



August 19, 2020

Mr. James Charowsky
Environmental Group Manager
Department of Environmental Protection
Bureau of Mining Programs
Rachel Carson State Office Building
400 Market Street
Harrisburg, Pennsylvania 17101

Dear Jim:

We completed the requested actuarial study for the Coal and Clay Mine Subsidence Insurance Fund as of June 30, 2019. The enclosed report contains our findings and detailed discussions of the analyses.

If we can be of further assistance, or if you have any questions or comments regarding our results, please contact us. We appreciate the opportunity to provide actuarial services to the Pennsylvania Department of Environmental Protection, Bureau of Mining Programs and look forward to continuing our relationship.

Thank you for your consideration,

TAYLOR-WALKER CONSULTING, LLC

A handwritten signature in black ink, appearing to read "BMS", written over a light blue horizontal line.

Brent M. Sallay, FCAS, MAAA
Senior Consulting Actuary

A handwritten signature in black ink, appearing to read "Solomon Frazier", written over a light blue horizontal line.

Solomon L. Frazier, FSA, FCAS, MAAA
Senior Consulting Actuary

BMS/slf

Enclosure

Coal and Clay Mine Subsidence Insurance Fund Actuarial Study

OVERVIEW

We were requested by the Pennsylvania Department of Environmental Protection, Bureau of Mining Programs (PDEP) to conduct an actuarial study of the Coal and Clay Mine Subsidence Insurance Fund (Fund) to evaluate the health of the Fund in various respects. Our results and analyses are summarized and explained in this report. All calculations are presented in the exhibits which are included as part of this report.

LIMITATIONS AND CONDITIONS

Our analysis is based on generally accepted actuarial methods and includes the use of such actuarial assumptions and calculations as we considered necessary. Our estimates make no provision for the extraordinary future emergence of either new classes of losses or post-contractual expansions of policy coverage. Due to the variability inherent in the estimation procedure, actual results may vary, perhaps substantially, from those indicated in our analysis.

PDEP provided us with paid claims data, written premium data, and assorted policy information including historical coverage amounts. We accepted these data without audit, but reviewed them for reasonableness and consistency. There were some inconsistencies with regard to the accident dates provided for some claims. In these instances, we estimated the accident dates following our best judgment. To the extent that any of these data might be found to be materially in error, our results could similarly be in error.

SUMMARY

Some of the key findings of our study are summarized as follows:

- The Fund's current pricing levels are deemed to be more than adequate given current coverage terms. The large indicated rate decrease might be addressed through a rate reduction, an increase in policy limits, or some combination of the two.
- The estimated claims reserve need as of June 30, 2019 was approximately \$1.1 million.
- The Fund is considered to be in good health relative to industry benchmarks, with adequate cushion to protect against potential catastrophes, and is expected to continue to improve its position under various scenarios of future performance.

- There is ample room for the Fund to make changes to its program if desired, most notably by increasing policy limits and/or allowing the reserves held in lieu of reinsurance to grow substantially.
- No material concerns were noted with regard to the Fund's compliance with relevant laws and regulations.

BACKGROUND

The Coal and Clay Mine Subsidence Insurance Fund was created in the early 1960s to provide insurance protection related to mine subsidence exposure arising from coal and clay mining operations in Pennsylvania. It is typical for this insurance to cover structural damage to both residential and commercial buildings as a result of ground movement from a mine subsidence event.

The Fund was initially capitalized with a \$1 million grant. Premium collections since then have increased the Fund's balance to over \$118 million as of June 30, 2019, with the majority of this amount held as a large reserve in lieu of obtaining commercial reinsurance coverage. The Fund's program, which is administered by the PDEP, currently offers over \$13 billion dollars in coverage across the state of Pennsylvania. Coverage under the Fund is limited to \$500,000 for both residential and commercial properties, with no deductible provision. (Previously, a \$250 deductible applied to residential properties and a \$500 deductible applied to commercial properties.) Since 2012, this coverage has been offered for \$2.00 per \$1,000 for the first \$5,000 of coverage, and \$0.50 per \$1,000 of coverage thereafter, with a 10% discount applicable to seniors. Implementation of these rates followed sizable rate reductions in 2009 and in 2012, as well as a \$1 million refund issued to policyholders in 2010.

The Coal and Clay Mine Subsidence Insurance Board (Board) has jurisdiction to change certain program terms as warranted.

ANALYSIS

As part of our assignment to evaluate the financial health of the Fund, we performed various different tasks, which are described in detail in the following sections.

Pricing Analysis

Exhibits 1 and 2 present our analysis of the Fund's pricing levels for the combination of both residential and commercial exposures. Loss assumptions used in this analysis, both at an expected level and at higher confidence levels, were derived in the reserve analysis described in the subsequent section of this report. All other assumptions

regarding pricing provisions were derived in Exhibit 2 in consideration of historical experience. In our opinion, this history, for instance including the historical administrative expense costs, demonstrated sufficient consistency to be used for this purpose. The various loss and expense provisions were then aggregated and compared to the current premium rate to produce a range of indicated rate level changes.

We note that the sizeable investment income earned on the Fund's equity each year offsets much of what would otherwise drive the premium need. As a result, a significant rate decrease is indicated for the Fund, even at a 90th percentile level. However, another option to address this pricing disparity would be to simply increase the coverage offered by each policy, namely, by increasing the policy limits. (As deductibles were already taken down to \$0 in the past, there is no room to increase the amount of coverage provided by further adjusting deductibles.) Based on diagnostics discussed later in this report, it would appear reasonable to offer coverage limits as high as \$5 million (the highest limit considered in our analysis), so long as the aggregate amount of coverage provided does not more than double as a result.

Ultimately, the chosen policy limits will depend on the PDEP's appetite for risk. It may also be desirable to choose some combination of a rate reduction and an increased policy limit. Our recommendation would be to set the premium rate applicable above \$5,000 of coverage based on our indicated rates (or some rounded value close to them) for the desired combination of policy limit and confidence level. The rate applicable to the first \$5,000 of coverage can then be set at four times this level, consistent with the current pricing structure.

Reserve Analysis

Our analysis of loss and allocated loss adjustment expense (ALAE) reserves as of June 30, 2019 is presented in Exhibits 4 through 9. We first used three standard actuarial methods to estimate ultimate losses and ALAE for each accident year: a paid development method, an expected method, and a paid Bornhuetter-Ferguson (B-F) method.

For the development method, we organized the historical experience into accident years to derive a pattern to develop the claims to ultimate value. As previously mentioned, this process required us to estimate the accident dates applicable to many historical claims based on report dates, specific notes in the claims files, and the average lag observed for historical claims for which both the accident date and report date were known. This effort was necessary as the development patterns informed several other elements of our analyses as well: the results of the B-F method, the variability assumed in our reserve estimate to produce estimates at higher percentiles, and the projected future payout used in our cash flow analysis.

As previously mentioned, the paid B-F method relied to some extent on our selected development pattern, but also on the results of the expected method. The expected method is somewhat iterative in nature, in that it relied on our ultimate selection of losses and ALAE to produce various indications of the historical loss ratio for each year. We deemed it appropriate to compare ultimate losses and ALAE to historical premiums without further adjustment because premium rates for the years under consideration have not changed. Based on the historical indications we selected an expected loss ratio and also observed the variability in the historical indications to define expected losses and ALAE at higher percentile levels. We note that each of these results was used in the determination of reasonable pricing levels previously described.

We then selected ultimate losses and ALAE for each accident year based on the results of the various methods considered, and subtracted paid losses and ALAE as of June 30, 2019 to estimate reserves as of the same date. Then, based on the observed variability in historical paid development patterns, we estimated reserves at various higher percentile levels. We note that the \$8,220,292 of reserves held by the Fund for the combination of outstanding claims and catastrophes as of June 30, 2019 exceeds even our 99th percentile reserve estimate.

Cash Flow Analysis

Exhibit 11 presents multiple scenarios of the Fund's projected performance through June 30, 2030 under various combinations of assumptions regarding growth, investment yield, losses, and premiums. In addition, we are able to provide further scenarios reflecting different assumptions, upon request. The premium rate is included here as a variable assumption to provide a forecast of future performance under different policy limits or levels of rate adequacy. A proposed change in policy limits would also necessitate a different assumption for the loss rate. Otherwise, the assumptions are varied across scenarios to test sensitivity to certain unknown elements of the future forecast.

Included among these calculations is a projection of payments made in each future year. This is done in two parts. First, the expected payout of reserves as of June 30, 2019 was derived in Exhibit 3. Then, for claims to be incurred in the future, the projected payments are a function of the same expected payment pattern, the growth rate, and the loss rate, which could vary based on either the selected policy limit or the percentile of claims experience assumed to apply.

We note that in each displayed scenario, the Fund's balance is projected to grow to some extent over the next ten years.

Review of Diagnostic Ratios

Exhibit 12 presents various diagnostics relating to both our results and the Fund's financial statements, and includes observations including how some of these measures compare to industry benchmarks. Frequency and severity indications were derived in

part based on ultimate claim counts estimated using a reported claim count development method in Exhibit 10. In our opinion, all of the computed diagnostics demonstrate the financial health of the Fund at present, but also indicate opportunities to sustain growth through improved practices. Most notably, the results suggest the following key findings:

- The Fund could reasonably support an increase in policy limits to the highest level contemplated in our analysis, namely, \$5 million, so long as coverage in force remains below roughly twice its current level.
- Reserves held in lieu of reinsurance could justifiably be allowed to grow to as much as five times their current level, relative to the amount of coverage currently in force. We are not aware if any other sources besides underwriting and investment income are available to increase the value of this reserve, but any additional reserves would help to align the Fund more closely with industry peers that are better prepared to withstand fortuitous catastrophe experience.
- There is sufficient consistency in the historical frequency and loss cost levels to suggest that coverage in force serves as an adequate proxy for loss.

Analysis of Catastrophe Potential

As a further test of the benchmarks in place with regard to reserves held in lieu of reinsurance, Exhibit 13 presents various possible outcomes of catastrophic loss activity arising from either earthquakes, flooding, or hurricanes. Due to the nature of this exposure, our projections necessarily rely on significant judgment. However, this judgment was informed by various industry sources including actual experience related to Hurricanes Agnes in 1972 and Ivan in 2004, as well as studies of historical seismic activity specific to the State of Pennsylvania. In our opinion, these results generally support our previous conclusion regarding the reserves held in lieu of reinsurance. Namely, the risk is low enough that a reserve representing only a fraction of the total exposure to loss is appropriate, but industry benchmarks would nonetheless justify an even larger reserve held in lieu of reinsurance, as much as five times the present level.

Compliance with Relevant Laws and Regulations

We noted no material concerns throughout our review with regard to compliance with Pennsylvania regulations, codes, or laws, or with policy specifications. With regard to compliance with actuarial standards, while we did find premium rates to be excessive during our review, the PDEP has expressed a willingness to alter pricing levels in accordance with our recommendations, which would bring them to a more actuarially justified level. We otherwise have no concerns regarding compliance with actuarial standards. In making our determination of compliance, we reviewed both a current and prior historical version of the insuring agreement as well as relevant laws such as Title

52, Chapter 14 of Pennsylvania Statutes and Title 25, Chapter 401 of the Pennsylvania Code (Code). We do note the following with regard to the latter:

- § 401.22 of the Code instructs that “[e]very insurance policy must include a loss deductible amount for which the Fund is not liable. The amount will be determined by the Board and may be changed as experience may warrant.” If the intent of this section is to promote loss control by leaving the underlying insured responsible for at least a portion of every reported claim, then the Fund is not technically in compliance. However, the \$0 deductible amount is actuarially justified by current pricing levels, and was certainly set by the Board as warranted by historical experience.
- § 401.23 of the Code states that “the Fund will be liable for only that portion of the loss which is not covered by...other sources of remuneration.” During the course of our review, we inquired of the PDEP whether this was in fact happening. In response, it was indicated that instances where other private insurance supersedes coverage by the Fund probably occur less than 1% of the time. We have no concerns related to this response.

CONCLUSION

In conclusion, it is our opinion that the Fund is in good financial health, but also has opportunities to sustain growth through improved practices. To this end, we recommend that the PDEP consider some combination of increasing policy limits and reducing premium rates, and also allow the reserves held in lieu of reinsurance to grow substantially, to the extent possible. We are available to provide further information, including additional cash flow projections under different assumptions, upon request.

**Coal and Clay Mine Subsidence Insurance Fund
Indicated 2020/2021 Premium Rates
Current \$500,000 Limits**

**Exhibit 1
Sheet 1**

	Point Estimate	80th Percentile	90th Percentile
(1) Projected Premiums at Current Rate Level:	7,000,000		
(2) Projected Ultimate Losses & ALAE:	1,225,000	1,569,221	1,854,796
(3) Projected Administrative Costs:	2,940,000	3,008,593	3,147,127
(4) Prior Year-End Fund Equity (000s):	118,220		
(5) Projected Investment Income Offset:	-2,955,500	-2,314,359	-2,247,992
(6) Provision for Commissions:	1.5%	1.9%	1.9%
(7) Provision for Premium Refunds:	0.8%	0.8%	0.9%
(8) Underwriting Profit and Contingency Margin:	15.0%	10.0%	5.0%
(9) Indicated Premium Need:	1,462,515	2,592,707	2,985,912
(10) Indicated Rate Change:	-79.1%	-63.0%	-57.3%
(11) Current Average Rate per \$1,000 of Coverage:	0.48		
(12) Indicated Rate per \$1,000 of Coverage:	0.10	0.18	0.21
(13) Loss Cost per \$1,000 of Coverage:	0.08	0.11	0.13

Notes:

(1) Roughly approximated based on historical premium volume, assuming some moderate growth.

(2) = (1) x loss ratios derived in Exhibit 7.

(3) = (1) x ratios selected in Exhibit 2.

(4), (11) Based on information provided by client.

(5) = (4) x ratios selected in Exhibit 2.

(6), (7) From Exhibit 2.

(8) Selected judgmentally.

(9) = [(2) + (3) + (5)] / [1 - (6) - (7) - (8)].

(10) = (9) / (1) - 1.

(12) = (11) x [1 + (10)].

(13) = (2) / (1) x (11).

**Coal and Clay Mine Subsidence Insurance Fund
Indicated 2020/2021 Premium Rates
\$1 Million Limits**

**Exhibit 1
Sheet 2**

	Point Estimate	80th Percentile	90th Percentile
(1) Projected Premiums at Current Rate Level:	7,000,000		
(2) Projected Ultimate Losses & ALAE:	1,604,273	2,055,069	2,429,060
(3) Projected Administrative Costs:	2,940,000	3,008,593	3,147,127
(4) Prior Year-End Fund Equity (000s):	118,220		
(5) Projected Investment Income Offset:	-2,955,500	-2,314,359	-2,247,992
(6) Provision for Commissions:	1.5%	1.9%	1.9%
(7) Provision for Premium Refunds:	0.8%	0.8%	0.9%
(8) Underwriting Profit and Contingency Margin:	15.0%	10.0%	5.0%
(9) Indicated Premium Need:	1,921,129	3,149,229	3,608,551
(10) Indicated Rate Change:	-72.6%	-55.0%	-48.4%
(11) Current Average Rate per \$1,000 of Coverage:	0.48		
(12) Indicated Rate per \$1,000 of Coverage:	0.13	0.22	0.25
(13) Loss Cost per \$1,000 of Coverage:	0.11	0.14	0.17

Notes:

(1) Roughly approximated based on historical premium volume, assuming some moderate growth.

(2) = (1) x loss ratios derived in Exhibit 7, adjusted based on industry increased limits factors.

(3) = (1) x ratios selected in Exhibit 2.

(4), (11) Based on information provided by client.

(5) = (4) x ratios selected in Exhibit 2.

(6), (7) From Exhibit 2.

(8) Selected judgmentally.

(9) = [(2) + (3) + (5)] / [1 - (6) - (7) - (8)].

(10) = (9) / (1) - 1.

(12) = (11) x [1 + (10)].

(13) = (2) / (1) x (11).

Coal and Clay Mine Subsidence Insurance Fund
Indicated 2020/2021 Premium Rates
\$2 Million Limits

Exhibit 1
Sheet 3

	Point Estimate	80th Percentile	90th Percentile
(1) Projected Premiums at Current Rate Level:	7,000,000		
(2) Projected Ultimate Losses & ALAE:	2,100,341	2,690,530	3,180,166
(3) Projected Administrative Costs:	2,940,000	3,008,593	3,147,127
(4) Prior Year-End Fund Equity (000s):	118,220		
(5) Projected Investment Income Offset:	-2,955,500	-2,314,359	-2,247,992
(6) Provision for Commissions:	1.5%	1.9%	1.9%
(7) Provision for Premium Refunds:	0.8%	0.8%	0.9%
(8) Underwriting Profit and Contingency Margin:	15.0%	10.0%	5.0%
(9) Indicated Premium Need:	2,520,969	3,877,127	4,422,926
(10) Indicated Rate Change:	-64.0%	-44.6%	-36.8%
(11) Current Average Rate per \$1,000 of Coverage:	0.48		
(12) Indicated Rate per \$1,000 of Coverage:	0.17	0.27	0.31
(13) Loss Cost per \$1,000 of Coverage:	0.15	0.19	0.22

Notes:

(1) Roughly approximated based on historical premium volume, assuming some moderate growth.

(2) = (1) x loss ratios derived in Exhibit 7, adjusted based on industry increased limits factors.

(3) = (1) x ratios selected in Exhibit 2.

(4), (11) Based on information provided by client.

(5) = (4) x ratios selected in Exhibit 2.

(6), (7) From Exhibit 2.

(8) Selected judgmentally.

(9) = [(2) + (3) + (5)] / [1 - (6) - (7) - (8)].

(10) = (9) / (1) - 1.

(12) = (11) x [1 + (10)].

(13) = (2) / (1) x (11).

Coal and Clay Mine Subsidence Insurance Fund
Indicated 2020/2021 Premium Rates
\$5 Million Limits

Exhibit 1
Sheet 4

	Point Estimate	80th Percentile	90th Percentile
(1) Projected Premiums at Current Rate Level:	7,000,000		
(2) Projected Ultimate Losses & ALAE:	2,999,765	3,842,689	4,542,000
(3) Projected Administrative Costs:	2,940,000	3,008,593	3,147,127
(4) Prior Year-End Fund Equity (000s):	118,220		
(5) Projected Investment Income Offset:	-2,955,500	-2,314,359	-2,247,992
(6) Provision for Commissions:	1.5%	1.9%	1.9%
(7) Provision for Premium Refunds:	0.8%	0.8%	0.9%
(8) Underwriting Profit and Contingency Margin:	15.0%	10.0%	5.0%
(9) Indicated Premium Need:	3,608,543	5,196,884	5,899,477
(10) Indicated Rate Change:	-48.4%	-25.8%	-15.7%
(11) Current Average Rate per \$1,000 of Coverage:	0.48		
(12) Indicated Rate per \$1,000 of Coverage:	0.25	0.36	0.41
(13) Loss Cost per \$1,000 of Coverage:	0.21	0.27	0.31

Notes:

(1) Roughly approximated based on historical premium volume, assuming some moderate growth.

(2) = (1) x loss ratios derived in Exhibit 7, adjusted based on industry increased limits factors.

(3) = (1) x ratios selected in Exhibit 2.

(4), (11) Based on information provided by client.

(5) = (4) x ratios selected in Exhibit 2.

(6), (7) From Exhibit 2.

(8) Selected judgmentally.

(9) = [(2) + (3) + (5)] / [1 - (6) - (7) - (8)].

(10) = (9) / (1) - 1.

(12) = (11) x [1 + (10)].

(13) = (2) / (1) x (11).

**Coal and Clay Mine Subsidence Insurance Fund
Pricing Provisions**

Exhibit 2

Accident Year Ending 6/30	(1) Earned Premiums	(2) Prior Yr Fund Equity (000s)	(3) Admin Costs	(4) Investment Income	(5) Paid Commissions	(6) Premium Refunds	(7) Ratio of Admin Cost to EP (3)/(1)	(8) Ratio of Inv Income to PY Equity (4)/(2)/1000	(9) Ratio of Commissions to EP (5)/(1)	(10) Ratio of Refunds to EP (6)/(1)
Source:										
2012	5,324,319	84,436	1,944,994	1,931,257	57,179	36,798	36.5%	2.3%	1.1%	0.7%
2013	5,234,455	88,394	2,010,750	1,615,706	94,758	41,264	38.4%	1.8%	1.8%	0.8%
2014	5,117,183	91,993	1,920,161	1,778,322	67,990	44,108	37.5%	1.9%	1.3%	0.9%
2015	5,312,354	94,951	1,885,182	1,948,550	69,268	38,184	35.5%	2.1%	1.3%	0.7%
2016	5,487,711	99,010	2,302,768	1,974,756	104,668	39,730	42.0%	2.0%	1.9%	0.7%
2017	5,653,391	102,955	2,331,718	2,493,734	109,907	47,832	41.2%	2.4%	1.9%	0.8%
2018	6,020,255	107,377	2,889,346	3,100,978	84,123	48,615	48.0%	2.9%	1.4%	0.8%
2019	6,413,835	112,192	2,800,173	3,588,917	61,630	38,450	43.7%	3.2%	1.0%	0.6%
						Average	40.4%	2.3%	1.5%	0.8%
						Wtd Avg	40.6%	2.4%	1.5%	0.8%
						Avg x H/L	39.9%	2.3%	1.5%	0.8%
						Avg L3	44.3%	2.8%	1.4%	0.8%
						Wtd L3	44.3%	2.8%	1.4%	0.7%
						L5 x H/L	42.3%	2.5%	1.5%	0.8%
						Avg Avgs	42.0%	2.5%	1.5%	0.8%
						Selected	42.0%	2.5%	1.5%	0.8%
						80th Percentile	43.0%	2.0%	1.9%	0.8%
						90th Percentile	45.0%	1.9%	1.9%	0.9%

Notes:

(1) through (6) Based on information provided by client.

(8) 80th and 90th percentiles actually set at 20th and 10th percentile levels, respectively, since the investment provision is an offset.

**Coal and Clay Mine Subsidence Insurance Fund
Projected Future Payout of Loss and ALAE Reserves
as of June 30, 2019**

Exhibit 3

Accident Year Ending 6/30	Loss & ALAE Reserves 6/30/19	Projected Paid in Year Ending June 30										
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
2004	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0
2007	823	823	0	0	0	0	0	0	0	0	0	0
2008	1,102	551	551	0	0	0	0	0	0	0	0	0
2009	3,270	1,089	1,090	1,091	0	0	0	0	0	0	0	0
2010	3,104	775	776	776	777	0	0	0	0	0	0	0
2011	6,226	2,071	1,037	1,038	1,039	1,040	0	0	0	0	0	0
2012	10,265	2,558	2,563	1,284	1,285	1,287	1,288	0	0	0	0	0
2013	8,686	2,358	1,577	1,580	792	792	793	794	0	0	0	0
2014	16,444	3,503	3,513	2,349	2,354	1,179	1,181	1,182	1,183	0	0	0
2015	18,263	7,539	2,284	2,291	1,532	1,535	769	770	771	771	0	0
2016	21,128	10,600	4,346	1,317	1,321	883	885	443	444	444	445	0
2017	69,185	27,970	20,678	8,478	2,569	2,577	1,723	1,726	865	866	867	867
2018	195,511	100,143	38,555	28,503	11,686	3,541	3,552	2,375	2,380	1,192	1,193	1,195
2019	746,788	563,450	93,908	36,155	26,729	10,959	3,320	3,330	2,227	2,231	1,118	1,119
Total	1,100,794	723,429	170,879	84,863	50,084	23,793	13,511	10,620	7,869	5,505	3,623	3,181

Notes:

Reserves from Exhibit 4.

Projected payout based on payment pattern selected in Exhibit 9.

**Coal and Clay Mine Subsidence Insurance Fund
Estimated Loss and ALAE Reserves
as of June 30, 2019**

Exhibit 4

	(1)	(2)	(3)
Accident Year Ending 6/30	Selected Ultimate Loss & ALAE	Paid Loss & ALAE 6/30/19	Loss Reserves 6/30/19
Source:	Exhibit 5		(1)-(2)
2004	171,653	171,653	0
2005	267,415	267,415	0
2006	1,455,766	1,455,766	0
2007	823,953	823,129	823
2008	551,666	550,564	1,102
2009	1,092,191	1,088,921	3,270
2010	777,905	774,801	3,104
2011	1,041,494	1,035,268	6,226
2012	1,289,188	1,278,923	10,265
2013	794,707	786,021	8,686
2014	1,184,105	1,167,661	16,444
2015	772,163	753,900	18,263
2016	281,553	260,425	21,128
2017	756,966	687,781	69,185
2018	1,556,865	1,361,354	195,511
2019	1,005,663	258,875	746,788
Total	13,823,253	12,722,459	1,100,794

Percentile	Estimate
70%	1,143,700
75%	1,322,930
80%	1,555,753
85%	1,879,338
90%	2,383,748
95%	3,390,787
99%	6,567,171

Notes:

(2) Based on data provided by client.

Percentile estimates derived based on observed variability in historical payment patterns displayed in Exhibit 9.

**Coal and Clay Mine Subsidence Insurance Fund
Selected Ultimate Losses and ALAE**

Exhibit 5

Accident Year Ending 6/30 Source:	(1)	(2)	(3)	(4)
	Estimated Ultimate Loss & ALAE			Selected Ultimate Loss & ALAE
	Paid Dev Method	Expected Method	Paid B-F Method	
	Exhibit 8	Exhibit 7	Exhibit 6	
2004	171,653			171,653
2005	267,415			267,415
2006	1,455,766			1,455,766
2007	823,953			823,953
2008	551,666			551,666
2009	1,092,191			1,092,191
2010	777,905			777,905
2011	1,041,494			1,041,494
2012	1,289,188	931,756	1,286,342	1,289,188
2013	794,707	916,030	796,033	794,707
2014	1,184,105	895,507	1,180,097	1,184,105
2015	772,163	929,662	775,888	772,163
2016	273,402	960,350	306,007	281,553
2017	747,325	989,343	766,608	756,966
2018	1,627,133	1,053,545	1,533,442	1,556,865
2019	773,539	1,122,421	1,005,663	1,005,663
Total	13,643,604	7,798,613	7,650,080	13,823,253

**Coal and Clay Mine Subsidence Insurance Fund
Estimated Ultimate Losses and ALAE
Paid Bornhuetter-Ferguson Method**

Exhibit 6

	(1)	(2)	(3)	(4)
Accident Year Ending 6/30	Expected Ultimate Losses & ALAE	Expected % Unpaid	Paid Loss & ALAE 6/30/19	Paid B-F Ultimate Losses & ALAE
Source:	Exhibit 7			(1)x(2)+(3)
2012	931,756	0.8%	1,278,923	1,286,342
2013	916,030	1.1%	786,021	796,033
2014	895,507	1.4%	1,167,661	1,180,097
2015	929,662	2.4%	753,900	775,888
2016	960,350	4.7%	260,425	306,007
2017	989,343	8.0%	687,781	766,608
2018	1,053,545	16.3%	1,361,354	1,533,442
2019	1,122,421	66.5%	258,875	1,005,663
Total	7,798,613			7,650,080

Notes:

(2) Based on development factors derived in Exhibit 9.

(3) Based on data provided by client.

Coal and Clay Mine Subsidence Insurance Fund
Estimated Ultimate Losses and ALAE
Expected Method

Exhibit 7

	(1)	(2)	(3)	(4)
Accident Year Ending 6/30	Selected Ultimate Loss & ALAE	Earned Premiums	Indicated Loss & ALAE Ratio	Expected Ultimate Loss & ALAE
Source:	Exhibit 5		(1)/(2)	(2)x(a)
2012	1,289,188	5,324,319	24.2%	931,756
2013	794,707	5,234,455	15.2%	916,030
2014	1,184,105	5,117,183	23.1%	895,507
2015	772,163	5,312,354	14.5%	929,662
2016	281,553	5,487,711	5.1%	960,350
2017	756,966	5,653,391	13.4%	989,343
2018	1,556,865	6,020,255	25.9%	1,053,545
2019	1,005,663	6,413,835	15.7%	1,122,421
Total/Wtd	7,641,210	44,563,502	17.1%	7,798,613

	<u>Loss & ALAE Ratio</u>
Average	17.1%
Wtd Avg	17.1%
Avg x H/L	17.7%
Avg L3	18.3%
Sum Digits	16.5%
(a) Selected	17.5%
Variance	4.8E-03
Lognormal μ	-1.815
Lognormal σ	0.380
80th Percentile	22.4%
90th Percentile	26.5%

Notes:

(2) Based on data provided by client.

No discernable trend was noted in (3) so we implicitly selected a 0% loss ratio trend.

**Coal and Clay Mine Subsidence Insurance Fund
Estimated Ultimate Losses and ALAE
Paid Development Method**

Exhibit 8

	(1)	(2)	(3)
Accident Year Ending 6/30	Paid Loss & ALAE 6/30/19	Paid Dev Factor	Paid Dev Ultimate Loss & ALAE
Source:		Exhibit 9	(1)x(2)
2004	171,653	1.000	171,653
2005	267,415	1.000	267,415
2006	1,455,766	1.000	1,455,766
2007	823,129	1.001	823,953
2008	550,564	1.002	551,666
2009	1,088,921	1.003	1,092,191
2010	774,801	1.004	777,905
2011	1,035,268	1.006	1,041,494
2012	1,278,923	1.008	1,289,188
2013	786,021	1.011	794,707
2014	1,167,661	1.014	1,184,105
2015	753,900	1.024	772,163
2016	260,425	1.050	273,402
2017	687,781	1.087	747,325
2018	1,361,354	1.195	1,627,133
2019	258,875	2.988	773,539
Total	12,722,459		13,643,604

Notes:

(1) Based on data provided by client.

Coal and Clay Mine Subsidence Insurance Fund
Mine Subsidence Insurance
Reported Claim Count Development

Exhibit 10

Acc Yr Ending 6/30	Age-to-Age Factors																				Estimated Ultimate Claims		
	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240		252	264
1998	14	15	15	15	15	15	15	15	15	15	15	16	16	16	16	16	16	16	16	16	16	16	16
1999	16	16	17	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
2000	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
2001	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
2002	12	15	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
2003	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
2004	8	8	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
2005	8	9	9	9	9	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2006	27	27	27	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
2007	13	13	14	14	14	14	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
2008	16	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
2009	24	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
2010	8	8	10	11	12	12	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
2011	19	23	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
2012	21	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
2013	15	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
2014	19	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
2015	12	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
2016	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
2017	7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
2018	11	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
2019	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17

Acc Yr Ending 6/30	Age-to-Age Factors																					
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132	132-144	144-156	156-168	168-180	180-192	192-204	204-216	216-228	228-240	240-252	252-264	264-Ult
1998	1.071	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.067	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1999	1.000	1.063	1.118	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2000	1.083	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2001	1.091	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2002	1.250	1.000	1.067	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2003	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2004	1.000	1.125	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2005	1.125	1.000	1.000	1.000	1.000	1.111	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2006	1.000	1.000	1.000	1.000	1.037	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2007	1.000	1.077	1.000	1.000	1.000	1.071	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2008	1.063	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2009	1.125	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2010	1.000	1.250	1.100	1.091	1.000	1.000	1.083	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2011	1.211	1.043	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2012	1.048	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2013	1.200	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2014	1.158	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2015	1.083	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2016	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2017	1.286	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2018	1.182	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Average	1.094	1.028	1.015	1.005	1.002	1.011	1.006	1.000	1.000	1.000	1.006	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Wtd Avg	1.090	1.019	1.013	1.003	1.003	1.007	1.004	1.000	1.000	1.000	1.006	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Avg x H/L	1.089	1.017	1.010	1.000	1.000	1.005	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Avg L5 x H/L	1.141	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Avg L3	1.156	1.000	1.000	1.000	1.000	1.000	1.028	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Wtd L3	1.160	1.000	1.000	1.000	1.000	1.000	1.017	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Avg Avgs	1.122	1.011	1.006	1.001	1.001	1.004	1.009	1.000	1.000	1.000	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Selected	1.125	1.020	1.010	1.005	1.003	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Cumulative	1.178	1.047	1.026	1.016	1.011	1.008	1.006	1.005	1.004	1.003	1.002	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 1**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	5,426,424	2,770,541	2,761,156	2,364,400	81,396	43,411	120,354,308
2021	13,905,211	120,354,308	5,562,084	2,671,341	2,830,185	2,407,086	83,431	44,497	122,694,025
2022	14,252,841	122,694,025	5,701,137	2,849,917	2,900,939	2,453,880	85,517	45,609	124,967,059
2023	14,609,162	124,967,059	5,843,665	3,059,696	2,973,463	2,499,341	87,655	46,749	127,142,502
2024	14,974,391	127,142,502	5,989,757	3,229,715	3,047,799	2,542,850	89,846	47,918	129,259,830
2025	15,348,751	129,259,830	6,139,500	3,395,381	3,123,994	2,585,197	92,093	49,116	131,323,943
2026	15,732,470	131,323,943	6,292,988	3,577,731	3,202,094	2,626,479	94,395	50,344	133,318,846
2027	16,125,782	133,318,846	6,450,313	3,765,182	3,282,147	2,666,377	96,755	51,603	135,239,851
2028	16,528,926	135,239,851	6,611,570	3,962,910	3,364,200	2,704,797	99,174	52,893	137,077,042
2029	16,942,149	137,077,042	6,776,860	4,166,443	3,448,305	2,741,541	101,653	54,215	138,824,826
2030	17,365,703	138,824,826	6,946,281	4,381,949	3,534,513	2,776,497	104,194	55,570	140,471,378

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	2.0%
(c) Premium Rate	0.40
(d) Loss Rate	0.20

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 2**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	5,426,424	2,770,541	2,761,156	2,955,500	81,396	43,411	120,945,408
2021	13,905,211	120,945,408	5,562,084	2,671,341	2,830,185	3,023,635	83,431	44,497	123,901,674
2022	14,252,841	123,901,674	5,701,137	2,849,917	2,900,939	3,097,542	85,517	45,609	126,818,370
2023	14,609,162	126,818,370	5,843,665	3,059,696	2,973,463	3,170,459	87,655	46,749	129,664,931
2024	14,974,391	129,664,931	5,989,757	3,229,715	3,047,799	3,241,623	89,846	47,918	132,481,032
2025	15,348,751	132,481,032	6,139,500	3,395,381	3,123,994	3,312,026	92,093	49,116	135,271,974
2026	15,732,470	135,271,974	6,292,988	3,577,731	3,202,094	3,381,799	94,395	50,344	138,022,198
2027	16,125,782	138,022,198	6,450,313	3,765,182	3,282,147	3,450,555	96,755	51,603	140,727,380
2028	16,528,926	140,727,380	6,611,570	3,962,910	3,364,200	3,518,184	99,174	52,893	143,377,959
2029	16,942,149	143,377,959	6,776,860	4,166,443	3,448,305	3,584,449	101,653	54,215	145,968,651
2030	17,365,703	145,968,651	6,946,281	4,381,949	3,534,513	3,649,216	104,194	55,570	148,487,922

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	2.5%
(c) Premium Rate	0.40
(d) Loss Rate	0.20

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 3**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	5,426,424	2,770,541	2,761,156	3,546,600	81,396	43,411	121,536,508
2021	13,905,211	121,536,508	5,562,084	2,671,341	2,830,185	3,646,095	83,431	44,497	125,115,234
2022	14,252,841	125,115,234	5,701,137	2,849,917	2,900,939	3,753,457	85,517	45,609	128,687,845
2023	14,609,162	128,687,845	5,843,665	3,059,696	2,973,463	3,860,635	87,655	46,749	132,224,582
2024	14,974,391	132,224,582	5,989,757	3,229,715	3,047,799	3,966,737	89,846	47,918	135,765,797
2025	15,348,751	135,765,797	6,139,500	3,395,381	3,123,994	4,072,974	92,093	49,116	139,317,688
2026	15,732,470	139,317,688	6,292,988	3,577,731	3,202,094	4,179,531	94,395	50,344	142,865,643
2027	16,125,782	142,865,643	6,450,313	3,765,182	3,282,147	4,285,969	96,755	51,603	146,406,239
2028	16,528,926	146,406,239	6,611,570	3,962,910	3,364,200	4,392,187	99,174	52,893	149,930,821
2029	16,942,149	149,930,821	6,776,860	4,166,443	3,448,305	4,497,925	101,653	54,215	153,434,989
2030	17,365,703	153,434,989	6,946,281	4,381,949	3,534,513	4,603,050	104,194	55,570	156,908,093

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	3.0%
(c) Premium Rate	0.40
(d) Loss Rate	0.20

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 4**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	5,558,776	2,820,471	2,828,501	2,364,400	83,382	44,470	120,366,341
2021	14,591,786	120,366,341	5,836,714	2,794,802	2,969,926	2,407,327	87,551	46,694	122,711,409
2022	15,321,375	122,711,409	6,128,550	3,057,213	3,118,422	2,454,228	91,928	49,028	124,977,595
2023	16,087,444	124,977,595	6,434,978	3,364,234	3,274,344	2,499,552	96,525	51,480	127,125,543
2024	16,891,816	127,125,543	6,756,726	3,640,223	3,438,061	2,542,511	101,351	54,054	129,191,091
2025	17,736,407	129,191,091	7,094,563	3,921,466	3,609,964	2,583,822	106,418	56,757	131,174,871
2026	18,623,227	131,174,871	7,449,291	4,233,168	3,790,462	2,623,497	111,739	59,594	133,052,696
2027	19,554,389	133,052,696	7,821,755	4,564,048	3,979,985	2,661,054	117,326	62,574	134,811,571
2028	20,532,108	134,811,571	8,212,843	4,921,363	4,178,984	2,696,231	123,193	65,703	136,431,403
2029	21,558,714	136,431,403	8,623,485	5,300,770	4,387,933	2,728,628	129,352	68,988	137,896,473
2030	22,636,649	137,896,473	9,054,660	5,711,020	4,607,330	2,757,929	135,820	72,437	139,182,455

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	2.0%
(c) Premium Rate	0.40
(d) Loss Rate	0.20

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 5**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	5,558,776	2,820,471	2,828,501	2,955,500	83,382	44,470	120,957,441
2021	14,591,786	120,957,441	5,836,714	2,794,802	2,969,926	3,023,936	87,551	46,694	123,919,118
2022	15,321,375	123,919,118	6,128,550	3,057,213	3,118,422	3,097,978	91,928	49,028	126,829,054
2023	16,087,444	126,829,054	6,434,978	3,364,234	3,274,344	3,170,726	96,525	51,480	129,648,176
2024	16,891,816	129,648,176	6,756,726	3,640,223	3,438,061	3,241,204	101,351	54,054	132,412,418
2025	17,736,407	132,412,418	7,094,563	3,921,466	3,609,964	3,310,310	106,418	56,757	135,122,687
2026	18,623,227	135,122,687	7,449,291	4,233,168	3,790,462	3,378,067	111,739	59,594	137,755,081
2027	19,554,389	137,755,081	7,821,755	4,564,048	3,979,985	3,443,877	117,326	62,574	140,296,780
2028	20,532,108	140,296,780	8,212,843	4,921,363	4,178,984	3,507,419	123,193	65,703	142,727,799
2029	21,558,714	142,727,799	8,623,485	5,300,770	4,387,933	3,568,195	129,352	68,988	145,032,436
2030	22,636,649	145,032,436	9,054,660	5,711,020	4,607,330	3,625,811	135,820	72,437	147,186,299

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	2.5%
(c) Premium Rate	0.40
(d) Loss Rate	0.20

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 6**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	5,558,776	2,820,471	2,828,501	3,546,600	83,382	44,470	121,548,541
2021	14,591,786	121,548,541	5,836,714	2,794,802	2,969,926	3,646,456	87,551	46,694	125,132,739
2022	15,321,375	125,132,739	6,128,550	3,057,213	3,118,422	3,753,982	91,928	49,028	128,698,679
2023	16,087,444	128,698,679	6,434,978	3,364,234	3,274,344	3,860,960	96,525	51,480	132,208,034
2024	16,891,816	132,208,034	6,756,726	3,640,223	3,438,061	3,966,241	101,351	54,054	135,697,313
2025	17,736,407	135,697,313	7,094,563	3,921,466	3,609,964	4,070,919	106,418	56,757	139,168,191
2026	18,623,227	139,168,191	7,449,291	4,233,168	3,790,462	4,175,046	111,739	59,594	142,597,563
2027	19,554,389	142,597,563	7,821,755	4,564,048	3,979,985	4,277,927	117,326	62,574	145,973,312
2028	20,532,108	145,973,312	8,212,843	4,921,363	4,178,984	4,379,199	123,193	65,703	149,276,112
2029	21,558,714	149,276,112	8,623,485	5,300,770	4,387,933	4,478,283	129,352	68,988	152,490,837
2030	22,636,649	152,490,837	9,054,660	5,711,020	4,607,330	4,574,725	135,820	72,437	155,593,614

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	3.0%
(c) Premium Rate	0.40
(d) Loss Rate	0.20

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 7**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	4,069,818	2,258,763	2,761,156	2,364,400	61,047	32,559	119,540,682
2021	13,905,211	119,540,682	4,171,563	2,046,226	2,830,185	2,390,814	62,573	33,373	121,130,703
2022	14,252,841	121,130,703	4,275,852	2,158,654	2,900,939	2,422,614	64,138	34,207	122,671,232
2023	14,609,162	122,671,232	4,382,749	2,307,293	2,973,463	2,453,425	65,741	35,062	124,125,846
2024	14,974,391	124,125,846	4,492,317	2,428,235	3,047,799	2,482,517	67,385	35,939	125,521,323
2025	15,348,751	125,521,323	4,604,625	2,549,914	3,123,994	2,510,426	69,069	36,837	126,856,561
2026	15,732,470	126,856,561	4,719,741	2,685,953	3,202,094	2,537,131	70,796	37,758	128,116,831
2027	16,125,782	128,116,831	4,837,734	2,825,853	3,282,147	2,562,337	72,566	38,702	129,297,635
2028	16,528,926	129,297,635	4,958,678	2,973,558	3,364,200	2,585,953	74,380	39,669	130,390,457
2029	16,942,149	130,390,457	5,082,645	3,125,738	3,448,305	2,607,809	76,240	40,661	131,389,967
2030	17,365,703	131,389,967	5,209,711	3,287,257	3,534,513	2,627,799	78,146	41,678	132,285,884

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	2.0%
(c) Premium Rate	0.30
(d) Loss Rate	0.15

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 8**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	4,069,818	2,258,763	2,761,156	2,955,500	61,047	32,559	120,131,782
2021	13,905,211	120,131,782	4,171,563	2,046,226	2,830,185	3,003,295	62,573	33,373	122,334,284
2022	14,252,841	122,334,284	4,275,852	2,158,654	2,900,939	3,058,357	64,138	34,207	124,510,555
2023	14,609,162	124,510,555	4,382,749	2,307,293	2,973,463	3,112,764	65,741	35,062	126,624,509
2024	14,974,391	126,624,509	4,492,317	2,428,235	3,047,799	3,165,613	67,385	35,939	128,703,082
2025	15,348,751	128,703,082	4,604,625	2,549,914	3,123,994	3,217,577	69,069	36,837	130,745,470
2026	15,732,470	130,745,470	4,719,741	2,685,953	3,202,094	3,268,637	70,796	37,758	132,737,247
2027	16,125,782	132,737,247	4,837,734	2,825,853	3,282,147	3,318,431	72,566	38,702	134,674,144
2028	16,528,926	134,674,144	4,958,678	2,973,558	3,364,200	3,366,854	74,380	39,669	136,547,867
2029	16,942,149	136,547,867	5,082,645	3,125,738	3,448,305	3,413,697	76,240	40,661	138,353,265
2030	17,365,703	138,353,265	5,209,711	3,287,257	3,534,513	3,458,832	78,146	41,678	140,080,214

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	2.5%
(c) Premium Rate	0.30
(d) Loss Rate	0.15

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 9**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	4,069,818	2,258,763	2,761,156	3,546,600	61,047	32,559	120,722,882
2021	13,905,211	120,722,882	4,171,563	2,046,226	2,830,185	3,621,686	62,573	33,373	123,543,775
2022	14,252,841	123,543,775	4,275,852	2,158,654	2,900,939	3,706,313	64,138	34,207	126,368,003
2023	14,609,162	126,368,003	4,382,749	2,307,293	2,973,463	3,791,040	65,741	35,062	129,160,233
2024	14,974,391	129,160,233	4,492,317	2,428,235	3,047,799	3,874,807	67,385	35,939	131,948,001
2025	15,348,751	131,948,001	4,604,625	2,549,914	3,123,994	3,958,440	69,069	36,837	134,731,252
2026	15,732,470	134,731,252	4,719,741	2,685,953	3,202,094	4,041,938	70,796	37,758	137,496,329
2027	16,125,782	137,496,329	4,837,734	2,825,853	3,282,147	4,124,890	72,566	38,702	140,239,685
2028	16,528,926	140,239,685	4,958,678	2,973,558	3,364,200	4,207,191	74,380	39,669	142,953,745
2029	16,942,149	142,953,745	5,082,645	3,125,738	3,448,305	4,288,612	76,240	40,661	145,634,058
2030	17,365,703	145,634,058	5,209,711	3,287,257	3,534,513	4,369,022	78,146	41,678	148,271,198

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	3.0%
(c) Premium Rate	0.30
(d) Loss Rate	0.15

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 10**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	4,169,082	2,296,210	2,828,501	2,364,400	62,536	33,353	119,532,870
2021	14,591,786	119,532,870	4,377,536	2,138,821	2,969,926	2,390,657	65,663	35,020	121,091,633
2022	15,321,375	121,091,633	4,596,413	2,314,126	3,118,422	2,421,833	68,946	36,771	122,571,612
2023	16,087,444	122,571,612	4,826,233	2,535,697	3,274,344	2,451,432	72,393	38,610	123,928,234
2024	16,891,816	123,928,234	5,067,545	2,736,116	3,438,061	2,478,565	76,013	40,540	125,183,614
2025	17,736,407	125,183,614	5,320,922	2,944,477	3,609,964	2,503,672	79,814	42,567	126,331,386
2026	18,623,227	126,331,386	5,586,968	3,177,531	3,790,462	2,526,628	83,805	44,696	127,348,488
2027	19,554,389	127,348,488	5,866,317	3,425,003	3,979,985	2,546,970	87,995	46,931	128,221,861
2028	20,532,108	128,221,861	6,159,632	3,692,399	4,178,984	2,564,437	92,394	49,277	128,932,876
2029	21,558,714	128,932,876	6,467,614	3,976,483	4,387,933	2,578,658	97,014	51,741	129,465,976
2030	22,636,649	129,465,976	6,790,995	4,284,060	4,607,330	2,589,320	101,865	54,328	129,798,707

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	2.0%
(c) Premium Rate	0.30
(d) Loss Rate	0.15

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 11**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	4,169,082	2,296,210	2,828,501	2,955,500	62,536	33,353	120,123,970
2021	14,591,786	120,123,970	4,377,536	2,138,821	2,969,926	3,003,099	65,663	35,020	122,295,174
2022	15,321,375	122,295,174	4,596,413	2,314,126	3,118,422	3,057,379	68,946	36,771	124,410,701
2023	16,087,444	124,410,701	4,826,233	2,535,697	3,274,344	3,110,268	72,393	38,610	126,426,158
2024	16,891,816	126,426,158	5,067,545	2,736,116	3,438,061	3,160,654	76,013	40,540	128,363,627
2025	17,736,407	128,363,627	5,320,922	2,944,477	3,609,964	3,209,091	79,814	42,567	130,216,817
2026	18,623,227	130,216,817	5,586,968	3,177,531	3,790,462	3,255,420	83,805	44,696	131,962,712
2027	19,554,389	131,962,712	5,866,317	3,425,003	3,979,985	3,299,068	87,995	46,931	133,588,183
2028	20,532,108	133,588,183	6,159,632	3,692,399	4,178,984	3,339,705	92,394	49,277	135,074,466
2029	21,558,714	135,074,466	6,467,614	3,976,483	4,387,933	3,376,862	97,014	51,741	136,405,770
2030	22,636,649	136,405,770	6,790,995	4,284,060	4,607,330	3,410,144	101,865	54,328	137,559,325

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	2.5%
(c) Premium Rate	0.30
(d) Loss Rate	0.15

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 12**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	4,169,082	2,296,210	2,828,501	3,546,600	62,536	33,353	120,715,070
2021	14,591,786	120,715,070	4,377,536	2,138,821	2,969,926	3,621,452	65,663	35,020	123,504,627
2022	15,321,375	123,504,627	4,596,413	2,314,126	3,118,422	3,705,139	68,946	36,771	126,267,913
2023	16,087,444	126,267,913	4,826,233	2,535,697	3,274,344	3,788,037	72,393	38,610	128,961,140
2024	16,891,816	128,961,140	5,067,545	2,736,116	3,438,061	3,868,834	76,013	40,540	131,606,789
2025	17,736,407	131,606,789	5,320,922	2,944,477	3,609,964	3,948,204	79,814	42,567	134,199,093
2026	18,623,227	134,199,093	5,586,968	3,177,531	3,790,462	4,025,973	83,805	44,696	136,715,540
2027	19,554,389	136,715,540	5,866,317	3,425,003	3,979,985	4,101,466	87,995	46,931	139,143,409
2028	20,532,108	139,143,409	6,159,632	3,692,399	4,178,984	4,174,302	92,394	49,277	141,464,289
2029	21,558,714	141,464,289	6,467,614	3,976,483	4,387,933	4,243,929	97,014	51,741	143,662,660
2030	22,636,649	143,662,660	6,790,995	4,284,060	4,607,330	4,309,880	101,865	54,328	145,715,952

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	3.0%
(c) Premium Rate	0.30
(d) Loss Rate	0.15

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 13**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	2,713,212	1,746,985	2,761,156	2,364,400	40,698	21,706	118,727,056
2021	13,905,211	118,727,056	2,781,042	1,421,110	2,830,185	2,374,541	41,716	22,248	119,567,381
2022	14,252,841	119,567,381	2,850,568	1,467,390	2,900,939	2,391,348	42,759	22,805	120,375,404
2023	14,609,162	120,375,404	2,921,832	1,554,890	2,973,463	2,407,508	43,827	23,375	121,109,190
2024	14,974,391	121,109,190	2,994,878	1,626,754	3,047,799	2,422,184	44,923	23,959	121,782,816
2025	15,348,751	121,782,816	3,069,750	1,704,446	3,123,994	2,435,656	46,046	24,558	122,389,178
2026	15,732,470	122,389,178	3,146,494	1,794,176	3,202,094	2,447,784	47,197	25,172	122,914,816
2027	16,125,782	122,914,816	3,225,156	1,886,525	3,282,147	2,458,296	48,377	25,801	123,355,419
2028	16,528,926	123,355,419	3,305,785	1,984,207	3,364,200	2,467,108	49,587	26,446	123,703,872
2029	16,942,149	123,703,872	3,388,430	2,085,033	3,448,305	2,474,077	50,826	27,107	123,955,107
2030	17,365,703	123,955,107	3,473,141	2,192,565	3,534,513	2,479,102	52,097	27,785	124,100,390

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	2.0%
(c) Premium Rate	0.20
(d) Loss Rate	0.10

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 14**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	2,713,212	1,746,985	2,761,156	2,955,500	40,698	21,706	119,318,156
2021	13,905,211	119,318,156	2,781,042	1,421,110	2,830,185	2,982,954	41,716	22,248	120,766,893
2022	14,252,841	120,766,893	2,850,568	1,467,390	2,900,939	3,019,172	42,759	22,805	122,202,741
2023	14,609,162	122,202,741	2,921,832	1,554,890	2,973,463	3,055,069	43,827	23,375	123,584,087
2024	14,974,391	123,584,087	2,994,878	1,626,754	3,047,799	3,089,602	44,923	23,959	124,925,132
2025	15,348,751	124,925,132	3,069,750	1,704,446	3,123,994	3,123,128	46,046	24,558	126,218,966
2026	15,732,470	126,218,966	3,146,494	1,794,176	3,202,094	3,155,474	47,197	25,172	127,452,295
2027	16,125,782	127,452,295	3,225,156	1,886,525	3,282,147	3,186,307	48,377	25,801	128,620,909
2028	16,528,926	128,620,909	3,305,785	1,984,207	3,364,200	3,215,523	49,587	26,446	129,717,776
2029	16,942,149	129,717,776	3,388,430	2,085,033	3,448,305	3,242,944	50,826	27,107	130,737,878
2030	17,365,703	130,737,878	3,473,141	2,192,565	3,534,513	3,268,447	52,097	27,785	131,672,506

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	2.5%
(c) Premium Rate	0.20
(d) Loss Rate	0.10

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 15**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,566,060	118,219,989	2,713,212	1,746,985	2,761,156	3,546,600	40,698	21,706	119,909,256
2021	13,905,211	119,909,256	2,781,042	1,421,110	2,830,185	3,597,278	41,716	22,248	121,972,317
2022	14,252,841	121,972,317	2,850,568	1,467,390	2,900,939	3,659,170	42,759	22,805	124,048,162
2023	14,609,162	124,048,162	2,921,832	1,554,890	2,973,463	3,721,445	43,827	23,375	126,095,885
2024	14,974,391	126,095,885	2,994,878	1,626,754	3,047,799	3,782,877	44,923	23,959	128,130,204
2025	15,348,751	128,130,204	3,069,750	1,704,446	3,123,994	3,843,906	46,046	24,558	130,144,816
2026	15,732,470	130,144,816	3,146,494	1,794,176	3,202,094	3,904,344	47,197	25,172	132,127,015
2027	16,125,782	132,127,015	3,225,156	1,886,525	3,282,147	3,963,810	48,377	25,801	134,073,131
2028	16,528,926	134,073,131	3,305,785	1,984,207	3,364,200	4,022,194	49,587	26,446	135,976,670
2029	16,942,149	135,976,670	3,388,430	2,085,033	3,448,305	4,079,300	50,826	27,107	137,833,128
2030	17,365,703	137,833,128	3,473,141	2,192,565	3,534,513	4,134,994	52,097	27,785	139,634,302

(a) Growth Rate	2.5%
(b) Investment Yield as Function of Beginning Fund Balance	3.0%
(c) Premium Rate	0.20
(d) Loss Rate	0.10

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 16**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	2,779,388	1,771,950	2,828,501	2,364,400	41,691	22,235	118,699,400
2021	14,591,786	118,699,400	2,918,357	1,482,841	2,969,926	2,373,988	43,775	23,347	119,471,856
2022	15,321,375	119,471,856	3,064,275	1,571,038	3,118,422	2,389,437	45,964	24,514	120,165,629
2023	16,087,444	120,165,629	3,217,489	1,707,159	3,274,344	2,403,313	48,262	25,740	120,730,926
2024	16,891,816	120,730,926	3,378,363	1,832,008	3,438,061	2,414,619	50,675	27,027	121,176,136
2025	17,736,407	121,176,136	3,547,281	1,967,488	3,609,964	2,423,523	53,209	28,378	121,487,901
2026	18,623,227	121,487,901	3,724,645	2,121,894	3,790,462	2,429,758	55,870	29,797	121,644,281
2027	19,554,389	121,644,281	3,910,878	2,285,959	3,979,985	2,432,886	58,663	31,287	121,632,151
2028	20,532,108	121,632,151	4,106,422	2,463,434	4,178,984	2,432,643	61,596	32,851	121,434,349
2029	21,558,714	121,434,349	4,311,743	2,652,196	4,387,933	2,428,687	64,676	34,494	121,035,479
2030	22,636,649	121,035,479	4,527,330	2,857,101	4,607,330	2,420,710	67,910	36,219	120,414,959

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	2.0%
(c) Premium Rate	0.20
(d) Loss Rate	0.10

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 17**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	2,779,388	1,771,950	2,828,501	2,955,500	41,691	22,235	119,290,500
2021	14,591,786	119,290,500	2,918,357	1,482,841	2,969,926	2,982,262	43,775	23,347	120,671,230
2022	15,321,375	120,671,230	3,064,275	1,571,038	3,118,422	3,016,781	45,964	24,514	121,992,347
2023	16,087,444	121,992,347	3,217,489	1,707,159	3,274,344	3,049,809	48,262	25,740	123,204,140
2024	16,891,816	123,204,140	3,378,363	1,832,008	3,438,061	3,080,103	50,675	27,027	124,314,835
2025	17,736,407	124,314,835	3,547,281	1,967,488	3,609,964	3,107,871	53,209	28,378	125,310,948
2026	18,623,227	125,310,948	3,724,645	2,121,894	3,790,462	3,132,774	55,870	29,797	126,170,344
2027	19,554,389	126,170,344	3,910,878	2,285,959	3,979,985	3,154,259	58,663	31,287	126,879,587
2028	20,532,108	126,879,587	4,106,422	2,463,434	4,178,984	3,171,990	61,596	32,851	127,421,132
2029	21,558,714	127,421,132	4,311,743	2,652,196	4,387,933	3,185,528	64,676	34,494	127,779,103
2030	22,636,649	127,779,103	4,527,330	2,857,101	4,607,330	3,194,478	67,910	36,219	127,932,351

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	2.5%
(c) Premium Rate	0.20
(d) Loss Rate	0.10

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Projected Cash Flows**

**Exhibit 11
Sheet 18**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year Ending 6/30	Coverage In Force (000s)	Beginning Fund Balance	Collected Premiums	Paid Loss & ALAE	Admin Cost	Investment Income	Paid Commissions	Premium Refunds	Ending Balance
Source:		Prior (9)	(1)x(c)			(2)x(b)			
2019	13,235,180								118,219,989
2020	13,896,939	118,219,989	2,779,388	1,771,950	2,828,501	3,546,600	41,691	22,235	119,881,600
2021	14,591,786	119,881,600	2,918,357	1,482,841	2,969,926	3,596,448	43,775	23,347	121,876,516
2022	15,321,375	121,876,516	3,064,275	1,571,038	3,118,422	3,656,295	45,964	24,514	123,837,148
2023	16,087,444	123,837,148	3,217,489	1,707,159	3,274,344	3,715,114	48,262	25,740	125,714,246
2024	16,891,816	125,714,246	3,378,363	1,832,008	3,438,061	3,771,427	50,675	27,027	127,516,265
2025	17,736,407	127,516,265	3,547,281	1,967,488	3,609,964	3,825,488	53,209	28,378	129,229,995
2026	18,623,227	129,229,995	3,724,645	2,121,894	3,790,462	3,876,900	55,870	29,797	130,833,517
2027	19,554,389	130,833,517	3,910,878	2,285,959	3,979,985	3,925,006	58,663	31,287	132,313,507
2028	20,532,108	132,313,507	4,106,422	2,463,434	4,178,984	3,969,405	61,596	32,851	133,652,467
2029	21,558,714	133,652,467	4,311,743	2,652,196	4,387,933	4,009,574	64,676	34,494	134,834,484
2030	22,636,649	134,834,484	4,527,330	2,857,101	4,607,330	4,045,035	67,910	36,219	135,838,289

(a) Growth Rate	5.0%
(b) Investment Yield as Function of Beginning Fund Balance	3.0%
(c) Premium Rate	0.20
(d) Loss Rate	0.10

Notes:

2019 values provided by client.

(1) Amount from prior year trended by (a).

(4) Payout of reserves from Exhibit 3 plus a provision reflecting (d), (a), and payment pattern selected in Exhibit 9.

(5) Based on (1) and provision selected in Exhibit 2 as though premiums were set at historical rate level.

(7), (8) Based on (3) and provisions selected in Exhibit 2.

(9) = (2) + (3) - (4) - (5) + (6) - (7) - (8).

**Coal and Clay Mine Subsidence Insurance Fund
Comparison of Certain Diagnostic Ratios to Industry Benchmarks**

**Exhibit 12
Sheet 1**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Accident Year Ending 6/30	Coverage in Force (000s)	Policy Limits	Earned Premiums	Year-End Assets	Year-End Fund Equity	Year-End Reserves Held in Lieu of Reins	All Other Reserves at Year-End	Asset to Liability Ratio	Policy Limit to Surplus Ratio	Premium to Surplus Ratio	Ratio of Reins Resrv to Coverage in Force	
Source:								(4)/(7)	(2)/(5)	(3)/(5)	(6)/(1)	
2012	9,233,570	500,000	5,324,319	91,128,219	88,394,029	80,823,105	6,874,314	13.26	0.6%	6.0%	8.75	
2013	9,516,880	500,000	5,234,455	94,335,544	91,992,651	83,272,718	8,865,404	10.64	0.5%	5.7%	8.75	
2014	10,287,560	500,000	5,117,183	97,527,791	94,950,569	87,958,652	7,548,674	12.92	0.5%	5.4%	8.55	
2015	10,550,790	500,000	5,312,354	101,515,042	99,009,591	91,369,856	7,457,183	13.61	0.5%	5.4%	8.66	
2016	10,869,620	500,000	5,487,711	105,582,015	102,955,155	93,587,374	8,306,564	12.71	0.5%	5.3%	8.61	
2017	11,553,590	500,000	5,653,391	110,100,023	107,376,916	96,125,856	10,150,692	10.85	0.5%	5.3%	8.32	
2018	12,365,970	500,000	6,020,255	115,140,307	112,192,113	101,648,292	9,532,388	12.08	0.4%	5.4%	8.22	
2019	13,235,180	500,000	6,413,835	121,552,483	118,219,989	108,925,509	8,220,292	14.79	0.4%	5.4%	8.23	
								Industry Benchmark:	>1.5	<10.0%	<300.0%	4.44-40

Notes:

(1) through (7) Based on information provided by client.

(8) is a measure of liquidity which suggests that the Fund has ample resources should circumstances necessitate that assets be converted to cash.

(9) A common measure is that no more than 10% of surplus should be exposed by any one risk. Note that the Fund would fall below this benchmark even if policy limits were increased to \$5 million.

(10) A common measure to ensure that an insurer does not exceed its capacity is that annual premium writings should be no greater than three times the level of surplus. The Fund is in no danger of approaching this threshold.

(11) The 2012 actuarial review established an acceptable range of 4.44-12.95 based on diagnostics reviewed for the California Earthquake Authority.

A current update to these measures produces a range of roughly 15-40, suggesting that the CEA has substantially strengthened its position. However, it stands to reason that the low end suggested by the prior actuary remains a valid benchmark for consideration. Based on this, the Fund could sustain a near doubling of its current coverage in force, whether achieved through an increase in policy limits or growth. By the same token, reserves held in lieu of reinsurance could justifiably be allowed to grow to nearly five times their current level. Also compare to factors derived in Exhibit 13.

**Coal and Clay Mine Subsidence Insurance Fund
Miscellaneous Diagnostics**

**Exhibit 12
Sheet 2**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Accident Year Ending 6/30	Selected Ultimate Loss & ALAE	Estimated Ultimate Claim Counts	Coverage in Force (000s)	Earned Premiums	Average Frequency per \$1M of Coverage	Average Ultimate Severity Per Claim	Indicated Ultimate Loss & ALAE Ratio	Average Loss Cost per \$1,000 of Coverage	Average Prem Rate per \$1,000 of Coverage
Source:	Exhibit 5	Exhibit 10			(2)/(3)*1000	(1)/(2)	(1)/(4)	(1)/(3)	(4)/(3)
2012	1,289,188	22	9,233,570	5,324,319	0.24%	58,599	24.2%	0.14	0.58
2013	794,707	18	9,516,880	5,234,455	0.19%	44,150	15.2%	0.08	0.55
2014	1,184,105	22	10,287,560	5,117,183	0.21%	53,823	23.1%	0.12	0.50
2015	772,163	13	10,550,790	5,312,354	0.12%	59,397	14.5%	0.07	0.50
2016	281,553	7	10,869,620	5,487,711	0.06%	40,222	5.1%	0.03	0.50
2017	756,966	9	11,553,590	5,653,391	0.08%	84,107	13.4%	0.07	0.49
2018	1,556,865	14	12,365,970	6,020,255	0.11%	111,205	25.9%	0.13	0.49
2019	1,005,663	20	13,235,180	6,413,835	0.15%	50,283	15.7%	0.08	0.48
Total/Wtd	7,641,210	125	87,613,160	44,563,502	0.14%	61,130	17.1%	0.09	0.51

(3), (4) Based on information provided by client.

Conclusion: Historical frequency, severity, loss ratios, and loss costs exhibit moderate volatility. No clear trends can be discerned.

However, there is sufficient consistency in the frequencies and loss costs to suggest that coverage in force serves as an adequate proxy for loss.

**Coal and Clay Mine Subsidence Insurance Fund
Potential for Catastrophic Losses from Seismic Activity**

**Exhibit 13
Sheet 1**

	(1)	(2)	(3)	(4)	(5)	(6)
Confidence Level	Estimated Frequency	Estimated Percent of Policies Exposed	Estimated Percent of Structures Damaged	Estimated Severity (000s)	Expected Value of Losses	Reserve Factor per \$1,000 of Coverage
Source:				(2)x(3)x(a)	(1)x(4)x1000	(5)/(a)
30%	1%	10%	5%	68,750	687,500	0.05
40%	2%	10%	10%	137,500	2,750,000	0.20
50%	2%	20%	10%	275,000	5,500,000	0.40
60%	3%	20%	10%	275,000	8,250,000	0.60
70%	5%	30%	20%	825,000	41,250,000	3.00
99.5%	5%	40%	30%	1,650,000	82,500,000	6.00

(a) Projected Coverage in Force (000s): 13,750,000

Notes:

(1), (2), (3) Judgmentally selected based on historical seismic activity.

(a) Judgmentally selected based on past history.

**Coal and Clay Mine Subsidence Insurance Fund
Potential for Catastrophic Losses from Flooding and Hurricane Activity**

**Exhibit 13
Sheet 2**

	(1)	(2)	(3)	(4)	(5)	(6)
Confidence Level	Estimated Frequency	Estimated Percent of Policies Exposed	Estimated Percent of Structures Damaged	Estimated Severity (000s)	Expected Value of Losses	Reserve Factor per \$1,000 of Coverage
Source:				(2)x(3)x(a)	(1)x(4)x1000	(5)/(a)
30%	1%	5%	5%	34,375	343,750	0.03
40%	1%	10%	5%	68,750	687,500	0.05
50%	2%	10%	10%	137,500	2,750,000	0.20
60%	3%	20%	10%	275,000	8,250,000	0.60
70%	5%	20%	20%	550,000	27,500,000	2.00
99.5%	5%	40%	20%	1,100,000	55,000,000	4.00

(a) Projected Coverage in Force (000s): 13,750,000

Notes:

(1), (2), (3) Judgmentally selected based on historical flooding and hurricane activity.

(a) Judgmentally selected based on past history.