

**ATTACHMENT 2**

**ACTUARIAL ANALYSIS**

# **Report on the Actuarial Valuation**

of the

## **Pennsylvania Mine Subsidence Insurance Fund**

*Actuarial Analysis  
as of December 31, 2011*

**March, 2012**

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# Pennsylvania Mine Subsidence Insurance Fund

## *Actuarial Valuation as of December 31, 2011*

### **I. BACKGROUND**

#### ***Purpose & Scope***

Pinnacle Actuarial Resources, Inc. (Pinnacle) was retained by the Pennsylvania Department of Environmental Protection (DEP or Department) to provide an actuarial valuation of the Mine Subsidence Insurance Fund (MSI Fund or Fund) as of December 31, 2011.

#### ***Fund History***

Mine Subsidence Insurance typically covers structural damage to residential and/or commercial buildings and specific affixed appurtenances as the result of surface ground movement following a mine subsidence event. In the late 1950s this coverage in the Pennsylvania commercial market place became cost prohibitive. The Commonwealth created the MSI Fund in the early 1960s to address the lack of available affordable coverage.

The MSI Program is administered under the Bureau of Mining and Reclamation, Department of Environmental Protection, taking advantage of administrative resources available to the DEP, including premium collection, policy issuance, claim investigation, claim payments, and data collection. Initial funding for the MSI Fund came from a one million dollar grant. Subsequent premium collections have elevated the Fund balance to over eighty five million dollars as of December 31, 2011. As of June 30, 2011 The Fund carried a sixty seven million dollar liability reserve in lieu of reinsurance in addition to five million dollars reserved for catastrophes. Over fifty seven thousand structures are currently insured, providing over nine billion dollars of coverage.

Coverage under the Fund is limited to \$500,000. This is an increase from the prior analysis when the coverage was limited to \$250,000, with lesser limits being available prior to 2003. These limitations have greatly reduced the risk of catastrophic loss due to an insured structure having a claim.

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### **I. BACKGROUND**

Premiums are established by formulas that vary by type of structure (residential versus non-residential) and amount of coverage. A ten percent discount is offered to residential owners who are 65 years of age or older (applies to primary residence only).

It is desired that the MSI Fund remain solvent, providing low-cost coverage that is economically administered, resulting in increased subscriptions.

#### ***Methodology***

Claims data were analyzed to determine outstanding loss, reporting patterns, average claims, and the adequacy of rate levels. Relevant criteria were utilized in producing a future cash flow model. Standard actuarial techniques were employed throughout. Details are contained in this report and attached exhibits.

#### ***Data***

The primary source of data was special detail claims and summarized policy runs against MSI Fund databases. Little adjustment to data fields in terms of correction was needed. In some cases occurrence dates had to be reformatted or judgmentally selected. Amy Berrios supplied the internal data to us. Additional insight on Fund operation was provided by Larry Ruane, Administrator, and Amy Berrios in follow up phone calls, and subsequent emails. Data was primarily reviewed on a Fiscal Report Year basis.

Another key data source was the annual MSI Fund Board meeting minutes on the MSI Fund website. This was a valuable resource in pulling financial and other operation information. Data therein was generally on a Fiscal Year basis and included several years of historic detail.

Some external data was also utilized, including general insurance industry statistics.

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### **I. BACKGROUND**

Please note that for the purposes of this report, the accounting date (the date used to separate the paid versus unpaid claim estimates) is June 30, 2011, the valuation date (the date through which transactions are included in the data used to estimate the unpaid claim estimates) is December 31, 2011, and the review date (the cutoff date for including information to the actuary) is February 7, 2012, although most of the data items were not physically transmitted to us until January or early to mid-February.

#### ***Distribution & Use***

This study has been conducted at the request of DEP officials.

The exhibits attached in support of our findings are an integral part of this report. These sections have been prepared so that our actuarial assumptions and judgments are documented. Judgments about the conclusions drawn in this report should be made only after considering the report in its entirety. We remain available to answer any questions that may arise regarding this report. We assume that the user of this report will seek such explanation on any matter in question.

Our conclusions are predicated on a number of assumptions as to future conditions and events. Those assumptions, which are documented in subsequent sections of this report, must be understood in order to place our conclusions in their appropriate context. In addition, our work is subject to inherent limitations, which are also discussed in this report.

#### ***Reliances & Limitations***

We have prepared this report in conformity with its intended use by persons technically competent in the areas addressed and for the stated purposes only. Judgments as to conclusions, methods, and data contained in this report should be made only after studying the report in its entirety. Furthermore, we are available to explain any matter presented herein.

# Pennsylvania Mine Subsidence Insurance Fund

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### **I. BACKGROUND**

Throughout our analysis we have, without audit or verification, relied on historical data and qualitative information provided by the DEP. We have reviewed this data for consistency and believe it to be reasonable and accurate. However, we have made no attempt to audit or verify this information. The accuracy of our results is dependent upon the accuracy and completeness of this underlying data. Therefore, any material discrepancies discovered in this data by DEP or its auditor should be reported to us and this report amended accordingly, if warranted. It is noted that some claims records were incomplete, particularly in some of the relevant date fields. This adds to the potential uncertainty associated with calculating estimates of the liabilities.

There is a limitation upon the accuracy of these estimates and projections in that there is an inherent uncertainty in any estimate of loss reserves and financial projections. This is due to the fact that the ultimate liability for claims is subject to the outcome of events yet to occur, e.g., the likelihood of claimants bringing suit, the size of awards, changes in the standards of liability, and the attitudes of claimants toward settlement of their claims. Also our financial projections are subject to a very high degree of uncertainty because they require prediction of future economic, legal, and judicial conditions which are not knowable. In our judgment, we have employed techniques and assumptions that are appropriate, and the conclusions presented herein are reasonable, given the information currently available. However, it should be recognized that future financial results will likely deviate, perhaps materially, from our estimates.

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### **II. EXECUTIVE SUMMARY**

The MSI Fund program is a well funded mechanism for providing mine subsidence insurance coverage for those consumers living in designated mine subsidence areas. Claims data is thin, but claims settle quickly once they are reported. Due to the unique nature of the coverage (low claim frequency) and the limitation on data, traditional development techniques for determining outstanding liabilities are not as reliable as in some other lines of insurance, but are necessary considering the lack of relevant external data and other applicable reserving techniques.

The current Premium Rates reflect a recently implemented significant rate reduction (over 25%) over rates that had otherwise been in use for a long time. The following analysis and recommendation call for an additional rate reduction that should help lead to increased penetration without having a negative impact on the financial integrity of the Fund.

Catastrophic potential was analyzed in our prior analysis leading to the conclusion that reinsurance was not needed at the time providing that the level of Fund surplus was maintained at an adequate level. We did not revisit the Catastrophe or reinsurance issues with this analysis.

The following points summarize our observations and recommendations.

- The MSI Fund is financially sound.
- The Fund's projected surplus can withstand significant catastrophic losses.
- A reduction in the Fund's surplus is not recommended at this time.
- A 17.3% premium reduction is recommended.
- The factor reserve per reported claims should be changed to \$3,600.
- No change is recommended to the \$500,000 coverage limit at this time.
- Consideration should be given to adding Additional Living Expense Coverage to the MSI Fund policies.



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**II. EXECUTIVE SUMMARY**

- A range of Surplus to Coverage In Force benchmarks have been provided within the report.

# Pennsylvania Mine Subsidence Insurance Fund

## *Actuarial Valuation as of December 31, 2011*

### **III. FINANCIAL STATUS**

The MSI Fund maintains a strong financial position, as is evidenced by past financial statements, and supported by this actuarial review. The Fund's projected surplus is sufficient to see it through several years of significant underwriting loss and even withstand significant catastrophic losses.

#### ***1. Outstanding Liabilities***

In terms of claim obligations, it is estimated the Fund has an outstanding liability of \$480,000 to \$775,000, as developed on Exhibit 1. This estimate is derived from the paid claim file for the 1991 fiscal report year and subsequent as of December 31, 2011, provided by the DEP. Claims were aggregated on a Fiscal Report Year basis. A review was made of the relationship of the reporting pattern and the occurrence date. Adjustment factors, commonly referred to as Loss Development Factors, were estimated to account for unreported claims. It should be noted, that some of the occurrence dates were not always accurate, sometimes being later than the report date, incomplete, or inconsistently coded. In such cases logical assumptions were made to populate this field. Report date issues were not observed.

Mine Subsidence claims are generally considered to be of a high severity, low frequency nature, resulting in thin and volatile historical data. However, once a claim is reported, it generally is adjusted, paid, and settled quickly. There is little development on known claims. Development does exist for unknown claims. Incurred But Not Reported (IBNR) claims are the result of covered occurrences that have not been discovered, or at least have not been reported, or if reported, have not had a claim file established. For an average Fiscal Report Year approximately 12 to 24% of the claim liabilities are not yet reported as of the end of that year. This figure drops to 10 to 15% after the second year, and continues to decline toward zero. The longest reporting lag observed in the MSI paid data was 40 years, indicating a need for at least a modest tail factor for all Report Years not at least 40 years old. Since data was only provided back to the 1991 Fiscal Report Year, an estimate of the Prior Years' outstanding liabilities was made based on the

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**III. FINANCIAL STATUS**

oldest of the data and the observed reporting pattern. We have assumed that there is a potential for 1 to 2% additional development after 40 years.

It is interesting to observe that the MSI financial statements have recently carried Liabilities for Outstanding Claims in amounts ranging from \$300,000 to \$600,000. It is not certain how these estimates are derived. They may be IBNR estimates, or they may represent known obligations on known claims that have simply not yet been paid.

**2. Assets**

The assets of the MSI Fund may generally be considered the funds available for investing as Furniture and Equipment make up less than 1% of MSI assets. MSI investable assets have grown strongly over the years, fueled by premium growth, low claim liabilities, and favorable investment rates of return. As of Fiscal Year ending 06/30/11, investable funds were just over \$86 million. Pinnacle has estimates the investable funds as of 06/30/12 to be \$90 million, matching the growth seen in the prior year, based on recent investment returns and the historically low number of claims that are paid annually.

**3. Surplus**

The required surplus level for an insurance entity is dependent on goals of the insuring entity, underlying nature of the risk being insured, and capital structure of the insurance entity. Surplus typically is equated with the net worth of the insurance entity and protects the viability of the insurance entity from extreme or unforeseen adverse events, allows entities to expand coverage, and is a source of income generated through investment activities. The ability of a company to raise capital also impacts how much surplus a company will hold in reserve. If a company has limited means to raise capital, more surplus will need to be held.

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### **III. FINANCIAL STATUS**

Property insurers generally cover short tail exposures with predictable severities and frequencies. When severities or frequencies are less predictable, greater surplus is then needed to cover the potential adverse results that can occur. When the property insured is subject to potential catastrophic loss risk increases. The level of held surplus should increase accordingly.

There are a number of considerations when evaluating the appropriate surplus level for the Pennsylvania Mine Subsidence Insurance Fund. Mine subsidence coverage is subject to low frequency; however it is possible that one natural event would impact multiple insureds, increasing frequency. Severity tends to be low in comparison to coverage purchased. However, the potential for total losses does exist and total losses do occur. Further, maximum policy limits restrict the level of loss to any one insured. These factors may mitigate the potential for a catastrophic mine subsidence loss, however the risk remains, requiring a higher surplus level. It is also noted that the Fund has recently doubled its maximum policy limit to \$500,000.

One of the primary sources of capital is underwriting income (premium excess of loss and expense.) In the past underwriting income has resulted in consistent increases to surplus; however a reduction in rates as recommended will decrease the level of underwriting income and mostly likely reduce the rate of increase in surplus. Also, the Pennsylvania Mine Subsidence Insurance Fund has limited ability to raise capital. As a government agency, the Fund could possibly borrow money, although this may not be a desirable situation.

In 1972 Hurricane Agnes caused localized flooding in the Wilkes-Barre region. The damages occurred when a levee on the West Bank of the Susquehanna River located across the river from Wilkes-Barre was breached. During the time that flood related claims were processed, from 1972 through 1975, there was a significant increase to the number of claims reported in the Anthracite Region. In 1971 there were 7 claims paid in the Anthracite Region. The paid claims jumped to 34 in 1974 before dropping back to 19 in 1976, when the last of the Agnes related

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claims were paid. The potential for larger regions of flooding in the future does exist. As the Fund's penetration in the marketplace increases, exposure concentration will increase and exposure to catastrophic events from flooding or earthquake also increases.

One gauge of an appropriate surplus level is to review the surplus levels carried by other property insurance writers. Since, the Pennsylvania Mine Subsidence Insurance Fund covers only property a comparison of companies that write primarily property would be appropriate. Data was collected from A.M. Best on companies where property premium made up at least 80 percent of their total premium. Excerpts from that analysis are shown in the table below.

**NET PREMIUM TO SURPLUS RATIOS**  
**ALL WRITERS AND PROPERTY DOMINANT WRITERS**

<b>Characteristic</b>	<b>Net Premium to Surplus Ratio</b>	<b>Implied MSIF Surplus</b>
Historic Benchmark (All Writers)	2/1	\$3,000,000
Current Industry Trend (All Writers)	< 1/1	\$6,700,000
Industry Property Writers (2006-2010)	.85/1	\$7,100,000
Industry Property Writers (2010)	.75/1	\$8,000,000
Select Property (only) Reinsurers (2006-2010)	.51/1	\$11,800,000
Select Property (only) Reinsurers (2010)	.50/1	\$12,000,000
California Earthquake Authority (2006-2010)	.11/1	\$54,500,000
California Earthquake Authority (2011)	.15/1	\$40,000,000

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The Fund's premium is approximately \$6 million annually. If a similar premium to surplus level as that held by the California Earthquake Authority (CEA), .15/1, then a surplus of approximately \$40 million (\$6,000,000/.15) would be required.

Consideration should also be given to the relationship of premium to coverage in force (CIF). It might be more appropriate to relate surplus levels to CIF as this benchmark is not subject to shifting rate levels, but is the true measure of exposure at risk and will capture the impact of any significant exposure growth in the Fund. The Fund's CIF at 06/30/11 was just over \$9 billion. A \$40 million dollar surplus translates to a surplus level of \$4.44 per \$1,000 of CIF.

At June 30, 2011 the CEA's surplus per \$1,000 CIF was \$12.95. The same relationship for the Pennsylvania Mine Subsidence Insurance Fund would imply a needed Fund surplus of \$116,600,000.

For ease of reference, various Surplus to (\$1,000) Coverage in Force are displayed in the following table.

**NET SURPLUS TO \$1000 COVERAGE IN FORCE RATIOS**

<b>Benchmark</b>	<b>Implied MSIF Surplus</b>	<b>Surplus per \$1000 CIF</b>
Select Property Reinsurers (Premium basis)	\$12,000,000	\$1.33
California Earthquake Authority (Premium basis)	\$40,000,000	\$4.44
California Earthquake Authority (CIF basis)	\$ 116,600,000	\$12.95
Pennsylvania MSI Fund (Current actual)	\$86,740,060	\$9.64
Pennsylvania MSI Fund (Current formula)		\$7.43

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**NET SURPLUS TO \$1000 COVERAGE IN FORCE RATIOS**

<b>Benchmark</b>	<b>Implied MSIF Surplus</b>	<b>Surplus per \$1000 CIF</b>
Recommended MSI Fund Benchmark Low		\$4.44
Recommended MSI Fund Benchmark High		\$12.95

While the CEA has different coverages (contents, loss of use, etc) the risk exposure on Fund assets may be thought of as being similar. Frequencies and severities will also differ between the CEA and mine subsidence. In establishing benchmarks for surplus levels, the Fund should consider all the various points above, including its appetite for risk. We have recommended benchmarks closely associated with those developed from the analysis of the California Earthquake Authority because of some of the similarities between the programs (property coverage, catastrophic potential in terms of frequency and severity).

**4. Cash Flow**

Exhibit 2 displays the Fund's estimated cash flow for the next 10 fiscal years. At the end of 10 years it is estimated that the Fund's ending balance will be over \$200 million if no change is made to the premium rates.

Several factors go into the cash flow analysis, including estimated premium growth and refunds, paid commissions, investment income, paid losses, and administrative expense. Exhibit 3 shows the development of the various growth rates applied within the cash flow analysis. Premium rates have not changed for some time. The relation of premium to Coverage in Force (CIF) has recently been declining significantly, reflecting premium reductions and the availability of increased coverage at lower costs per dollar of coverage. For our cash flow estimates, a figure

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of 60 cents per \$1,000 of coverage was selected and held constant to project each of the next 10 years. In addition, premium refunds have been consistently running at about 0.5% per \$1,000 of CIF.

For premium, and many of the other cash flow parameters, projected CIF figures were developed. Many of the cash flow parameters have very consistent relationships with CIF. Losses and Administrative Expenses are the notable exceptions.

The historic annual growth of Coverage In Force was reviewed, along with the growth of Policies In Force and Inflationary Trends. These latter two items are what might be considered the primary drivers of CIF growth. Annual changes of 1.25% and 3.35% were selected for Policy growth and Inflation, respectively. (See Exhibit 3.) However, even after accounting for Policy Growth and Coverage Inflation, there is still a significant residual effect from other unknown factors. The historic pattern of these other factors was also considered in establishing a CIF growth rate. In the end, 6.24% CIF annual growth was selected. Exhibit 3 displays the detail of the above discussion.

Commissions are a relatively new phenomenon and are related to outside producers writing coverage for the MSI program. Currently the MSI pays 50% of the first year premium for an outside producer writing an MSI program policy. The most recent Operational Performance report shows Paid Commissions is 0.9% of the CIF, after reaching a high of 3.0% in 2005. See Exhibit 3. For the cash flow analysis the Commission rate to CIF was set at 1.0%.

Investment return rates have grown steadily over the past few years. The average return for Fiscal Year ending 06/30/11 was 11.5%, but the average has been much lower over recent history. For the future cash flow analysis the return was selected to be a constant 5.50%, which is close to the average over the last five years. We have also projected cash flows using a 4%



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**III. FINANCIAL STATUS**

average return which is less than what the Fund has earned on average, but not so in some recent years, or the financial community in general for some time.

Even though the relationship of Paid Loss to CIF has not been consistent, a long term average ratio was selected for future projections. The lack of consistency on a year-to-year basis has nothing to do with the CIF itself, and the CIF is a very reliable measure of exposure. Taking a long term average of a high severity/low frequency exposure is a common actuarial practice and is often used in establishing catastrophe loads. One can not predict, with any kind of certainty, the annual number of catastrophes or the number of mine collapses resulting in insured loss, or the severity of those losses. Using a long term average applied to the stable CIF allows a good means of bringing in total expected mine subsidence losses in a smooth process, although it does not account for the annual fluctuation that is apparent when reviewing the historic patterns in Exhibit 3. For the cash flow analysis we have selected a long term average ratio to CIF of 12.4%.

The last parameter reviewed in the cash flow analysis was Administrative Expense. Unlike many of the other parameters, Administrative Expense is not directly proportional to CIF. Many expenses are fixed in nature, while others can dramatically increase or decrease regardless of the CIF levels. Over the last 15 fiscal years Administrative Expenses have grown from \$1.2 million to \$1.9 million, in a notably fluctuating manner. See the historic detail in Exhibit 3, column 15. For this analysis, an annual expense growth rate of 4.0% was selected and applied consistently to each new year. A starting expense of \$2.0 million was selected for Fiscal Year ending 06/30/13.

A second scenario was modeled in the cash flow analysis. The only difference from what has been discussed above is a premium rate reduction of 17% was incorporated, effective 07/01/12. As can be seen in Exhibit 2, this change brought the Fund's estimated ending balance down to \$185 million as of 06/30/22.

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Finally, both of the above scenarios were run again, but this time selecting an investment rate of return of 4.00% as a more conservative measure. As can be seen in Exhibit 2, this change brought the Fund's estimated ending balance down to \$176 million as of 06/30/22, assuming no premium rate reduction. With a 17% premium rate reduction, the 4.00% rate of return assumptions brings the projected ending balance down to \$161 million as of 06/30/22. See Exhibit 2.

***5. Immediate and Future Status of MSI Fund***

Exhibit 2 summarizes the various elements that make up the Fund adjustments and the resulting estimated Fund balance for each of the next 10 Fiscal Years.

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### **IV. PREMIUM RATES**

#### ***1. Overall Premium Levels***

The current premium rate levels have adequately funded the MSI program for some years to come. An indicated premium adjustment is developed in Exhibit 4. Many of the parameters in Exhibit 4 were developed in Exhibit 3. The rate indication methodology employed is referred to as a loss ratio approach. Under this approach, the estimated future loss plus non-premium variable expense is divided by the estimated premium less premium variable expense plus investment income.

Generally, an adjustment for profit and contingencies is included in the denominator of the indications calculation. While this was not done explicitly in this case, as a conservative measure, an allowance for the fluctuating amount of losses was included in the calculation. This allowance was set equal to the average incurred loss (average paid loss plus average loss reserve). A review of exhibit 3 shows that the paid loss amount (as a percent of Coverage In Force), was at about double the selected long term average in three years. Many years were well below the 12.4% selected average. By basically doubling the average expected loss we have accounted for a recurrence of the most extreme loss in the data period under review without having to consider a rate increase. The surplus increase that will be generated in most years should comfortably add to the amount of funds available to cover the improbable catastrophe loss.

The overall premium indicated rate level change is for a 62% decrease.

An overall premium rate level decrease of 17.33% is proposed, a summary of which can be found in Exhibit 5. Parts of this proposed decrease are discussed in the following sections. A larger decrease is not suggested at this time for conservative reasons, to mitigate market disruptions, and in recognition of the fact that a significant portion of the indicated decrease is driven by the investment income generated from surplus.

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**IV. PREMIUM RATES**

***2. Residential and Non-Residential Premium Rates***

Non-Residential Premium Rates are currently two times the Residential Premium Rates. When these rate differentials were first established with non-residential at four times the residential rate levels, consideration may have been given to intuitive factors such as types of construction and their susceptibility to damage in the event of a mine subsidence, predominant location of each type of structure, affordability to each type of purchaser, the differential for other property perils, and the likelihood of submitting a claim for minor damage. The combination of the above factors could lead to an assumed rate differential as is currently in place.

When the differentials were established there was no direct historic evidence to support the selected implied relationships. Even now the amount of Non-Residential claim experience is negligible, perhaps indicating the reluctance of consumers to buy the non-residential coverage at the split rates.

In our last analysis we recommended cutting the rate differential from 4.0 to 2.0. With this analysis it is recommended that the Non-Residential Premiums be established at the same level as the residential premiums.

The base rate decrease, combined with the change to the surcharge methodology, leads to an approximate premium decrease of 50 to 58% for Non-Residential risks. (See Exhibit 5.) While this is a significant decrease for these risks, it should be kept in mind that the current size of the Non-Residential book is minor in relationship to the Residential book. This change should also lead to increased penetration in the Non-Residential category, which may then encourage further penetration in the Residential category.

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**IV. PREMIUM RATES**

***3. Charges for the Initial Amount of Coverage***

In addition to the Non-Residential surcharge, some policyholders have expressed dissatisfaction with the basic rate level for low-cost housing. The purpose of the higher rate charge for the initial amount of coverage is to equitably share some of the fixed costs of providing this coverage. A review of the claims file provided to Pinnacle continues to support higher rate levels for the initial coverage. See Exhibits 6 and 7 for a sampling of some of the claims characteristics.

Higher charges for the initial amounts of coverage are intuitive from a claims perspective. As in other property insurance, most losses are not total losses or total limits losses. Nearly 30% of the Pennsylvania claims are for less than \$10,000. Decreasing rate levels for increasing coverage is a well documented standard for property insurance.

Be that as it may, it still does not address the affordability issue that is probably driving this concern. The overall rate decrease will help this in some regard. A uniform rate per coverage dollar regardless of the coverage amount would be easy to understand, less prone to error, and make the cost for low-cost housing policyholders more affordable. While it is financially possible to lower the basic charges for the initial coverage even further than is recommended at this time, doing so is left to the discretion of the MSI.

***4. Program Growth***

The MSI desires to increase its penetration in the available marketplace, thus lowering costs and providing a needed service to Pennsylvania consumers. Currently less than 5% of the available market is insured. The above changes should stimulate growth, especially in the Non-Residential category. Advertising these changes will also help, if it is deemed to be cost effective. Notification of changes to Producers will already be required. Getting some free press should also be easy to do.

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**V. RESERVES FOR OUTSTANDING CLAIMS**

Exhibit 8 develops the estimated trended ultimate average claim. This estimate is used in Exhibit 7 to develop some claim benchmarks by Layer of Coverage and Exhibit 9 to develop a factor reserve per reported claim. The reserves for known claims would be set equal to the benchmark ultimate claim (\$45,000) less any payments made to date.

Based on the relationship of paid claim counts to reported claim counts as detailed in Exhibit 9, a factor reserve of \$3,600 per reported claim regardless of mine type is recommended.

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**VI. COVERAGE LIMITS**

Currently the Fund offers coverage limits up to \$500,000. Exhibit 7 displays claims activity on Paid Claims, broken down into a claim range within an amount of purchased coverage range. On the Summary page of Exhibit 7 it can be seen that on average, paid claims tend to settle for about 19.2% of the coverage amount purchased. As the amount of coverage purchased increases, the relationship of the settlement to purchased coverage tends to decrease. This is not only intuitive, but supported by the Detail in Exhibit 7 which shows that smaller claims tend to be more prevalent regardless of the amount of coverage purchased. Exhibit 6 restates these same numbers, but summarized on a range of claims size basis. In this exhibit it can also be seen that claims at or below \$100,000 make up the majority of claims payments.

The MSI Fund has about 4,300 policies with the maximum limit of \$500,000, or a little less than 10% of total policies. Given that the Fund just began offering this coverage in 2010, and given the remote possibility of multiple claims from a single occurrence, no further adjustments are recommended at this time. After there has been an opportunity to develop more experience at these upper coverage limits layers, higher coverage limits should be reviewed again to see if additional adjustments are warranted.

Additional Living Expense Coverage is not currently offered by the Fund. This particular coverage is offered by the private market to similar risks that are written by the MSI Fund. Also in 2010, Additional Living Expense Coverage of up to \$25,000 was added to all residential policies at no additional charge to the policyholders of the Kentucky Mine Subsidence Insurance Fund. The Pennsylvania MSI Fund may wish to consider adding this coverage option to its policies for competitive, policyholder welfare, and public perception reasons. With its current surplus position, the Fund could offer or automatically provide this coverage at no additional charge.

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**VII. CONCLUDING REMARKS**

In wrapping up our study, the following observations and recommendations are made:

- The MSI Fund is financially sound.
- The Fund's projected surplus is sufficient to see it through several years of significant underwriting loss and even withstand significant catastrophic losses.
- A reduction in surplus is not recommended at this time. Rather, changes noted below are recommended and their impacts observed before lowering the surplus.
- A 17.3% Premium reduction is recommended. This includes reducing residential base rates 16.7%, reducing non-residential base rates 58.3%, and reducing initial coverage on non-residential rates by 50.0%.
- The factor reserve per reported claims should be changed to \$3,600 for both Bituminous and Anthracite mine subsidence claims.
- No change is recommended to the \$500,000 coverage limit at this time.
- Consideration should be given to offering Additional Living Expense Coverage.
- A range of Surplus to Coverage In Force benchmarks have been provided within the report.

It has been a pleasure working with the DEP to develop this analysis and resulting recommendations. Pinnacle remains available to further discuss this analysis or add to it if so desired by the DEP.



**Pennsylvania Mine Subsidence Insurance Fund  
2011 Actuarial Review  
Index of Exhibits**

<b>Exhibit</b>	<b>Description</b>
1	Estimated Outstanding Liabilities
2	Projected Cash Flow Page 1   Assuming No Change in Premium Rates and a 5.50% Rate of Return on Investments Page 2   Assuming a Rate Reduction of -17.33% and a 5.50% Rate of Return on Investments Page 3   Assuming No Change in Premium Rates and a 4.00% Rate of Return on Investments Page 4   Assuming a Rate Reduction of -17.33% and a 4.00% Rate of Return on Investments
3	Historic Coverage In Force and Other Parameters
4	Indicated Premium Change
5	Rating Program Proposal
6	Claims by Range
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8	Estimated Average Paid Claim
9	Factor Reserve per Reported Claim
10	Report Lag Analysis
11	Net Premium to Surplus Ratios

<b>Pennsylvania Mine Subsidence Insurance Fund</b> <b>2011 Actuarial Review</b> <b>Estimated Outstanding Liabilities</b> <b>as of 12/31/2011</b>							
Fiscal Report Year Beginning 7/1	Paid Claim Amount	Amount Ultimate Adjustment		Estimated Ultimate Amount		Estimated Outstanding Liability	
		Low	High	Low	High	Low	High
(1)	(2)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)
Prior						80,000	130,000
1991	1,415,693	1.014	1.024	1,435,578	1,449,792	19,885	34,099
1992	1,012,866	1.014	1.024	1,027,207	1,037,377	14,341	24,511
1993	1,279,515	1.014	1.024	1,297,776	1,310,625	18,260	31,110
1994	744,356	1.014	1.024	755,063	762,538	10,707	18,183
1995	973,174	1.014	1.025	987,282	997,057	14,108	23,883
1996	602,438	1.015	1.025	611,240	617,291	8,801	14,853
1997	406,461	1.015	1.025	412,445	416,529	5,984	10,068
1998	513,075	1.015	1.025	520,686	525,842	7,611	12,767
1999	503,114	1.015	1.025	510,634	515,690	7,520	12,576
2000	332,401	1.016	1.026	337,575	340,918	5,175	8,517
2001	497,757	1.017	1.027	506,011	511,021	8,254	13,264
2002	1,341,643	1.018	1.028	1,365,256	1,378,773	23,613	37,130
2003	160,478	1.019	1.029	163,466	165,084	2,988	4,606
2004	246,683	1.020	1.030	251,527	254,018	4,844	7,334
2005	1,169,872	1.021	1.031	1,194,036	1,205,858	24,164	35,987
2006	502,142	1.024	1.034	514,052	519,142	11,910	17,000
2007	506,439	1.037	1.049	524,941	531,451	18,502	25,012
2008	1,107,071	1.057	1.081	1,170,467	1,196,671	63,396	89,600
2009	462,082	1.081	1.127	499,547	520,773	37,465	58,691
2010	837,510	1.111	1.198	930,341	1,003,165	92,832	165,656
Total	14,614,770			15,015,132	15,259,616	480,362	774,846

Notes:

- (2) Provided by MSI. 1991 - 1996 from prior analysis  
(3) Exhibit 10 - cumulative settlement amount factors  
(4) (2) x (3)  
(5) (4) - (2), Prior based on subsequent 5 year average extended for 5 years

**Pennsylvania Mine Subsidence Insurance Fund**  
**2011 Actuarial Review**  
**Projected Cash Flow**  
**Assuming No Change in Premium Rates**

Fiscal Report Year Beginning 7/1	Coverage In Force in \$ (000's)	Beginning Balance	Premium	Paid Commission	Premium Refund	Investment Income	Paid Loss	Administrative Expense	Ending Balance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2010	9,001,630								86,740,060
2011	9,001,630	86,740,060							90,000,000
2012	9,563,431	90,000,000	5,738,059	95,634	43,460	5,154,355	1,184,290	2,000,000	97,569,029
2013	10,160,295	97,569,029	6,096,177	101,603	46,173	5,587,593	1,258,203	2,081,097	105,765,723
2014	10,794,410	105,765,723	6,476,646	107,944	49,055	6,056,696	1,336,729	2,165,483	114,639,855
2015	11,468,101	114,639,855	6,880,861	114,681	52,116	6,564,501	1,420,155	2,253,290	124,244,975
2016	12,183,837	124,244,975	7,310,302	121,838	55,369	7,114,065	1,508,789	2,344,657	134,638,689
2017	12,944,244	134,638,689	7,766,546	129,442	58,824	7,708,672	1,602,954	2,439,730	145,882,956
2018	13,752,108	145,882,956	8,251,265	137,521	62,496	8,351,855	1,702,996	2,538,657	158,044,406
2019	14,610,391	158,044,406	8,766,235	146,104	66,396	9,047,416	1,809,282	2,641,596	171,194,679
2020	15,522,242	171,194,679	9,313,345	155,222	70,540	9,799,438	1,922,201	2,748,709	185,410,790
2021	16,491,001	185,410,790	9,894,601	164,910	74,942	10,612,313	2,042,167	2,860,165	200,775,518

Notes:

- (2) Reflects Average Annual Change developed in Exhibit 3 Col (3)
- (3) Prior Year Ending Balance
- (4) (2) x Selected Premium Rate developed in Exhibit 3 Col (9)
- (5) (2) x Selected Commission Rate and Increment developed in Exhibit 3 Col (12), capped at 7.5%
- (6) (2) x Selected Premium Refund Rate developed in Exhibit 3 Col (19)
- (7) Based on a Selected Investment Rate of 5.50%**
- (8) (2) x Selected Paid Loss Rate developed in Exhibit 3 Col (14)
- (9) Reflects Average Annual Change developed in Exhibit 3 Col (16)
- (10) (3) + (4) - (5) - (6) + (7) - (8) - (9)

**Pennsylvania Mine Subsidence Insurance Fund**  
**2011 Actuarial Review**  
**Projected Cash Flow**  
**Assuming a Rate Reduction of -17.33%**

Fiscal Report Year Beginning 7/1	Coverage In Force in \$ (000's)	Beginning Balance	Premium with change of -17.33%	Paid Commission	Premium Refund	Investment Income	Paid Loss	Administrative Expense	Ending Balance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2010	9,001,630								86,740,060
2011	9,001,630	86,740,060							90,000,000
2012	9,563,431	90,000,000	5,240,856	83,680	38,028	5,140,797	1,184,290	2,000,000	97,075,655
2013	10,160,295	97,075,655	5,039,710	76,202	34,630	5,530,903	1,258,203	2,081,097	104,196,136
2014	10,794,410	104,196,136	5,354,243	80,958	36,791	5,937,388	1,336,729	2,165,483	111,867,808
2015	11,468,101	111,867,808	5,688,407	86,011	39,087	6,375,330	1,420,155	2,253,290	120,133,003
2016	12,183,837	120,133,003	6,043,427	91,379	41,527	6,847,142	1,508,789	2,344,657	129,037,220
2017	12,944,244	129,037,220	6,420,604	97,082	44,118	7,355,417	1,602,954	2,439,730	138,629,357
2018	13,752,108	138,629,357	6,821,320	103,141	46,872	7,902,944	1,702,996	2,538,657	148,961,956
2019	14,610,391	148,961,956	7,247,046	109,578	49,797	8,492,718	1,809,282	2,641,596	160,091,468
2020	15,522,242	160,091,468	7,699,342	116,417	52,905	9,127,957	1,922,201	2,748,709	172,078,535
2021	16,491,001	172,078,535	8,179,866	123,683	56,207	9,812,116	2,042,167	2,860,165	184,988,296

Notes:

- (2) Reflects Average Annual Change developed in Exhibit 3 Col (3)
- (3) Prior Year Ending Balance
- (4) (2) x Selected Premium Rate developed in Exhibit 3 Col (9) x (1 + -17.33%)
- (5) (2) x Selected Commission Rate and Increment developed in Exhibit 3 Col (12), capped at 7.5% x 25% for yrs 2013 - 2021 (a 12.5% Reduction in yr 2012)
- (6) (2) x Selected Premium Refund Rate developed in Exhibit 3 Col (19) x 25% for years 2013 - 2021 (a 12.5% Reduction in year 2012)
- (7) Based on a Selected Investment Rate of 5.50%**
- (8) (2) x Selected Paid Loss Rate developed in Exhibit 3 Col (14)
- (9) Reflects Average Annual Change developed in Exhibit 3 Col (16)
- (10) (3) + (4) - (5) - (6) + (7) - (8) - (9)

Pennsylvania Mine Subsidence Insurance Fund									
2011 Actuarial Review									
Projected Cash Flow									
Assuming No Change in Premium Rates and a 4.00% Rate of Return on Investments									
Fiscal Report Year Beginning 7/1	Coverage In Force in \$ (000's)	Beginning Balance	Premium	Paid Commission	Premium Refund	Investment Income	Paid Loss	Administrative Expense	Ending Balance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2010	9,001,630								86,740,060
2011	9,001,630	86,740,060							90,000,000
2012	9,563,431	90,000,000	5,738,059	95,634	43,460	3,721,259	1,184,290	2,000,000	96,135,933
2013	10,160,295	96,135,933	6,096,177	101,603	46,173	3,975,572	1,258,203	2,081,097	102,720,607
2014	10,794,410	102,720,607	6,476,646	107,944	49,055	4,248,476	1,336,729	2,165,483	109,786,519
2015	11,468,101	109,786,519	6,880,861	114,681	52,116	4,541,319	1,420,155	2,253,290	117,368,457
2016	12,183,837	117,368,457	7,310,302	121,838	55,369	4,855,538	1,508,789	2,344,657	125,503,644
2017	12,944,244	125,503,644	7,766,546	129,442	58,824	5,192,675	1,602,954	2,439,730	134,231,914
2018	13,752,108	134,231,914	8,251,265	137,521	62,496	5,554,378	1,702,996	2,538,657	143,595,887
2019	14,610,391	143,595,887	8,766,235	146,104	66,396	5,942,410	1,809,282	2,641,596	153,641,154
2020	15,522,242	153,641,154	9,313,345	155,222	70,540	6,358,659	1,922,201	2,748,709	164,416,486
2021	16,491,001	164,416,486	9,894,601	164,910	74,942	6,805,142	2,042,167	2,860,165	175,974,043

Notes:

- (2) Reflects Average Annual Change developed in Exhibit 3 Col (3)
- (3) Prior Year Ending Balance
- (4) (2) x Selected Premium Rate developed in Exhibit 3 Col (9)
- (5) (2) x Selected Commission Rate and Increment developed in Exhibit 3 Col (12), capped at 7.5%
- (6) (2) x Selected Premium Refund Rate developed in Exhibit 3 Col (19)
- (7) **Based on a Selected Investment Rate of 4.00%**
- (8) (2) x Selected Paid Loss Rate developed in Exhibit 3 Col (14)
- (9) Reflects Average Annual Change developed in Exhibit 3 Col (16)
- (10) (3) + (4) - (5) - (6) + (7) - (8) - (9)

Pennsylvania Mine Subsidence Insurance Fund									
2011 Actuarial Review									
Projected Cash Flow									
Assuming a Rate Reduction of -17.33% and a 4.00% Rate of Return on Investments									
Fiscal Report Year Beginning 7/1	Coverage In Force in \$ (000's)	Beginning Balance	Premium with change of -17.33%	Paid Commission	Premium Refund	Investment Income	Paid Loss	Administrative Expense	Ending Balance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2010	9,001,630								86,740,060
2011	9,001,630	86,740,060							90,000,000
2012	9,563,431	90,000,000	5,240,856	83,680	38,028	3,711,471	1,184,290	2,000,000	95,646,329
2013	10,160,295	95,646,329	5,039,710	76,202	34,630	3,934,798	1,258,203	2,081,097	101,170,705
2014	10,794,410	101,170,705	5,354,243	80,958	36,791	4,163,144	1,336,729	2,165,483	107,068,132
2015	11,468,101	107,068,132	5,688,407	86,011	39,087	4,406,933	1,420,155	2,253,290	113,364,930
2016	12,183,837	113,364,930	6,043,427	91,379	41,527	4,667,253	1,508,789	2,344,657	120,089,259
2017	12,944,244	120,089,259	6,420,604	97,082	44,118	4,945,271	1,602,954	2,439,730	127,271,250
2018	13,752,108	127,271,250	6,821,320	103,141	46,872	5,242,232	1,702,996	2,538,657	134,943,136
2019	14,610,391	134,943,136	7,247,046	109,578	49,797	5,559,471	1,809,282	2,641,596	143,139,400
2020	15,522,242	143,139,400	7,699,342	116,417	52,905	5,898,413	1,922,201	2,748,709	151,896,924
2021	16,491,001	151,896,924	8,179,866	123,683	56,207	6,260,586	2,042,167	2,860,165	161,255,155

Notes:

- (2) Reflects Average Annual Change developed in Exhibit 3 Col (3)
- (3) Prior Year Ending Balance
- (4) (2) x Selected Premium Rate developed in Exhibit 3 Col (9) x (1 + -17.33%)
- (5) (2) x Selected Commission Rate and Increment developed in Exhibit 3 Col (12), capped at 7.5% x 25% for yrs 2013 - 2021 (a 12.5% Reduction in yr 2012)
- (6) (2) x Selected Premium Refund Rate developed in Exhibit 3 Col (19) x 25% for years 2013 - 2021 (a 12.5% Reduction in year 2012)
- (7) **Based on a Selected Investment Rate of 4.00%**
- (8) (2) x Selected Paid Loss Rate developed in Exhibit 3 Col (14)
- (9) Reflects Average Annual Change developed in Exhibit 3 Col (16)
- (10) (3) + (4) - (5) - (6) + (7) - (8) - (9)

**Pennsylvania Mine Subsidence Insurance Fund**  
**2011 Actuarial Review**  
**Historic Coverage In Force and Other Parameters**

Fiscal Report Year Beginning 7/1	Coverage In Force in \$ (000's)	Coverage Annual Change	Policies In Force	Policies Annual Change	Coverage Per Policy Change	Estimated Inflation Change	Residual Change	Average Premium per \$1000 Coverage	Average Investment Rates
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1996	3,478,793		43,589					1.10	
1997	3,640,974	4.66%	44,319	1.67%	2.94%	0.87%	2.05%	1.06	
1998	3,746,272	2.89%	44,574	0.58%	2.30%	0.62%	1.67%	1.09	
1999	3,945,403	5.32%	45,420	1.90%	3.35%	2.05%	1.28%	1.06	
2000	4,754,237	20.50%	52,395	15.36%	4.46%	3.18%	1.24%	0.93	
2001	4,950,738	4.13%	53,309	1.74%	2.35%	1.94%	0.40%	0.93	
2002	5,134,789	3.72%	53,280	-0.05%	3.77%	2.26%	1.49%	0.97	4.38%
2003	5,484,411	6.81%	53,487	0.39%	6.40%	4.74%	1.58%	0.92	3.73%
2004	5,972,256	8.90%	54,749	2.36%	6.39%	6.96%	-0.54%	0.92	4.41%
2005	6,728,380	12.66%	56,567	3.32%	9.04%	3.57%	5.28%	0.92	5.83%
2006	7,372,360	9.57%	57,314	1.32%	8.14%	7.76%	0.36%	0.89	8.50%
2007	7,680,300	4.18%	57,558	0.43%	3.74%	6.57%	-2.66%	0.83	0.22%
2008	8,158,710	6.23%	58,177	1.08%	5.10%	3.17%	1.87%	0.77	-1.62%
2009	8,663,940	6.19%	57,774	-0.69%	6.93%	0.94%	5.94%	0.60	8.85%
2010	9,001,630	3.90%	57,856	0.14%	3.75%	2.25%	1.47%	0.55	11.50%
Average		7.12%		2.11%		3.35%	1.53%	0.90	5.09%
Prior 2007 Selected		6.93%		1.49%		3.70%	1.61%	0.92	5.50%
Selected		6.24%		1.25%		3.35%	1.53%	0.60	5.50%

Fiscal Report Year Beginning 7/1	Paid Commission	Commsion Rate per \$1000 Coverage	Paid Loss	Paid Loss Rate per \$1000 Coverage	Administrative Expense	Expense Annual Change	Expense Rate per \$1000 Coverage	Premium Refund	Refund Rate per \$1000 Coverage
(1)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
1996			891,182	25.62%	1,238,671		35.61%	12,765	0.37%
1997			727,549	19.98%	1,363,026	10.04%	37.44%	18,642	0.51%
1998			513,075	13.70%	1,399,249	2.66%	37.35%	17,862	0.48%
1999			503,114	12.75%	1,779,486	27.17%	45.10%	19,568	0.50%
2000			332,401	6.99%	1,853,614	4.17%	38.99%	19,206	0.40%
2001			481,786	9.73%	1,585,883	-14.44%	32.03%	17,185	0.35%
2002			1,415,945	27.58%	1,834,257	15.66%	35.72%	23,289	0.45%
2003	67,446	1.23%	160,478	2.93%	1,808,099	-1.43%	32.97%	24,462	0.45%
2004	124,767	2.09%	246,683	4.13%	1,583,470	-12.42%	26.51%	33,165	0.56%
2005	201,525	3.00%	1,522,531	22.63%	1,881,931	18.85%	27.97%	41,035	0.61%
2006	166,026	2.25%	776,796	10.54%	2,208,894	17.37%	29.96%	38,571	0.52%
2007	152,481	1.99%	506,439	6.59%	2,332,823	5.61%	30.37%	57,967	0.75%
2008	118,961	1.46%	1,107,071	13.57%	2,124,639	-8.92%	26.04%	36,540	0.45%
2009	92,609	1.07%	462,082	5.33%	1,743,476	-17.94%	20.12%	36,709	0.42%
2010	84,396	0.94%	332,024	3.69%	1,924,696	10.39%	21.38%	-38	0.00%
Average		1.75%		12.38%		4.05%	31.84%		0.45%
Prior 2007 Selected		4.00%		12.35%		5.00%	28.00%		0.50%
Selected		1.00%		12.38%		4.05%	22.50%		0.45%
Annual Increment		0.00%							

\*\* 27.9% rate reduction

\*\* 13.7% premium distribution and \$500K Limit introduced

**Notes:**

(2)	MSI 2011 board report and prior board reports	(11)	MSI 2011 board report and prior board reports
(3)	(2) / Prior (2)	(12)	(11) / (2)
(4)	MSI 2011 board report and prior board reports	(13)	MSI 2011 board report and prior board reports
(5)	(4) / Prior (4)	(14)	(13) / (2)
(6)	[1 + (3)] / (1+ (5)) - 1	(15)	MSI 2011 board report and prior board reports
(7)	Provided by MSI	(16)	(15) / Prior (15)
(8)	[1 + (6)] / (1+ (7)) - 1	(17)	(15) / (2)
(9)	MSI 2011 board report and prior board reports	(18)	MSI 2011 board report and prior board reports
(10)	MSI 2011 board report and prior board reports	(19)	(18) / (2)

<b>Pennsylvania Mine Subsidence Insurance Fund</b>			
<b>2011 Actuarial Review</b>			
<b>Indicated Premium Change</b>			
Item	Percent of \$1000 Coverage In Force	Adjustment to Earned Premium	Restated to Net Earned Premium
(1)	(2)	(3)	(4)
Written Premium	60.00%		
Premium Refund	0.45%		
Net Premium	59.55%	57.69%	100.00%
Paid Claim	12.38%	12.00%	20.80%
Claim Reserve*		1.85%	3.21%
Claim Fluctuation Reserve**	12.38%	13.85%	24.01%
Commission	1.00%	0.97%	1.68%
Administrative Expense	22.50%	21.80%	37.79%
Investment Income <sup>^</sup>	77.00%	74.60%	129.31%
Underwriting and Investment Profit	88.28%		141.84%
Indicated Rate Change <sup>^^</sup>			-62.31%
Proposed Rate Change			-17.33%

Notes:

- (2) Exhibit 3
- (3) Reflects Earning Lag of 50% and Annual Written Premium Increase equal to Coverage In Force Increase (Exhibit 3)
- (4) (3) / (3) Net Premium
- \* Based on 12-Ultimate Development Factor in Exhibit 1
- \*\* Set equal to Average Paid Claim and Claim Reserve.  
See Exhibit 3 for variability range.
- <sup>^</sup> Based on relationships developed from Exhibit 2.
- <sup>^^</sup> (Loss + Admin) / (Premium - Commission + Inv Inc) - 1.000



<b>Pennsylvania Mine Subsidence Insurance Fund</b> <b>2011 Actuarial Review</b> <b>Rating Program Proposal</b>							
Rating Element	Present		Proposed		Change		
	Residential	Non - Res.	Residential	Non - Res.	Residential	Non - Res.	Total
Rate/\$1, First \$5,000	0.00200	0.00400	0.00200	0.00200	0.0%	-50.0%	-2.0%
Rate/\$1, Each Subsequent \$1	0.00060	0.00120	0.00050	0.00050	-16.7%	-58.3%	-19.0%
Senior Discount	10.00%	0.00%	10.00%	0.00%	0.0%	0.0%	0.0%
Multiple Policy Discount	0.00%	0.00%	0.00%	0.00%	0.0%	0.0%	0.0%
Condo Assoc Discount	0.00%	0.00%	0.00%	0.00%	0.0%	0.0%	0.0%
Total					-15.0%	-57.7%	-17.3%

Note: Non-Resident Rate/\$1 is set as a factor to the Resident Rate

Pennsylvania Mine Subsidence Insurance Fund 2011 Actuarial Review Claims by Range						
Top End of Claims Range	Claim Count	Settlement Amount	Eliminated Layer			
			5,000	10,000	25,000	100,000
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5,000	91	223,082	0	0	0	0
10,000	67	473,187	138,187	0	0	0
15,000	36	448,805	268,805	88,805	0	0
20,000	27	462,730	327,730	192,730	0	0
25,000	27	596,202	461,202	326,202	0	0
50,000	43	1,493,898	1,278,898	1,063,898	418,898	0
75,000	20	1,284,496	1,184,496	1,084,496	784,496	0
100,000	18	1,562,278	1,472,278	1,382,278	1,112,278	0
125,000	2	211,100	201,100	191,100	161,100	11,100
150,000	3	426,954	411,954	396,954	351,954	126,954
200,000	1	176,700	171,700	166,700	151,700	76,700
225,000	1	218,868	213,868	208,868	193,868	118,868
250,000	2	500,000	490,000	480,000	450,000	300,000
375,000	1	352,916	347,916	342,916	327,916	252,916
Grand Total	339	8,431,216	6,968,134	5,924,947	3,952,210	886,538
Eliminated Loss			1,463,082	2,506,269	4,479,006	7,544,678
Eliminated Ratio*			17.4%	29.7%	53.1%	89.5%

Notes:

- (2) Closed Claims, Provided by MSI, excludes claims without payment  
(3) Closed Claims, Provided by MSI, excludes claims without payment  
(4) (3) - (2) x Eliminated Layer  
(5) (3) - (2) x Eliminated Layer  
(6) (3) - (2) x Eliminated Layer  
(7) (3) - (2) x Eliminated Layer

\* Eliminated Loss / (3) Total

<b>Pennsylvania Mine Subsidence Insurance Fund</b> <b>2011 Actuarial Review</b> <b>Claims by Range of Coverage</b> <b>Summary</b>								
Top End of Coverage Range	Claim Count	Settlement Amount	Coverage Amount	Settlement Amount		Trended Ultimate Claim	Trended Settlement Amount	
				Per Claim	Per Coverage		Per Claim	Per Coverage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
15,000	5	35,075	66,300	7,015	52.90%		12,693	95.72%
20,000	2	22,720	37,200	11,360	61.07%		20,554	110.50%
25,000	5	60,693	114,100	12,139	53.19%		21,963	96.24%
50,000	16	211,970	658,300	13,248	32.20%		23,970	58.26%
75,000	34	629,508	2,257,320	18,515	27.89%		33,500	50.46%
100,000	61	1,487,074	5,532,200	24,378	26.88%		44,109	48.64%
125,000	51	971,515	5,736,700	19,049	16.94%		34,467	30.64%
150,000	52	1,194,449	7,170,700	22,970	16.66%		41,561	30.14%
175,000	37	1,054,091	5,936,400	28,489	17.76%		51,546	32.13%
200,000	36	916,402	6,621,040	25,456	13.84%		46,058	25.04%
225,000	15	311,723	3,134,500	20,782	9.94%		37,601	17.99%
250,000	21	1,165,094	5,165,100	55,481	22.56%		100,384	40.81%
275,000	1	6,298	261,300	6,298	2.41%		11,395	4.36%
350,000	1	3,770	350,000	3,770	1.08%		6,821	1.95%
400,000	1	352,916	376,200	352,916	93.81%		638,548	169.74%
500,000	1	7,918	500,000	7,918	1.58%		14,326	2.87%
Total	339	8,431,216	43,917,360	24,871	19.20%	45,000	45,000	34.74%

Notes:

- |     |   |     |                             |
|-----|---|-----|-----------------------------|
| (2) | Closed Claims, Provided by MSI, excludes claims without payment | (6) | (3) / (4)                   |
| (3) | Closed Claims, Provided by MSI, excludes claims without payment | (7) | Exhibit 8 Col (11)          |
| (4) | Closed Claims, Provided by MSI, excludes claims without payment | (8) | (5) x Total (7) / Total (5) |
| (5) | (3) / (2)   | (9) | (6) x Total (7) / Total (5) |

**Pennsylvania Mine Subsidence Insurance Fund  
2011 Actuarial Review**

**Claims by Range of Coverage  
Detail**

Coverage Band	Data Element	Claim Band (Upper Limit)													Total	Settlement per Claim	Settlement per Cover.			
		5,000	10,000	15,000	20,000	25,000	50,000	75,000	100,000	125,000	150,000	200,000	225,000	250,000				375,000		
15,000	Claim Count	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	5	7,015	52.9%
	Total Settlement	5,925	7,550	21,600	0	0	0	0	0	0	0	0	0	0	0	0	0	35,075		
	Total Coverage	29,800	14,900	21,600	0	0	0	0	0	0	0	0	0	0	0	0	0	66,300		
20,000	Claim Count	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	11,360	61.1%
	Total Settlement	0	5,420	0	17,300	0	0	0	0	0	0	0	0	0	0	0	0	22,720		
	Total Coverage	0	19,600	0	17,600	0	0	0	0	0	0	0	0	0	0	0	0	37,200		
25,000	Claim Count	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	5	12,139	53.2%
	Total Settlement	6,358	0	0	33,935	20,400	0	0	0	0	0	0	0	0	0	0	0	60,693		
	Total Coverage	49,300	0	0	43,500	21,300	0	0	0	0	0	0	0	0	0	0	0	114,100		
50,000	Claim Count	6	4	0	2	0	4	0	0	0	0	0	0	0	0	0	0	16	13,248	32.2%
	Total Settlement	16,089	33,688	0	32,705	0	129,488	0	0	0	0	0	0	0	0	0	0	211,970		
	Total Coverage	251,700	168,000	0	88,700	0	149,900	0	0	0	0	0	0	0	0	0	0	658,300		
75,000	Claim Count	12	5	3	2	2	6	4	0	0	0	0	0	0	0	0	0	34	18,515	27.9%
	Total Settlement	24,040	40,701	36,411	31,346	42,062	205,627	249,320	0	0	0	0	0	0	0	0	0	629,508		
	Total Coverage	800,100	354,300	196,400	138,700	138,900	362,400	266,520	0	0	0	0	0	0	0	0	0	2,257,320		
100,000	Claim Count	18	9	8	6	3	6	3	8	0	0	0	0	0	0	0	0	61	24,378	26.9%
	Total Settlement	49,708	62,540	102,267	103,503	67,733	209,249	201,150	690,924	0	0	0	0	0	0	0	0	1,487,074		
	Total Coverage	1,617,100	785,200	757,200	539,600	274,600	567,400	267,000	724,100	0	0	0	0	0	0	0	0	5,532,200		
125,000	Claim Count	15	11	7	5	2	5	3	2	1	0	0	0	0	0	0	0	51	19,049	16.9%
	Total Settlement	35,664	77,086	91,005	91,312	41,780	171,774	194,662	158,732	109,500	0	0	0	0	0	0	0	971,515		
	Total Coverage	1,683,100	1,291,500	781,900	563,200	232,900	529,200	312,100	229,000	113,800	0	0	0	0	0	0	0	5,736,700		
150,000	Claim Count	11	15	5	4	5	4	3	3	1	1	0	0	0	0	0	0	52	22,970	16.7%
	Total Settlement	24,551	102,145	63,944	66,427	113,371	134,838	188,980	271,594	101,600	127,000	0	0	0	0	0	0	1,194,449		
	Total Coverage	1,477,600	2,066,700	705,400	530,400	700,200	563,300	435,000	435,900	129,200	127,000	0	0	0	0	0	0	7,170,700		
175,000	Claim Count	7	7	6	1	4	7	1	2	0	2	0	0	0	0	0	0	37	28,489	17.8%
	Total Settlement	14,373	56,324	71,057	17,408	91,132	268,185	59,307	176,352	0	299,954	0	0	0	0	0	0	1,054,091		
	Total Coverage	1,131,400	1,104,300	974,000	163,200	643,500	1,137,000	162,300	306,200	0	314,500	0	0	0	0	0	0	5,936,400		
200,000	Claim Count	7	7	2	3	8	4	3	1	0	0	1	0	0	0	0	0	36	25,456	13.8%
	Total Settlement	18,151	44,701	25,647	53,094	175,724	145,468	192,018	84,900	0	176,700	0	0	0	0	0	0	916,402		
	Total Coverage	1,290,300	1,327,440	372,600	538,400	1,439,600	741,800	556,000	178,200	0	176,700	0	0	0	0	0	0	6,621,040		
225,000	Claim Count	3	4	1	1	1	3	1	1	0	0	0	0	0	0	0	0	15	20,782	9.9%
	Total Settlement	7,768	23,717	12,950	15,700	23,300	84,558	57,480	86,250	0	0	0	0	0	0	0	0	311,723		
	Total Coverage	628,300	830,300	203,800	209,500	213,000	633,300	213,000	203,300	0	0	0	0	0	0	0	0	3,134,500		
250,000	Claim Count	7	1	2	0	1	4	2	1	0	0	0	1	2	0	0	0	21	55,481	22.6%
	Total Settlement	16,686	5,100	23,925	0	20,700	144,710	141,579	93,527	0	0	0	218,868	500,000	0	0	0	1,165,094		
	Total Coverage	1,710,000	250,000	480,000	0	250,000	1,000,000	500,000	225,100	0	0	0	250,000	500,000	0	0	0	5,165,100		
275,000	Claim Count	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6,298	2.4%
	Total Settlement	0	6,298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6,298		
	Total Coverage	0	261,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	261,300		
350,000	Claim Count	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3,770	1.1%
	Total Settlement	3,770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,770		
	Total Coverage	350,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350,000		
400,000	Claim Count	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	352,916	93.8%
	Total Settlement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	352,916	0	352,916		
	Total Coverage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	376,200	0	376,200		
500,000	Claim Count	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7,918	1.6%
	Total Settlement	0	7,918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,918		
	Total Coverage	0	500,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500,000		
Total	Claim Count	91	67	36	27	27	43	20	18	2	3	1	1	2	1	0	0	339	24,871	19.2%
	Total Settlement	223,082	473,187	448,805	462,730	596,202	1,493,898	1,284,496	1,562,278	211,100	426,954	176,700	218,868	500,000	352,916	0	0	8,431,216		
	Total Coverage	11,018,700	8,973,540	4,492,900	2,832,800	3,914,000	5,684,300	2,711,920	2,301,800	243,000	441,500	176,700	250,000	500,000	376,200	0	0	43,917,360		

**Pennsylvania Mine Subsidence Insurance Fund  
2011 Actuarial Review  
Estimated Average Paid Claim  
as of 12/31/2011**

Fiscal Report Year Beginning 7/1	Paid Claim Count	Paid Claim Amount	Average Claim	Ultimate Adjustment				Estimated Ultimate						Inflation Index 3.35%	Trended Ultimate Average
				Count		Amount		Claim Count		Claim Amount		Claim Average			
				Low	High	Low	High	Low	High	Low	High	Low	High		
(1)	(2)	(3)	(4)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)	(8a)	(8b)	(9a)	(9b)	(10)	(11)
1991	43	1,415,693	32,923	1.005	1.007	1.014	1.024	43.22	43.30	1,435,578	1,449,792	33,219	33,481	1.964	65,514
1992	34	1,012,866	29,790	1.005	1.007	1.014	1.024	34.17	34.24	1,027,207	1,037,377	30,058	30,295	1.901	57,359
1993	42	1,279,515	30,465	1.005	1.007	1.014	1.024	42.22	42.30	1,297,776	1,310,625	30,739	30,981	1.839	56,757
1994	24	744,356	31,015	1.005	1.007	1.014	1.024	24.13	24.18	755,063	762,538	31,294	31,540	1.780	55,910
1995	40	973,174	24,329	1.005	1.007	1.014	1.025	40.22	40.30	987,282	997,057	24,548	24,742	1.722	42,437
1996	21	602,438	28,688	1.006	1.008	1.015	1.025	21.12	21.16	611,240	617,291	28,945	29,174	1.666	48,418
1997	14	406,461	29,033	1.006	1.008	1.015	1.025	14.08	14.11	412,445	416,529	29,294	29,525	1.612	47,413
1998	22	513,075	23,322	1.006	1.008	1.015	1.025	22.13	22.17	520,686	525,842	23,531	23,717	1.560	36,852
1999	13	503,114	38,701	1.006	1.008	1.015	1.025	13.08	13.10	510,634	515,690	39,049	39,357	1.509	59,173
2000	13	332,401	25,569	1.007	1.009	1.016	1.026	13.08	13.11	337,575	340,918	25,799	26,003	1.460	37,828
2001	15	497,757	33,184	1.008	1.010	1.017	1.027	15.11	15.14	506,011	511,021	33,482	33,746	1.413	47,503
2002	21	1,341,643	63,888	1.009	1.011	1.018	1.028	21.18	21.22	1,365,256	1,378,773	64,462	64,971	1.367	88,492
2003	9	160,478	17,831	1.010	1.012	1.019	1.029	9.09	9.10	163,466	165,084	17,991	18,133	1.323	23,898
2004	8	246,683	30,835	1.011	1.013	1.020	1.030	8.09	8.10	251,527	254,018	31,097	31,342	1.280	39,968
2005	25	1,169,872	46,795	1.015	1.017	1.021	1.031	25.36	25.42	1,194,036	1,205,858	47,074	47,446	1.239	58,543
2006	8	502,142	62,768	1.020	1.022	1.024	1.034	8.16	8.17	514,052	519,142	63,017	63,514	1.199	75,830
2007	18	506,439	28,136	1.027	1.032	1.037	1.049	18.49	18.57	524,941	531,451	28,388	28,611	1.160	33,053
2008	52	1,107,071	21,290	1.040	1.053	1.057	1.081	54.09	54.74	1,170,467	1,196,671	21,640	21,863	1.122	24,409
2009	16	462,082	28,880	1.074	1.119	1.081	1.127	17.19	17.90	499,547	520,773	29,067	29,090	1.086	31,574
2010	31	837,510	27,016	1.142	1.260	1.111	1.198	35.39	39.06	930,341	1,003,165	26,289	25,681	1.051	27,301
Total	469	14,614,770						480	485	15,015,132	15,259,616				
Average															47,912
Weighted Average - Low															47,320
Weighted Average - High															47,122
Prior 2007 Selected Average															45,000
Selected															45,000

Notes:

- (2) Provided by MSI. 1991 - 1996 from prior analysis (7) (2) x (5)
- (3) Exhibit 1 Col (2) (8) (3) x (6)
- (4) (3) / (2) (9) (8) / (7)
- (5) Exhibit 10 - cumulative claim count factors (10) Based on claim trend of 3.35%
- (6) Exhibit 10 - cumulative settlement amount factors (11) [average of (9)] x (10)



**Pennsylvania Mine Subsidence Insurance Fund  
2011 Actuarial Review  
Report Lag Analysis**

Claim Count																			
Report Fiscal Year	0	1	2	3	4	5	6	7	Report Lag										Total
									8	9	10	11	19	26	31	40			
1997	130	12	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	145
1998	146	9	6	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	163
1999	190	20	3	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	219
2000	154	10	9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	174
2001	202	20	5	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	232
2002	233	28	3	5	2	1	1	1	0	1	0	1	0	0	0	0	0	0	276
2003	134	9	2	0	2	0	0	0	0	0	0	1	0	0	0	0	0	148	
2004	142	8	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	154	
2005	233	15	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	253	
2006	168	9	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	180	
2007	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	
2008	55	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	56	
2009	16	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	
2010	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	
<b>Total</b>	<b>1,860</b>	<b>142</b>	<b>36</b>	<b>9</b>	<b>10</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,075</b>	

Settlement Amount																			
Report Fiscal Year	0	1	2	3	4	5	6	7	Report Lag										Total
									8	9	10	11	19	26	31	40			
1997	406,461	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	406,461
1998	437,850	-	75,225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	513,075
1999	440,394	-	-	-	-	-	-	-	2,720	-	-	-	60,000	-	-	-	-	-	503,114
2000	310,868	5,420	16,113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	332,401
2001	424,015	5,147	-	68,595	-	-	-	-	-	-	-	-	-	-	-	-	-	-	497,757
2002	1,371,296	26,172	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,397,468
2003	150,653	-	-	-	-	-	-	-	-	-	-	9,825	-	-	-	-	-	-	160,478
2004	246,683	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	246,683
2005	1,147,372	-	22,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,169,872
2006	502,142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	502,142
2007	506,439	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	506,439
2008	1,066,846	-	-	-	-	-	-	-	-	-	-	40,225	-	-	-	-	-	-	1,107,071
2009	407,304	54,778	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	462,082
2010	837,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	837,510
<b>Total</b>	<b>8,255,833</b>	<b>91,517</b>	<b>113,838</b>	<b>68,595</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>2,720</b>	<b>-</b>	<b>-</b>	<b>50,050</b>	<b>60,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>8,642,553</b>

Percentage Incremental Increase																			
	1	2	3	4	5	6	7	8	9	10	11	19	26	31	40	Tail			
<b>Claim Count</b>	7.63%	1.80%	0.44%	0.49%	0.19%	0.10%	0.05%	0.15%	0.05%	0.05%	0.24%	0.05%	0.00%	0.00%	0.00%	0.00%			
<b>Settlement Amt</b>	1.11%	1.36%	0.81%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.59%	0.70%	0.00%	0.00%	0.00%	0.00%			
<b>Prior 2007 Analysis Selected Factors</b>																			
<b>Claim Count</b>	1.050	1.020	1.015	1.005	1.005	1.002	1.001	1.000	1.000	1.025	1.002	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
<b>Settlement Amt</b>	1.025	1.020	1.020	1.005	1.001	1.001	1.001	1.000	1.000	1.001	1.000	1.010	1.000	1.000	1.000	1.000	1.000	1.000	1.000
<b>Selected Factors - LOW</b>																			
<b>Claim Count</b>	1.075	1.050	1.015	1.010	1.005	1.005	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001
<b>Settlement Amt</b>	1.030	1.025	1.020	1.020	1.005	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.010
<b>Selected Factors - HIGH</b>																			
<b>Claim Count</b>	1.150	1.100	1.025	1.015	1.005	1.005	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.003
<b>Settlement Amt</b>	1.075	1.050	1.035	1.025	1.005	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.020
<b>Cumulative Factors - LOW</b>																			
<b>Claim Count</b>	1.183	1.100	1.048	1.032	1.022	1.017	1.012	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.002	1.001	1.001	1.001
<b>Settlement Amt</b>	1.127	1.094	1.068	1.047	1.026	1.021	1.020	1.019	1.018	1.017	1.016	1.015	1.014	1.013	1.012	1.011	1.011	1.011	1.010
<b>Cumulative Factors - HIGH</b>																			
<b>Claim Count</b>	1.348	1.172	1.066	1.040	1.024	1.019	1.014	1.012	1.011	1.010	1.009	1.008	1.007	1.006	1.005	1.004	1.003	1.003	1.003
<b>Settlement Amt</b>	1.241	1.155	1.100	1.062	1.036	1.031	1.030	1.029	1.028	1.027	1.026	1.025	1.024	1.023	1.022	1.021	1.021	1.021	1.020

<b>Pennsylvania Mine Subsidence Insurance Fund</b> <b>2011 Actuarial Review</b> <b>Net Premium to Surplus Ratios</b>		
Characteristic	Net Premium to Surplus Ratio	Implied MSIF Surplus Based on Premium of \$6,000,000
(1)	(2)	(3)
Historic Benchmark (All Writers)	2 / 1	3,000,000
Current Industry Trend (All Writers)	0.90 / 1	6,700,000
Industry Property Writers (2006-2010)	0.85 / 1	7,100,000
Industry Property Writers (2010)	0.75 / 1	8,000,000
Select Property (only) Reinsurers (2006-2010)	0.51 / 1	11,800,000
Select Property (only) Reinsurers (2010)	0.50 / 1	12,000,000
California Earthquake Authority (2006-2010)	0.11 / 1	54,500,000
California Earthquake Authority (2011)	0.15 / 1	40,000,000

Characteristic	Implied MSIF Surplus Based on Premium of \$6,000,000	Surplus per \$1,000 CIF
(4)	(5)	(6)
Select Property (only) Reinsurers (2010)	12,000,000	\$1.33
California Earthquake Authority (2011)	40,000,000	4.44
California Earthquake Authority (CIF basis)	116,600,000	12.95
Pennsylvania MSIF (Current actual)	86,740,060	9.64
Pennsylvania MSIF (Current formula)		7.43
Recommended MSIF Low		4.44
Recommended MSIF High		12.95

**Notes:**

- |     |                             |
|-----|-----------------------------|
| (1) | A.M. Best company data      |
| (2) | A.M. Best company data      |
| (3) | \$6M / Col (2)              |
| (4) | \$(M / Col (2)              |
| (5) | Col (3) and CEA data        |
| (6) | Col (5) / Exhibit 3 Col (2) |