	604	754	1,019	1,272	1,168	1,285	1,747	1,907	1,734	1,652	2,112
R	Products Liability	212	226	206	124	135	123	95	98	151	140	91	81	90	186	169	181
S	Financial Guarantee	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
T	Warranty	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074

**LOB-Size Thresholds for Premium Risk Factors
by Line of Business and Accident Year
(\$000s)**

Sch P Line	Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
A	Homeowners/Farmowners	927	1,065	1,010	1,224	1,151	1,211	1,240	1,184	1,337	1,396	1,536
B	Priv. Passeng Auto Liability	1,807	1,485	1,447	1,818	1,672	2,029	2,518	2,336	2,641	3,227	3,550
C	Comml Auto Liab.	894	956	932	1,023	873	962	1,044	1,066	1,068	1,214	1,228
D	Workers Comp	2,224	2,747	2,497	2,747	2,316	2,084	2,557	2,577	3,244	3,893	4,282
E	Comm Multiperil	986	952	1,064	1,130	1,243	1,106	1,039	1,161	1,477	1,659	1,825
F1	Medical Mal - Occurrence	777	803	497	552	580	554	704	774	914	690	561
F2	Medical Mal - Claims made	1,077	1,397	1,431	1,228	1,242	1,280	1,207	1,165	1,395	1,422	1,299
G	Special Liability	1,030	944	1,397	1,869	1,699	1,712	1,219	1,354	1,489	1,443	1,321
H	Other Liab	567	523	649	590	529	506	490	441	546	497	546
K	Fidelity & Surety	461	824	749	706	635	892	811	784	862	1,071	831
I	Spec Property	505	499	499	602	568	533	571	610	621	761	837
J	Auto Physical Damage	1,148	1,044	948	1,030	990	1,102	1,190	1,256	1,580	1,583	1,741
L	Other	1,139	999	1,093	738	677	823	1,005	1,245	1,383	1,321	1,206
M	International	43	43	43	43	43	43	43	43	43	43	43
N&P	Reinsurance A & C	1,624	1,462	920	921	1,023	1,277	1,275	2,636	3,606	4,007	4,408
O	Reinsurance B	2,323	1,062	1,180	1,547	1,406	1,392	1,898	2,381	7,748	7,375	6,684
R	Products Liability	223	203	161	176	184	169	159	175	210	264	284
S	Financial Guarantee	91	91	91	91	91	91	91	91	91	91	91
T	Warranty	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074	1,074

**LOB-Size Thresholds for Reserve Risk Factors
by Line of Business and Reserve Year
(\$000s)**

Sch P Line	Name	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
A	Homeowners/Farmowners	130	145	144	145	142	153	145	168	185	151	168	170	191	186	186
B	Priv. Passeng Auto Liability	617	612	736	859	969	1,161	1,063	905	886	975	871	801	742	846	894
C	Comml Auto Liab.	300	293	264	382	534	590	706	701	636	638	471	408	433	453	496
D	Workers Comp	1,257	1,163	1,241	1,623	1,781	1,735	1,716	1,844	1,807	1,443	1,366	1,572	1,549	1,665	1,768
E	Comm Multiperil	109	121	160	172	232	238	246	329	320	315	311	280	329	480	448
F1	Medical Mal - Occurrence	5,503	6,032	5,033	4,575	1,789	1,610	1,318	1,099	1,004	829	921	1,197	1,328	1,584	1,726
F2	Medical Mal - Claims made	1,278	1,420	1,636	1,954	2,088	1,980	1,971	1,337	1,256	1,382	1,155	1,092	1,296	1,178	991
G	Special Liability	362	329	255	230	402	442	221	199	234	230	244	242	186	167	186
H	Other Liab	203	225	285	313	492	447	488	479	521	580	531	433	472	422	461
K	Fidelity & Surety	60	64	56	59	49	50	42	47	51	41	40	39	45	46	55
I	Spec Property	100	96	106	94	97	78	85	87	96	85	69	72	77	82	90
J	Auto Physical Damage	101	114	125	65	72	79	69	77	85	73	66	62	38	42	77
L	Other	78	87	131	120	104	116	161	178	176	185	152	142	159	185	168
M	International	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
N&P	Reinsurance A & C	528	408	575	750	825	466	373	365	405	434	421	808	873	453	283
O	Reinsurance B	1,395	1,550	3,244	3,390	1,770	1,651	1,573	1,748	1,923	1,867	2,462	2,708	2,317	1,646	2,234
R	Products Liability	210	191	161	150	146	126	140	153	138	165	150	126	118	99	100
S	Financial Guarantee	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
T	Warranty	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282

**LOB-Size Thresholds for Reserve Risk Factors
by Line of Business and Reserve Year
(\$000s)**

Sch P Line	Name	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
A	Homeowners/Farmowners	217	209	224	209	220	218	207	242	266	229	225
B	Priv. Passeng Auto Liability	898	988	777	756	832	731	736	841	934	1110	1031
C	Comml Auto Liab.	536	647	600	584	588	432	470	520	658	647	712
D	Workers Comp	2142	2074	2616	2611	2694	2399	2665	2865	3136	3886	3533
E	Comm Multiperil	512	517	499	449	542	545	419	466	430	469	516
F1	Medical Mal - Occurrence	1932	1756	1322	1469	1616	1372	1235	1494	1607	2275	2068
F2	Medical Mal - Claims made	649	721	1009	1185	1245	1356	1603	1802	1904	1867	2054
G	Special Liability	277	264	271	468	515	465	392	435	469	515	457
H	Other Liab	415	444	451	563	512	469	375	381	409	484	457
K	Fidelity & Surety	56	60	53	48	52	56	75	69	74	68	68
I	Spec Property	68	75	71	69	49	49	52	76	71	93	93
J	Auto Physical Damage	101	109	152	147	156	154	196	208	223	203	203
L	Other	187	198	164	149	124	126	114	90	92	175	175
M	International	49	49	49	49	49	49	49	49	49	49	49
N&P	Reinsurance A & C	271	229	233	414	376	157	174	595	541	380	422
O	Reinsurance B	2482	5225	4935	5225	3688	3926	4319	3845	3665	3845	3853
R	Products Liability	148	186	245	223	197	190	181	196	194	166	184
S	Financial Guarantee	46	46	46	46	46	46	46	46	46	46	46
T	Warranty	282	282	282	282	282	282	282	282	282	282	282

Appendix 2—Pooling Methodology

In order to identify intercompany pooling arrangements, we used information in the Annual Statements to identify individual companies that appear to be part of a larger pooled entity. This is similar to the methodology described in the DCWP Report 6.³⁶

The key difference in our approach is that, consistent with a recommendation by the DCWP, we refined the work by identifying intercompany pools by annual statement year.³⁷

For each company and annual statement year, we reviewed four sources:

- NAIC group code;
- Schedule P Intercompany Pooling Participation Percentage (Column 34);
- Schedule F Part 9 Note; and
- Notes to Financial Statements, Note 26 (on Intercompany Pooling Arrangements).

For each NAIC group, we identified the member companies that had either non-zero Schedule P pooling percentages or had Schedule F Part 9 Note box set equal to “Yes.” We then reviewed the determined pools for reasonableness and consistency with the net loss and LAE ratio, Schedule F Part 9 note and the Notes to Financial Statements, Note 26.

Further details on the mapping are available, upon request.

Note that due to the limitations of the data and information available, our methodology is approximate, and may not necessarily identify all intercompany pooling arrangements and/or may combine some companies that are not actually pooled. However, we feel that this adjustment is an improvement to the CCM, which treats each company separately.

³⁶ Appendix G.

³⁷ The pool is defined separately for each statement year. For example, if two companies are in an intercompany pool for Annual Statement year 2013, then all data points from that annual statement year will be pooled. If the same two companies are no longer subject to intercompany pooling in 2014, the data points will not be pooled. This methodology assumes that the intercompany pools are retroactive.

Appendix 3—Years of LOB NEP > 0 (Age) Analysis

Exhibit 3.1

87.5th Percentile of Company Loss & LAE Ratios by LOB and Company Years of Experience in LOB

Line	Company Years of Experience in LOB							
	0 - 4	5+	0 - 9	10+	0 - 14	15+	0 - 19	20+
(1) H/F	1.011	0.964	1.036	0.960	1.010	0.956	1.000	0.953
(2) PPA	1.169	0.969	1.099	0.964	1.021	0.958	1.018	0.946
(3) CA	1.100	1.010	1.146	1.001	1.124	0.983	1.095	0.960
(4) WC	1.238	1.044	1.159	1.034	1.115	1.025	1.087	1.019
(5) CMP	0.928	0.901	1.061	0.894	1.009	0.877	1.009	0.846
(6) MM Occurrence	1.800	1.522	2.819	1.495	1.725	1.514	1.665	1.496
(7) MM CM	1.431	1.176	1.169	1.184	1.148	1.196	1.174	1.191
(8) SL	1.296	0.949	1.246	0.927	1.143	0.894	1.047	0.877
(9) OL	1.058	1.013	1.131	1.004	1.076	0.996	1.092	0.962
(11) Spec Prop	1.007	0.831	0.891	0.828	0.891	0.820	0.881	0.806
(12) Auto Phys Damage	1.032	0.836	0.946	0.831	0.892	0.824	0.883	0.817
(10) Fidelity & Surety	0.830	0.680	0.831	0.677	0.787	0.641	0.796	0.599
(13) Other	1.130	0.935	1.130	0.916	0.993	0.893	0.980	0.863
(15) International	1.593	1.638	1.638	1.565	1.627	1.612	1.612	1.811
(16) Rein Property & Financial	1.479	1.240	1.429	1.239	1.173	1.273	1.185	1.287
(17) Reinsurance Liab	1.007	1.322	1.194	1.330	1.209	1.335	1.212	1.348
(18) Products Liability	0.963	1.285	1.111	1.290	1.238	1.287	1.339	1.234
(14) Fin & Mort	23.732	2.513	2.798	2.695				
(19) Warranty	1.028	1.028						
Wtd. Average (AY 2014 NEP)	1.323	0.971	1.085	0.964	1.001	0.929	0.994	0.916
% of Records	1.6%	98%	8.6%	91%	24%	76%	38%	62%
% of Premium	0.4%	100%	1.5%	99%	6%	94%	11%	89%

Exhibit 3.2

87.5th Percentile of Company Runoff Ratios by LOB and Company Years of Experience in LOB

Line	Company Years of Experience in LOB							
	0 - 4	5+	0 - 9	10+	0 - 14	15+	0 - 19	20+
(1) H/F	0.293	0.213	0.551	0.200	0.467	0.181	0.386	0.164
(2) PPA	0.434	0.180	0.316	0.176	0.308	0.162	0.238	0.153
(3) CA	0.709	0.348	0.914	0.324	0.640	0.297	0.493	0.268
(4) WC	0.312	0.344	0.412	0.338	0.409	0.324	0.390	0.310
(5) CMP	0.523	0.480	0.674	0.471	0.577	0.460	0.548	0.438
(6) MM Occurrence	-0.103	0.296	0.290	0.285	0.393	0.238	0.476	0.160
(7) MM CM	1.005	0.070	0.176	0.065	0.124	0.061	0.126	0.057
(8) SL	0.586	0.431	0.721	0.398	0.667	0.379	0.544	0.341
(9) OL	1.256	0.531	1.033	0.515	0.741	0.515	0.791	0.457
(11) Spec Prop	0.579	0.428	0.736	0.412	0.620	0.401	0.624	0.370
(12) Auto Phys Damage	0.899	0.155	0.817	0.129	0.307	0.116	0.282	0.095
(10) Fidelity & Surety	0.934	0.917	0.659	0.926	0.675	1.016	0.817	0.958
(13) Other	0.364	0.375	0.624	0.359	0.286	0.423	0.412	0.343
(15) International	1.091	0.749	1.083	0.592	1.061	0.323	1.035	0.336
(16) Rein Property & Financial	0.126	0.415	0.279	0.422	0.379	0.414	0.439	0.368
(17) Reinsurance Liab	0.849	0.629	0.690	0.585	0.854	0.501	0.715	0.505
(18) Products Liability	0.832	1.345	1.442	1.313	1.282	1.334	1.397	1.273
(14) Fin & Mort	-0.031	0.060						
(19) Warranty	0.052	0.316						
Wtd Average (CY 2014 Reserves)	0.623	0.393	0.609	0.379	0.519	0.366	0.502	0.340
% of Records	1.7%	98%	7.7%	92%	21%	79%	35%	65%
% of Premium	0.3%	100%	1.5%	98%	6%	94%	10%	90%

Appendix 4—Maturity Analysis

In the CCM, which uses data based on one Annual Statement year, the data set includes data points of varying development maturities. The PRF data include 10 accident years, and the RRF data include nine initial reserve dates. All data points are treated equivalently, regardless of the maturity of the data (12 months, 24 months, ..., 120 months for PRF data; 24 months, 36 months, ..., 120 months for RRF data).

For example, consider Schedule P Part 1 for annual statement year 2014. For each AY, the loss & LAE ratio has a different maturity. For AY 2014, the loss & LAE ratio is evaluated at 12 months (we call this maturity 1). For AY 2013, the loss & LAE ratio is evaluated at 24 months (we call this maturity 2), and so forth.

Similarly, the run-off ratios will be at varying development maturities.

DCWP research studied the effect that age of development has on PRFs and RRFs.

DCWP Report 6 (Premium Risk) analyzed data for AYs 1997-2000; for these AYs, every maturity was available from 12 months to 120 months. Short-tail lines, such as Private Passenger Auto or Homeowners/Farmowners, exhibited relatively flat PRFs by maturity; some other lines, such as Workers' Compensation or MPL-Occurrence, exhibited increasing PRFs by maturity. Table 6.5 in DCWP Report 6 displays the number of years needed for each LOB PRF to reach maturity (defined as within three percentage points of the mature PRF for the experience period).

DCWP Report 7 (Reserve Risk) analyzed data for initial reserve dates 1998-2001; for these initial reserve dates, every maturity was available from 24 months to 120 months. Results were similar to those in DCWP Report 6: RRFs for short-tail lines mature relatively rapidly; RRFs for other lines can take longer to reach maturity.

DCWP research did not study this effect further, but proposed two possible maturity adjustments. The most direct approach proposed would filter out data points that were not sufficiently mature. The more complex method proposed would adjust individual loss ratio and reserve runoff ratio data points for expected development and uses the adjusted data in the PRF and RRF calculations.

The Committee's proposed approach includes filtering data points based on maturity, which varies by LOB, separately for PRFs and RRFs. This is the direct approach suggested by the DCWP. However, the selected thresholds used are based on an analysis of the more complex development approach proposed by the DCWP. This analysis is a four-step process, as explained below.

1. For each LOB, the Committee analyzed PRFs/RRFs by year and maturity, creating a triangle of PRFs/RRFs.
2. These triangles were used to determine term-to-term PRF and RRF development factors. These term-to-term development factors were selected mechanically based on a simple average excluding high and low values. Cumulative factors were then derived based on these factors.
3. The cumulative factors were applied to the filtered data set based on LOB and maturity. Resulting RRFs and PRFs were determined by taking the 87.5th percentile of the developed Loss & LAE ratio or runoff ratio.
4. Maturity thresholds were selected so that they resulted in PRFs and RRFs similar to those derived from the developed data.

For example, consider the Reinsurance Liability line of business for PRFs.

Step 1: A triangle (or trapezoid) of PRFs is created by calculating the 87.5th percentile of loss & LAE ratios for each accident year and maturity available.

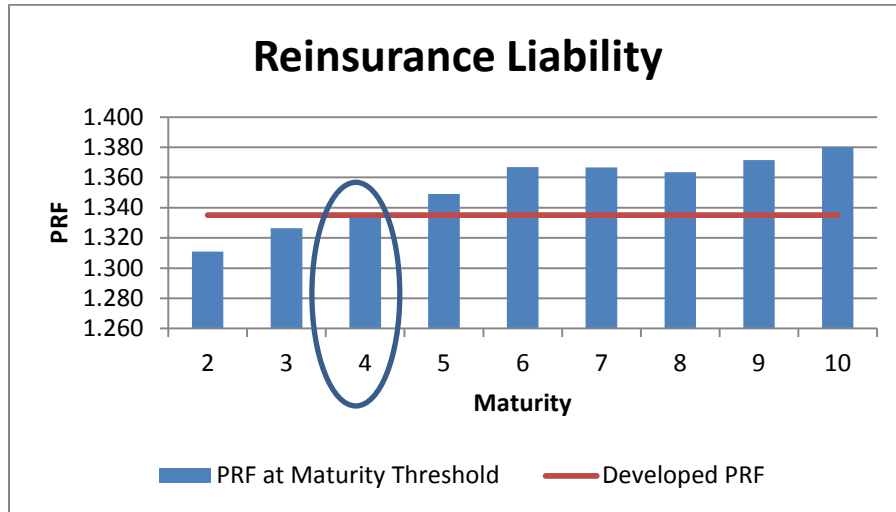
Accident Year	Maturity									
	1	2	3	4	5	6	7	8	9	10
1988										1.305
1989									1.914	1.824
1990								2.317	2.606	2.000
1991							1.250	1.232	1.227	1.323
1992						1.859	1.893	1.873	1.894	1.894
1993					1.149	1.282	1.212	1.273	1.111	1.229
1994				1.143	1.187	1.158	1.158	1.116	1.116	1.127
1995			1.214	1.154	1.155	1.111	1.126	1.190	1.152	1.201
1996		1.230	1.471	1.270	1.399	1.333	1.247	1.218	1.357	1.322
1997	1.260	1.240	1.462	1.436	2.250	1.981	1.434	1.464	1.632	1.632
1998	1.540	1.492	1.575	1.654	1.959	1.922	2.200	2.128	2.138	2.136
1999	1.433	1.651	2.179	2.827	2.347	2.519	2.773	2.884	2.794	2.762
2000	1.266	1.215	1.500	2.069	2.355	2.232	2.355	2.532	2.837	2.826
2001	2.329	1.571	2.002	2.463	2.888	2.955	2.632	2.732	2.685	2.910
2002	1.519	1.368	1.789	2.125	2.125	1.663	2.010	1.883	1.883	1.891
2003	1.475	1.705	1.779	1.780	1.656	1.546	1.714	1.700	1.675	1.917
2004	1.605	1.768	1.522	1.561	1.552	1.518	1.518	1.518	1.518	1.518
2005	1.443	1.293	1.221	1.141	1.087	1.134	1.098	1.041	1.214	1.127
2006	1.163	1.168	1.313	1.222	1.307	1.164	1.306	1.310	1.782	
2007	1.116	1.007	1.000	1.000	1.000	1.000	1.000	1.073		
2008	1.444	1.445	1.444	1.580	1.479	1.598	1.483			
2009	1.352	1.219	1.467	1.326	1.499	1.757				
2010	0.932	1.037	0.934	1.132	1.216					
2011	1.223	1.422	1.383	1.708						
2012	1.059	1.174	1.193							
2013	1.081	1.097								
2014	1.003									

Step 2: Incremental development factors are determined, and a selection of the simple average excluding high/low is calculated. Cumulative factors are determined from the selected incremental factors.

	Maturity								
	1	2	3	4	5	6	7	8	9
Selected Incremental	1.011	1.096	1.069	1.048	0.989	1.015	1.007	1.037	1.011
Cumulative	1.317	1.303	1.188	1.112	1.060	1.072	1.056	1.048	1.011

Step 3: These cumulative factors were applied to the filtered data set based on the maturity. The developed PRF was determined by taking the 87.5th percentile of the developed Loss & LAE ratio, in this case the resulting developed PRF is 1.335.

Step 4: Maturity thresholds were selected so that they resulted in a PRF similar to those derived from the developed data, in this case excluding data points with less than four years of maturity. This is depicted in the chart below.



Appendix 5—Capping & Effects

Table of Capped Factors

Line	PRF				RRF			
	Uncapped	Scenario 1	Scenario 2	Scenario 3	Uncapped	Scenario 1	Scenario 2	Scenario 3
(1) H/F	0.964	0.955	0.964	0.964	0.213	0.213	0.213	0.213
(2) PPA	0.969	0.969	0.969	0.969	0.179	0.181	0.179	0.179
(3) CA	1.010	1.005	1.010	1.010	0.348	0.243	0.256	0.276
(4) WC	1.044	1.044	1.044	1.044	0.344	0.336	0.344	0.344
(5) CMP	0.901	0.910	0.901	0.901	0.494	0.494	0.494	0.494
(6) MPL Occ.	1.490	1.778	1.734	1.668	0.296	0.417	0.404	0.383
(7) MPL C-M	1.176	1.103	1.114	1.130	0.089	0.297	0.289	0.276
(8) SL	0.949	0.914	0.924	0.938	0.431	0.270	0.284	0.304
(9) OL	1.013	1.027	1.013	1.013	0.531	0.531	0.531	0.531
(11) Spec. Prop.	0.831	0.923	0.905	0.879	0.428	0.207	0.222	0.246
(12) APD	0.836	0.836	0.836	0.836	0.155	0.121	0.129	0.143
(10) Fidelity / Surety	0.680	0.875	0.867	0.854	0.917	0.338	0.351	0.371
(13) Other	0.935	0.906	0.919	0.935	0.375	0.186	0.200	0.220
(15) International	1.638	1.187	1.206	1.234	0.695	0.336	0.345	0.359
(16) Reins. Prop. / Fin.	1.240	1.295	1.241	1.240	0.415	0.304	0.321	0.348
(17) Reins. Liab.	1.322	1.449	1.392	1.322	0.656	0.711	0.656	0.656
(18) PL	1.285	1.228	1.242	1.263	1.345	0.688	0.734	0.802
(14) Financial / Mortgage	2.513	1.515	1.548	1.598	0.060	0.194	0.188	0.179
(19) Warranty	1.028	0.875	0.867	0.854	0.316	0.338	0.351	0.371

2015 P&C RBC - Comparisons of P&C Industry R4 Charge by Company Type

Total R4 Charge \ Company Type	Commercial	Med Mal	Other	Personal	Reinsurance	Total
Current	79,289,647,578	3,783,232,383	557,829,779	20,448,954,785	3,463,391,654	107,543,056,179
PR0 17 Line 4 - Uncapped	96,596,743,635	1,083,454,966	1,091,278,241	20,954,791,442	3,258,323,455	122,984,591,740
Percentage change	21.8%	-71.4%	95.6%	2.5%	-5.9%	14.4%
PR017 Line 4 - Capped at 35%	86,049,211,179	3,187,114,159	628,690,530	19,961,844,393	3,039,194,001	112,866,054,262
Percentage change	8.5%	-15.8%	12.7%	-2.4%	-12.2%	4.9%
PR017 Line 4 - Capped at 20%	84,562,041,680	3,443,822,364	600,546,061	19,703,939,535	2,996,312,344	111,306,661,984
Percentage change	6.6%	-9.0%	7.7%	-3.6%	-13.5%	3.5%
PR017 Line 4 - Capped at 10%	83,349,086,888	3,617,710,793	584,386,286	19,882,561,551	3,236,426,840	110,670,172,358
Percentage change	5.1%	-4.4%	4.8%	-2.8%	-6.6%	2.9%

2015 P&C RBC - Comparisons of P&C Industry R5 Charge by Company Type

Total R5 Charge \ Company Type	Commercial	Med Mal	Other	Personal	Reinsurance	Total
Current	36,203,794,073	1,579,602,460	616,250,699	28,993,437,679	889,952,890	68,283,037,801
PRO 18 Line 4 - Uncapped	33,387,651,031	1,558,515,271	554,083,698	29,115,404,099	641,435,259	65,257,089,358
Percentage change	-7.8%	-1.3%	-10.1%	0.4%	-27.9%	-4.4%
PR018 Line 4 - Capped at 35%	34,213,469,151	1,560,493,416	596,635,538	29,310,410,623	669,970,906	66,350,979,634
Percentage change	-5.5%	-1.2%	-3.2%	1.1%	-24.7%	-2.8%
PR018 Line 4 - Capped at 20%	34,861,321,872	1,567,128,408	599,303,075	29,472,845,029	723,420,004	67,224,018,389
Percentage change	-3.7%	-0.8%	-2.8%	1.7%	-18.7%	-1.6%
PR018 Line 4 - Capped at 10%	35,765,897,203	1,573,718,590	606,477,315	29,304,579,092	807,137,818	68,057,810,018
Percentage change	-1.2%	-0.4%	-1.6%	1.1%	-9.3%	-0.3%

2015 P&C RBC - Comparisons of ACL RBC Charge by Company Type

ACL RBC \ Company Type	Commercial	Med Mal	Other	Personal	Reinsurance	Total
Current	63,774,142,821	2,593,095,492	877,037,505	49,856,973,034	6,316,764,877	123,418,013,729
PR018 Line 4 - Uncapped	70,609,096,452	1,704,393,326	1,066,249,904	50,288,083,592	6,233,066,457	129,900,889,732
Percentage change	10.7%	-34.3%	21.6%	0.9%	-1.3%	5.3%
PR018 Line 4 - Capped at 35%	66,216,931,022	2,351,283,873	893,076,057	50,110,522,938	6,158,150,388	125,729,964,279
Percentage change	3.8%	-9.3%	1.8%	0.5%	-2.5%	1.9%
PR018 Line 4 - Capped at 20%	65,733,962,849	2,453,551,062	886,150,323	50,113,194,740	6,151,035,906	125,337,894,879
Percentage change	3.1%	-5.4%	1.0%	0.5%	-2.6%	1.6%
PR018 Line 4 - Capped at 10%	65,403,209,962	2,524,662,104	883,462,349	49,994,018,559	6,234,904,744	125,040,257,719
Percentage change	2.6%	-2.6%	0.7%	0.3%	-1.3%	1.3%

2015 P&C RBC - Comparisons of P&C Industry R4 Charge by Company Size

----- Percentile Range on Companies with Size Greater than Zero ----->												
Total R4 Charge \ Company Size	zero or less	0%-10%	10%-20%	20%-30%	30%-40%	40%-50%	50%-60%	60%-70%	70%-80%	80%-90%	90%-100%	Total
Current	83,843,370	14,092,790	77,542,899	183,504,874	325,183,878	632,515,911	1,180,588,119	2,063,642,807	3,648,282,256	9,986,915,640	89,346,943,635	107,543,056,179
PR017 Line 4 - Uncapped	86,367,621	15,307,045	88,469,770	184,449,155	343,516,294	682,782,675	1,313,785,669	2,397,479,547	4,051,274,111	11,590,979,825	102,230,180,029	122,984,591,740
Percentage change	3.0%	8.6%	14.1%	0.5%	5.6%	7.9%	11.3%	16.2%	11.0%	16.1%	14.4%	14.4%
PR017 Line 4 - Capped at 35%	86,357,705	14,648,865	80,750,121	190,144,493	337,411,076	652,770,890	1,226,130,907	2,209,165,191	3,853,263,441	10,574,760,687	93,640,650,886	112,866,054,262
Percentage change	3.0%	3.9%	4.1%	3.6%	3.8%	3.2%	3.9%	7.1%	5.6%	5.9%	4.8%	4.9%
PR017 Line 4 - Capped at 20%	86,259,701	14,540,857	80,160,511	189,959,673	335,366,867	648,870,007	1,213,209,839	2,181,503,670	3,810,541,672	10,420,911,618	92,325,337,569	111,306,661,984
Percentage change	2.9%	3.2%	3.4%	3.5%	3.1%	2.6%	2.8%	5.7%	4.4%	4.3%	3.3%	3.5%
PR017 Line 4 - Capped at 10%	85,833,847	14,457,350	79,631,187	189,353,180	333,467,357	647,374,273	1,209,590,738	2,156,063,706	3,777,630,261	10,333,035,729	91,843,734,729	110,670,172,358
Percentage change	2.4%	2.6%	2.7%	3.2%	2.5%	2.3%	2.5%	4.5%	3.5%	3.5%	2.8%	2.9%

2015 P&C RBC - Comparisons of P&C Industry R5 Charge by Company Size

----- Percentile Range on Companies with Size Greater than Zero ----->												
Total R5 Charge \ Company Size	zero or less	0%-10%	10%-20%	20%-30%	30%-40%	40%-50%	50%-60%	60%-70%	70%-80%	80%-90%	90%-100%	Total
Current	2,635,796	32,583,535	131,690,705	213,764,208	399,293,436	681,664,133	1,146,863,868	1,803,776,682	3,363,051,133	7,605,199,448	52,902,514,857	68,283,037,801
PR018 Line 4 - Uncapped	2,629,512	31,524,085	118,324,462	215,886,723	394,797,237	664,191,385	1,101,237,229	1,697,280,962	3,255,765,369	7,140,077,778	50,635,374,617	65,257,089,358
Percentage change	-0.2%	-3.3%	-10.1%	1.0%	-1.1%	-2.6%	-4.0%	-5.9%	-3.2%	-6.1%	-4.3%	-4.4%
PR018 Line 4 - Capped at 35%	2,631,572	32,162,562	127,239,366	213,363,586	401,991,801	681,818,478	1,134,882,026	1,747,982,851	3,323,901,326	7,310,086,072	51,374,919,994	66,350,979,634
Percentage change	-0.2%	-1.3%	-3.4%	-0.2%	0.7%	0.0%	-1.0%	-3.1%	-1.2%	-3.9%	-2.9%	-2.8%
PR018 Line 4 - Capped at 20%	2,632,814	32,391,349	129,366,560	214,209,241	405,659,863	688,235,583	1,147,113,772	1,774,373,893	3,369,753,950	7,451,507,636	52,008,773,727	67,224,018,389
Percentage change	-0.1%	-0.6%	-1.8%	0.2%	1.6%	1.0%	0.0%	-1.6%	0.2%	-2.0%	-1.7%	-1.6%
PR018 Line 4 - Capped at 10%	2,633,772	32,557,501	130,745,360	214,845,470	405,703,650	689,436,826	1,153,647,213	1,800,162,130	3,391,513,870	7,579,687,265	52,656,876,961	68,057,810,018
Percentage change	-0.1%	-0.1%	-0.7%	0.5%	1.6%	1.1%	0.6%	-0.2%	0.8%	-0.3%	-0.5%	-0.3%

2015 P&C RBC - Comparisons of ACL RBC Charge by Company Size

----- Percentile Range on Companies with Size Greater than Zero ----->												
ACL RBC Charge \ Company Size	zero or less	0%-10%	10%-20%	20%-30%	30%-40%	40%-50%	50%-60%	60%-70%	70%-80%	80%-90%	90%-100%	Total
Current	571,879,442	122,555,143	175,423,422	490,245,718	441,411,271	828,695,958	1,178,060,755	2,206,884,987	4,030,699,975	9,906,712,686	103,465,444,373	123,418,013,729
Uncapped	573,370,560	122,682,207	173,772,113	488,941,536	449,148,434	838,056,809	1,220,337,208	2,292,672,660	4,153,476,424	10,480,097,572	109,108,334,208	129,900,889,732
Percentage change	0.3%	0.1%	-0.9%	-0.3%	1.8%	1.1%	3.6%	3.9%	3.0%	5.8%	5.5%	5.3%
Capped at 35%	573,018,873	122,574,112	174,287,975	491,810,446	446,527,205	833,760,642	1,191,271,492	2,243,470,712	4,089,187,550	10,081,241,913	105,482,813,358	125,729,964,279
Percentage change	0.2%	0.0%	-0.6%	0.3%	1.2%	0.6%	1.1%	1.7%	1.5%	1.8%	1.9%	1.9%
Capped at 20%	572,939,963	122,622,712	175,134,983	492,391,746	447,499,242	835,886,334	1,191,982,015	2,244,857,740	4,092,309,909	10,064,673,765	105,097,596,471	125,337,894,879
Percentage change	0.2%	0.1%	-0.2%	0.4%	1.4%	0.9%	1.2%	1.7%	1.5%	1.6%	1.6%	1.6%
Capped at 10%	572,728,261	122,652,893	175,610,739	492,492,752	446,917,133	836,444,664	1,192,637,579	2,242,366,391	4,086,911,134	10,055,318,644	104,816,177,529	125,040,257,719
Percentage change	0.1%	0.1%	0.1%	0.5%	1.2%	0.9%	1.2%	1.6%	1.4%	1.5%	1.3%	1.3%

Type of Company Definition

For each company, the company type was assigned to one of five categories—Personal Lines, Commercial Lines, Medical Professional Liability, Reinsurance, or Other—by determining the amount of premium plus reserves (net written premium plus net loss & LAE unpaid) for each of the five categories (using the table shown below), and then determining the category with the highest amount of premium plus reserves.

Schedule P Line	Category
(1) H/F	Personal Lines
(2) PPA	Personal Lines
(3) CA	Commercial Lines
(4) WC	Commercial Lines
(5) CMP	Commercial Lines
(6) MPL Occ.	Medical Professional Liability
(7) MPL C-M	Medical Professional Liability
(8) SL	Other
(9) OL	Commercial Lines
(11) Spec. Prop.	Commercial Lines
(12) APD	Personal Lines
(10) Fidelity / Surety	Other
(13) Other	Other
(15) International	Other
(16) Reins. Prop. / Fin.	Reinsurance
(17) Reins. Liab.	Reinsurance
(18) PL	Commercial Lines
(14) Financial / Mortgage	Other
(19) Warranty	Other

Appendix 6—Letter to NAIC

March 13, 2015

Via email to: eyeung@naic.org

David Altmaier
Chair, Property/Casualty Risk-Based Capital Working Group
National Association of Insurance Commissioners

c/o Eva Yeung, Senior Insurance Reporting Analyst
1100 Walnut Street, Suite 1500
Kansas City, MO 64106-2197

Re: Underwriting Risk Factors in the NAIC Property/Casualty (P/C) Risk-Based Capital Formula

Dear Mr. Altmaier:

The American Academy of Actuaries¹ P/C Risk-Based Capital (RBC) Committee is pleased to provide this update to the NAIC's Property/Casualty Risk-Based Capital Working Group on its plans to develop indicated property/casualty premium and reserve underwriting (UW) risk factors for consideration by the Working Group.²

While subject to revision based on further analysis, the approach currently contemplated by the Academy's P/C RBC Committee is based on the concepts outlined below. Elements of this approach have been presented at various Working Group meetings by the CAS Dependency and Calibration Working Party (DCWP). As we proceed, we encourage questions, suggestions, and discussion of issues related to our work from the Working Group and interested parties.

To assist in that discussion, the attached outline covers the following elements of the Academy P/C RBC Committee work:

¹ The American Academy of Actuaries is an 18,000+ member professional association whose mission is to serve the public and the U.S. actuarial profession. The Academy assists public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

² In September 2010, this Working Group requested an analysis of methods of properly quantifying reserve and pricing (premium) underwriting factors. To assist in this effort, the Academy enlisted the research aid of the Casualty Actuarial Society (CAS). In July 2011, the Academy's P/C RBC Committee reported to the Working Group that the complexity of these issues would necessitate additional research by the CAS working party. The current work by the P/C RBC Committee is a continuation of that effort, now that a significant amount of research on that subject has been completed by the CAS working party.

1. Policy Decisions—Issues we consider a matter of NAIC policy and our interpretation of that policy based on past practices
2. Analysis Decisions—Required to prepare recommendations
3. Implications for NAIC Procedures—There are features in Academy P/C RBC

- recommendations that may affect NAIC procedures
4. Scope of P/C RBC Recommendations—Areas that are currently outside the scope of the contemplated Academy P/C RBC Committee recommendations. These issues may be addressed in subsequent recommendations after additional research.
 5. Data Requests of NAIC

We welcome feedback and/or questions from Working Group members, interested regulators, and interested parties as early in the process as possible. If you have any questions about our comments, please contact Lauren Pachman, the Academy's casualty policy analyst, at pachman@actuary.org or (202) 223-8196.

Sincerely,

Thomas S. McIntyre, MAAA, FCAS, CERA
Chairperson, P/C Risk-Based Capital Committee
American Academy of Actuaries

Academy RBC Committee
Approach to Underwriting Factor Calibration
Prepared for Discussion by NAIC RBC Working Group and interested parties

Feature	Approach	Comments
1. Policy Decisions		
Line of Business Size (LOB-Size)	While indicated premium risk factors ³ (PRFs) and reserve risk factors ⁴ (RRFs) vary by size, the Academy RBC Committee will provide a single factor for all LOB-sizes	We understand this is a policy decision by the NAIC. We note that Solvency II and most factor-based standard formulas also use UW factors that do not vary by LOB-size.
Transition Rules	The Academy RBC Committee expects to provide transition rules for implementation, consistent with past practice and/or if such rules are suggested by any features in the data.	In the past, the NAIC implemented recommended factor changes with transition rules.

³ For each Schedule P LOB, R5 is determined using an “Industry RBC Loss and Expense Ratio,” a value applicable to all companies, used in PR017 line 4. We refer to this as the premium risk factor.

⁴ For each Schedule P line of business (LOB), reserve risk is determined using an “Industry Loss and Expense %,” a value applicable to all companies, on PR016 Line 4. We refer to this as the reserve risk factor.

Feature	Approach	Comments
<p>Safety Level</p>	<p>RRF based on 87.5th percentile of observed reserve runoff ratios across companies and initial reserve dates.</p> <p>PRF based on 87.5th percentile of observed loss ratios across companies and Accident Years.</p>	<p>This is the “safety level” used in prior Academy analyses, including the most recent (“Current Calibration Method” [CCM]). No safety level was specified in the earliest calibrations.</p> <p>This safety level is based on a “company view” of insolvency risk. It means that 12.5 percent of runoff ratios or loss ratios are higher than the indicated RRF or PRF, respectively, across companies and years.</p> <p>An alternative view is one based on “number of policies” or, as a more practical proxy, premium. We intend to provide the percentile of premium equivalent to the 87.5th percentile of companies, i.e., the portion of industry premium from companies with runoff ratios or loss ratios above the indicated RRF or PRF, respectively. We expect that for most lines of business, when the company view is 87.5 percent, the premium equivalent safety level view is higher than 87.5 percent.</p> <p>The committee could provide factors that also require a certain percentile of premium equivalent safety levels by line of business (in addition to the 87.5th percentile of companies).</p> <p>Also, the P/C RBC committee may be able to provide factors at other safety levels, if needed.</p>

Feature	Approach	Comments
2. Analysis Decisions		
Data	The P/C RBC Committee will use data from as many years as can be provided by the NAIC, likely to be Annual Statements 1997-2013.	<p>The DCWP research showed the significance of including underwriting cycles.</p> <p>The P/C RBC Committee is interested in any data or analysis supporting a view that future UW risk will be significantly different from observed past risk. Absent such data or analysis, to the extent the history appears to provide enough data, the P/C RBC Committee recommendations will be based primarily on the historical data.</p>
Survivorship	The P/C RBC Committee will use data for any years in which Annual Statements were filed, even if a company is no longer filing statements, i.e., including data for companies that are no longer in operation.	The CCM, based on data from only one Annual Statement, does not include any data from companies that did not file Annual statements in the most recent year.
LOB-Size	Select PRF and RRF for data points with LOB-size at or above a selected percentile for each LOB. ⁵	<p>For PRFs, the CCM was calibrated to sizes over \$500,000 in premium. This CCM filter would include more data points for some lines and fewer data points for other lines.</p> <p>For RRFs, no filter exists for LOB-size. The P/C RBC Committee proposes LOB-size filters based on a selected percentile of reserve volume.</p>

⁵ The P/C RBC Committee is still considering the other alternatives, the median approach and the threshold approach, identified in the DCWP research.

Feature	Approach	Comments
Pooling	The P/C RBC Committee intends to recommend combining the data from intercompany pool participants into a single pool-wide data point .	In CCM, data from each company that is part of an intercompany pooling arrangement is treated as an independent data point. Treating such interrelated data points as independent has the potential to cause distortion. The DCWP approach addresses that potential distortion.
Minor lines	The P/C RBC Committee intends to recommend some type of filtering for “ minor lines ” – data points where the net earned premium for the Line of Business (LOB) represents a small portion of the company’s total net earned premium.	The basis for this approach is described in DCWP Reports 6, 7, and 8, on premium risk factors, reserve risk factors, and variation in risk factors by type of company, respectively. (All DCWP reports are published in the CAS E-Forum.)
Company Age	The P/C RBC Committee intends to exclude data points from companies with less than five years of earned premium.	The basis for this approach is described in DCWP Reports 6 and 7, on premium risk factors and reserve risk factors.
Maturity	The P/C RBC committee will investigate the effects of determining indicated factors using data (a) of all maturities and (b) removing the least mature data points, as those data points might distort indicated UW risk factors, as indicated by DCWP research.	
Inflation	The percentile threshold for LOB-size may be applied separately for each Accident Year/ reserve date to adjust for inflation over time. ⁶	As the CCM used only 10 years of data (the latest Annual Statement), inflation adjustments were not as important.

⁶ As was stated earlier, the P/C RBC Committee will use data from as many years as can be provided by the NAIC, likely to be Annual Statements 1997-2013. Therefore, if a constant LOB-size threshold is applied for each Accident Year, this may lead to distortion due to inflation. A constant percentile could be selected for each Accident Year/reserve date separately to adjust for this.

Feature	Approach	Comments
Unexpected data values	The P/C RBC Committee intends to exclude data points that have anomalous values . This includes negative loss ratios, negative calendar reserves, reserve runoff ratios over 500 percent, etc.	<p>CCM included similar filters.</p> <p>The new filters must be somewhat different because the data set will now include 25 years of data rather than just the 10 years of data used in CCM.</p> <p>Also, CCM filters were modeled on the rules for the RBC own-company experience adjustment. Those own-company adjustment data rules are not necessarily appropriate for determining the data points for calibration purposes.</p>
3. Features in Application of RBC Recommendations that may Affect NAIC Procedures		
Own-company experience adjustment	<p>The RBC formula includes an adjustment for the company loss ratio (or runoff ratio) in relation to the industry loss ratio (or runoff ratio) in PR0016 and PR0017 lines 1, 2, and 3.</p> <p>Consistent with the proposed calibration of premium and reserve risk factors, the P/C RBC Committee might recommend changes to the calculation of the industry loss ratio and/or reserve ratio (line 1 on PR0016 and PR0017) to reflect the minor lines, pooling, size, and maturity treatments in the risk factor calibration.</p>	
4. Scope of This P/C RBC Analysis		
Catastrophe Risk Charges	The P/C RBC Committee currently does not intend to address the effect of the new R6 and R7 charges in this work.	

Feature	Approach	Comments
Investment Income	The scope of this project does not include an evaluation or recommendation of changes to the investment income offset.	
Tabular Reserve	The P/C RBC Committee does not have the data necessary and therefore will not estimate the effect that unwinding workers' compensation tabular reserve might have on the indicated RBC factors.	Do the NAIC or interested parties have any suggestions regarding analysis of the effect and/or data sources to allow such analysis?
5. Data Requests of NAIC		
Data	NAIC has already provided Schedule P data for Annual Statement years 2011-2013 to supplement the 1997-2010 Annual Statement data already provided to DCWP.	
Measuring Impact	To allow the P/C RBC Committee and the NAIC itself to consider the effect of the P/C RBC Committee's proposals, we ask that the NAIC work with the P/C RBC Committee to perform a calculation of the impact.	This data can be approximated, but not quite reproduced, from public Annual Statement data.

Appendix 7—Runoff Ratio Example

To illustrate the runoff ratio calculation, consider the following hypothetical example, Company XYZ’s schedule P, Part 2 and 3 for a particular LOB for Annual Statement Year 2013.

Part 2

		1	2	3	4	5	6	7	8	9	10	11	12
		INCURRED NET LOSSES AND DEFENSE AND COST CONTAINMENT EXPENSES REPORTED AT YEAR END (\$000 OMITTED)										DEVELOPMENT	
Years in Which Losses Were Incurred		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	One Year	Two Year
1	Prior	730	510	470	450	450	450	440	440	440	440	0	0
2	2004	4,890	3,750	3,700	3,620	3,620	3,620	3,620	3,620	3,620	3,620	0	0
3	2005	XXX	5,010	4,110	3,680	3,730	3,660	3,650	3,650	3,660	3,660	0	10
4	2006	XXX	XXX	3,720	2,850	2,810	2,670	2,640	2,620	2,620	2,620	0	0
5	2007	XXX	XXX	XXX	3,150	2,500	2,490	2,480	2,480	2,480	2,470	(10)	(10)
6	2008	XXX	XXX	XXX	XXX	2,900	2,230	2,190	2,170	2,170	2,150	(20)	(20)
7	2009	XXX	XXX	XXX	XXX	XXX	2,700	1,960	1,970	1,960	2,050	90	80
8	2010	XXX	XXX	XXX	XXX	XXX	XXX	3,770	3,580	3,530	3,370	(160)	(210)
9	2011	XXX	XXX	XXX	XXX	XXX	XXX	XXX	270	310	300	(10)	30
10	2012	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	0	0	0	XXX
11	2013	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	0	XXX	XXX
12	Total											(110)	(120)

Part 3

		1	2	3	4	5	6	7	8	9	10	11	12
		CUMULATIVE PAID NET LOSSES AND DEFENSE AND COST CONTAINMENT EXPENSES REPORTED AT YEAR END (\$000 OMITTED)										Number of Claims Closed With Loss Payment	Number of Claims Closed Without Loss Payment
Years in Which Losses Were Incurred		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		
1	Prior	0	390	450	440	440	440	440	440	440	430	1,110	170
2	2004	2,100	3,360	3,580	3,620	3,620	3,620	3,620	3,620	3,620	3,620	860	150
3	2005	XXX	1,540	2,770	3,350	3,620	3,640	3,650	3,650	3,660	3,650	610	100
4	2006	XXX	XXX	1,410	2,180	2,380	2,570	2,600	2,600	2,600	2,600	490	90
5	2007	XXX	XXX	XXX	1,280	2,120	2,310	2,430	2,440	2,440	2,470	420	50
6	2008	XXX	XXX	XXX	XXX	980	1,630	1,880	2,010	2,080	2,100	410	40
7	2009	XXX	XXX	XXX	XXX	XXX	1,150	1,780	1,830	1,890	2,000	460	50
8	2010	XXX	XXX	XXX	XXX	XXX	XXX	1,560	2,590	3,200	3,300	530	70
9	2011	XXX	XXX	XXX	XXX	XXX	XXX	XXX	140	150	160	40	0
10	2012	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	0	0	0	0
11	2013	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	0	0	0

There are nine run-off ratios to be calculated from these data. The first is the runoff ratio for the 2004 reserve year. For this ratio, the numerator of the Reserve Runoff Ratio is the incurred development for 2004 and prior AYs combined from 2004 evaluation year to 2013 evaluation year. These data come from Schedule P, Part 2 and calculated from the numbers in bold above as:

$$440 + 3,620 - 730 - 4,890 = -1,560$$

The denominator is the held loss reserves at the 2004 evaluation date. This data point is calculated for all accident years combined using Schedule P, Part 2 and Part 3. This is calculated from the cells that are shaded above as:

$$730 + 4,890 - 0 - 2,100 = 3,520$$

The reserve runoff ratio is then simply the numerator divided by the denominator:

$$-1,560 \div 3,520 = -44.3\%$$

The reserve runoff ratios for reserve years 2005 through 2012 would be calculated in the same way.