October 14, 2011

Methodology Analysis for Weighting of Historical Experience

Actuarial Expert Review

United States Department of Agriculture
The Risk Management Agency

Call Order # AG-645S-B-09-0043

OLIVER WYMAN
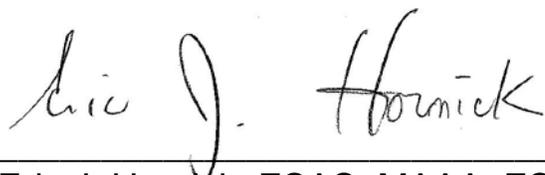
_____

Eric J. Hornick, FCAS, MAAA, FCA

Contents

<p style="text-align:center; border:1px solid black; display:inline-block;">

1.

Executive Summary

Overview

The Risk Management Agency (RMA) of the United States Department of Agriculture (USDA) was established under the provisions of the Federal Agricultural Improvement and Reform Act of 1996 to supervise the Federal Crop Insurance Corporation (FCIC) and oversee the programs authorized under the Federal Crop Insurance Act (7 U.S.C. 1505(e)) (the Act). Section 505(e)) of the Act requires FCIC's Board of Directors (the Board) to establish procedures under which any policy or plan of insurance, as well as any related material or modification of such a policy or plan of insurance, submitted to the Board be subject to independent review by persons experienced as actuaries and in underwriting.

Oliver Wyman Actuarial Consulting, Inc. (Oliver Wyman) has been retained as an independent reviewer of the Methodology Analysis for Weighting of Historical Experience dated September 12, 2011 (the Submission). This review is intended for the FCIC Board of Directors.

General information related to this Submission is presented in the Table below:

Methodology Analysis for Weighting Historical Experience: General Information

Applicant	Sumaria Systems c/o George Duffield Phone: 618-632-8450 e-mail: gduffield@sumaria.net
Type of Submission	This Submission is made pursuant to Section 508(h) of the Federal Crop Insurance Act. It proposes a new methodology for weighting, or otherwise adjusting, RMA's historical loss cost data in order to maximize the statistical validity for developing premium rates with consideration to feasibility, sustainability and complexity
Affected Crops	Apples, barley, corn, cotton, potatoes, rice, sorghum, soybeans, and wheat[1]
Affected Area	Nationally

---

[1] These are the crops mentioned by the Applicant

The findings of Oliver Wyman's review are presented in this report to RMA.

Findings

The Applicant offers five recommendations to modify the current methodology of weighting historical experience. The recommendations are summarized below:

1. Use Climate Division Data for calculating crop specific weather indexes.

2. Use fractional logit models[2] estimated at the climate division level to relate loss cost experience to the Palmer Drought Severity Index (PDSI) and Cooling Degree Days (CDD).

3. Categorize the loss cost experience observed over the chosen period into weather "probability bins" or categories.

4. Use all years available to calculate the catastrophic load, change the catastrophic load cap to the 90th percentile and reduce the aggregation region for catastrophic load from the state level to a climate division (consistent with the weather weighting procedure). The Applicant also recommends dampening of the weight given to the most extreme weather years to reduce the impact of a single extreme event.

5. Remove non-stationarity from the loss cost history when statistical analysis supports the adjustment. Estimate these adjustments at the national level for a crop and consider weather when these models are estimated. Impose symmetric caps on the magnitude of the adjustments to avoid excessive modification of the loss history in any particular location. Apply a discrete adjustment for data prior to 1995 to the adjusted loss cost data and shorten the loss history for base rates to 20 years; use a longer series of years for catastrophic loading. Use net acreage weighting within probability categories or "bins" to recognize the additional credibility of experience that is based on more exposed acres.

During the course of the development of the above recommendation, the applicant references two specific actuarial standards:

- The Statement of Principles Regarding Property and Casualty Insurance Ratemaking[3]
- ASOP No. 13, Trending Procedures In Property/Casualty Insurance Ratemaking[4]

Oliver Wyman concludes that the Applicant has provided sufficient actuarial support for the above recommendation. Additionally, the recommendations are in compliance with the referenced actuarial standards. However, if implemented, that there will be significant rate changes for individual insureds,   The Applicant does not present a mechanism in the implementation report for modifying, alleviating, or phasing in these changes nor is there a discussion of the potential dislocation in the market due to large changes. Additionally, we note that final rates are not presented in this document (only rate changes, and only for corn/soybeans are shown).

---

[2] The model improves upon previously used statistical methods because it only requires that the conditional mean be specified correctly to obtain consistent parameter estimates and it allows for direct estimation of (the) desired fractional response variable. (www.msu.edu/~lupi/FractionalLogit_Adoption-Risk_models.pdf)

[3] This can be found at http://www.casact.org/standards/princip/sppcrate.pdf

[4] This can be found at http://www.actuarialstandardsboard.org/pdf/asops/asops013_114.pdf

<div style="border:1px solid black; width:120px; height:120px; display:flex; align-items:center; justify-content:center;">
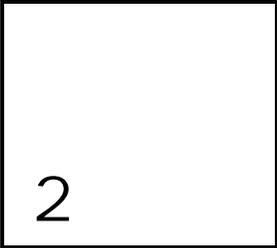
2

</div>

Research Report

Description of Methodology

Sumaria Systems (Applicant) has submitted this filing under section 508(h) of the Federal Crop Insurance Act (Act). This section of the Act, which was approved as part of the 2008 Farm Act, requires the FCIC Board to establish procedures under which any policy or plan of insurance, as well as any related material or modification of such a policy or plan of insurance, submitted to the Board be subject to independent review by persons experienced as actuaries and in underwriting.

The applicant proposes to modify the methodology of weighting historical experience. Five specific recommendations were submitted by the Applicant, as listed and quoted below:

Recommendation 1: We recommend that RMA use Climate Division data for calculating crop specific weather indexes. We believe the weather data collection that best meets the weather-data criteria is the National Climatic Data Center's Time Bias Corrected Divisional Temperature-Precipitation-Drought Index data, also called the climate division data. The climate division data provide several drought indexes and other weather variables that are time-aggregated to the monthly level and spatially-aggregated to the climate division level for the years back to 1895. Thus, the data allow RMA to compare the weather experience incurred by the modern program to weather extending 80 years prior to the 1975 cut-off of available loss-cost data.

Recommendation 2: We recommend that RMA use fractional logit models estimated at the climate division level to relate loss cost experience to the Palmer Drought Severity Index (PDSI) and Cooling Degree Days (CDD). Time period variants of both weather indicators should be used for different crops and locations. An out-of-sample forecasting competition is suggested to select the time-period/variables for a crop/climate division, and if the models are not found statistically significant the Applicant recommends no weather weighting. This process creates a weather index from 1895-present which characterizes the growing conditions experienced in each year.

Recommendation 3: Given recommendation 2 we propose that RMA categorize the loss cost experience observed over the period chosen into weather "probability bins" or categories. These

bins would be chosen according to an incremental procedure which would select a parsimonious number of bins for the crop/climate division. Once observed loss costs are categorized within bins, all historical loss costs within a bin are given equal weather probability. The bins recommended would have variable width but equal probability. The variable width binning process we propose ensures that at least one year during the rating period is classified in each bin, thereby providing proper weights that reflect all of the historical weather data.

Recommendation 4: (…)RMA should use all years available to calculate the catastrophic load and that extreme loss costs within the catastrophic load should be weighted using the weather index probabilities. Further, we recommend changing the catastrophic load cap to the 90th percentile and reducing the aggregation region for catastrophic load from the state level to a climate division, which is consistent with the weather weighting procedure. We also recommend dampening of the weight given to the most extreme weather years. Specifically, if the weather index for a particular year is above the 97th percentile, we recommend that the weight given to that year's input to the catastrophe load be adjusted to reflect the percentile of the weather index. That is, if the data span 30 years of experience, a year with a weather index at the 98th percentile should be given 2% (1-in-50) weight rather than 3.33% (1-in-30) weight. The weight taken from the adjusted year should then be spread evenly among the remaining years.

Recommendation 5: A variety of factors suggest non-stationarity in some RMA loss cost data. Such factors include an expanding participant pool, evolving production systems, the advent of biotechnology, and changing program underwriting rules. In many cases it is difficult, if not impossible, to disentangle these effects. We recommend that RMA use adjustments to remove non-stationarity from the loss cost history when statistical analysis supports the adjustment. We recommend estimating these adjustments at the national level for a crop and that weather should be taken into account when these models are estimated. Further, symmetric caps on the magnitude of the adjustments should be imposed to avoid excessive modification of the loss history in any particular location.

We first recommend application of a discrete adjustment for data prior to 1995 to the adjusted loss cost data. Specifically, the Applicant recommends estimating the effect at the national level and calculating a percentage difference by state using the effect relative to the post-1995 average loss cost. However, we stress that where analysis indicates that non-stationarity in the loss cost history is not statistically significant, no adjustment should be made.

Second, we recommend shortening the loss history for base rates to 20 years while using a longer series of years for catastrophic loading. This recommendation reflects the recognition that a longer time series is needed to capture extreme events than for measuring the risk quantified by the base rate. Finally we recommend using net acreage weighting within probability categories or "bins", which recognizes the additional credibility of experience that is based on more exposed acres.

Oliver Wyman's review is based on guidance provided in "The Statement of Principles Regarding Property and Casualty Insurance Ratemaking"[5] as discussed earlier.

---

[5] Our work is also guided by Actuarial Standards of Practice (ASOP), adopted by the Actuarial Standards Board (ASB); however we are not citing particular ASOPs in this review.

The Statement of Principles Regarding Property and Casualty Insurance Ratemaking

The Statements of Principles provides guidelines for actuaries. All ratemaking tasks undertaken by an actuary should be done in conformity with these statements. As such, a review of these principles and whether the Applicant has followed them is appropriate.

Principle 1: A rate is an estimate of the expected value of future costs.
Ratemaking should provide for all costs so that the insurance system is financially sound.

Principle 2: A rate provides for all costs associated with the transfer of risk.
Ratemaking should provide for the costs of an individual risk transfer so that equity among insureds is maintained. When the experience of an individual risk does not provide a credible basis for estimating these costs, it is appropriate to consider the aggregate experience of similar risks. A rate established from such experience is an estimate of the costs of the risk transfer for each individual in the class.

Principle 3: A rate provides for the costs associated with an individual risk transfer.
Ratemaking produces cost estimates that are actuarially sound if the estimation is based on Principles 1, 2, and 3. Such rates comply with four criteria commonly used by actuaries: reasonable, not excessive, not inadequate and not unfairly discriminatory.

These principles are examined using a series of considerations. We note that there are approximately 20 considerations in all; those particularly relevant to this review have been examined below.

Exposure Unit: The determination of an appropriate exposure unit or premium basis is essential. It is desirable that the exposure unit varies with the hazard and be practical and verifiable.

Acreage is used as the exposure base. It is both practical and verifiable.

Data: Historical premium, exposure, loss and expense experience is usually the starting point of ratemaking. This experience is relevant if it provides a basis for developing a reasonable indication of the future. Other relevant data may supplement historical experience. These other data may be external to the company or to the insurance industry and may indicate the general direction of trends in insurance claim costs, claim frequencies, expenses and premiums.

Several sources of historical weather data are available. This Submission relies on data from the National Climatic Data Center's Time Bias Corrected Divisional Temperature-Precipitation-Drought Index (Climate Division data). The Applicant believes this set of data best meets the following criteria:

- Provides climate information across all geographies where loss experience is observed.
- Provides climate information at sufficiently local scales to explain local loss experience.
- Provides the longest possible temporal record of climate events to ensure adequate analysis of the frequency of both normal and extreme climates.
- Provides specific climate variables that provide meaningful explanation of loss experience.
- Is operationally and routinely updated for use in future analysis and weighting.

The Applicant does note the following weaknesses in using Climate Division data:

- Climate division boundaries are not always delineated for climate homogeneity. Especially in the mountainous terrain of the western US, the boundaries follow drainage basins and all locations within those boundaries are not likely to have very similar climate characteristics as climate changes quickly with elevation.
- The station network used for each division calculations is not constant. Stations move, cease operation, and new ones are introduced throughout the history of the observing network. This introduces some error with any divisional calculations.
- Accuracy of division level data prior to 1931, when regression equations are used to estimate division-level data from statewide average data that were standard during that period.

This climate data set is combined with RMA's Statplan loss experience data, along with another data set that assigns counties to particular climate divisions (NOAA NCDC).

It is unlikely that any weather data will be absolutely correct for this application. By identifying the strengths and weaknesses of the data, the Applicant has presented a compelling argument as to why this is the most appropriate data for use in this application. The Applicant notes that the data "provide(s) serially complete national coverage (with no missing data) at a geographic scale sufficient to characterize local climate extremes with a period of record sufficient to identify the relative frequency of climate events that may be associated with loss experience. "

Homogeneity: Ratemaking accuracy often is improved by subdividing experience into groups exhibiting similar characteristics. For a heterogeneous product, consideration should be given to segregating the experience into more homogeneous groupings. Additionally, subdividing or combining the data so as to minimize the distorting effects of operational or procedural changes should be fully explored.

and

Credibility: Credibility is a measure of the predictive value that the actuary attaches to a particular body of data. Credibility is increased by making groupings more homogeneous or by increasing the size of the group analyzed. A group should be large enough to be statistically reliable. Obtaining homogeneous groupings requires refinement and partitioning of the data. There is a point at which partitioning divides data into groups too small to provide credible patterns. Each situation requires balancing homogeneity and the volume of data.

The Applicant has completely explained the steps that they have taken to balance homogeneity (groups with similar characteristics) and credibility (large enough groups to be statistically reliable).

Rather than pre-determining how many ways the data should be divided, the Applicant has allowed the data to divide itself using a process known as "binning". The Applicant describes the procedure as such: "*The weather indexes at the climate division level are used to classify each year into bins (i.e. years within the bins are years with similar weather). In this binning process, the number of bins is determined by looking at the 20-year period from 1991-2010 and making sure that there are no "empty bins" (i.e. each bin category is represented in this 20-year period). Fifteen… is the initial number of bins investigated and if not all fifteen bins are represented in the latest 20-year period then 14 bins are examined (and so on). This process is continued until we find the largest number of bins where all bin categories are represented in*

the 20-year period (i.e. this process goes from 15 bins to as few as 5 bins)." This process, which includes county-level binning to replace missing data allows an optimal number of bins to be generated for each climate division.

Trends: Consideration should be given to past and prospective changes in claim costs, claim frequencies, exposures, expenses and premiums.

and

Mix of Business: Consideration should be given to distributional changes in deductibles, coverage limitations or type of risks that may affect the frequency or severity of claims.

The Applicant has made adjustments to reflect changes in data over the experience period. Crop exposure data has changed significantly over the past 28 years for the six major crops (corn, soybeans, wheat, cotton, rice, barley) with net acreage insured quadrupling in this span. A steady upward trend began in the mid 1980s, but The Federal Crop Insurance Reform Act of 1994 dramatically increased participation in the program as the Act provided for subsidies built into the new program guidelines As a result, there was in nearly a 100% increase in insured acreage the following year.   Covered acreage then declined for several years but by 2009 surpassed the 1995 level. We note that there have also been changes in the type of coverage purchased.   Originally, most of the additional acreage was only for catastrophic coverage policies. However since 1995 the Applicant notes that there has been significant migration of that acreage to buy-up coverage.

Adjustments for this type of program dislocation have been made throughout the ratemaking process by measuring the average effect of the change at a macro level and then applying an adjustment to the data prior to the change. Adjustments of this type are found in many different types of insurance unrelated to crop coverage. For example, the National Council on Compensation Insurers (NCCI) uses a similar process to account for benefit changes adopted by state legislatures. The expected effect of the benefit change is calculated, and all experience prior to the change is adjusted uniformly for the expected effect for the purposes of ratemaking.

Based on the descriptions in the report, the adjustments made by the Applicant are appropriate for use in these calculations.

Catastrophes: Consideration should be given to the impact of catastrophes on the experience and procedures should be developed to include an allowance for the catastrophe exposure in the rate.

RMA is prone to catastrophic losses, which are generally defined as losses that are quite severe and occur infrequently. It is not unusual for the losses from a single catastrophe to exceed all of the other losses for a particular crop/region over a period of many years. As such, a significant portion of crop insurance purchased and a significant portion of crop insurance losses are due to catastrophes.

The applicant has recommended a refinement to RMA's existing catastrophic loading procedure in order to reduce the influence of outliers in the experience of a county/crop program.   As currently in place, catastrophe loading is used to mitigate the effect of sampling error by removing anomalous experience from the county/crop data and still preserving normal loss experience. In general, losses deemed catastrophic are spread across all counties for a crop in a state. The effect of the procedure is to share the catastrophic losses over a larger area and reduce the need for large rate increases in a particular area following a catastrophe.   The applicant notes that "*the capping of loss experience in a county/crop program is not a load in the*

sense that it is an additional factor added to rates, but rather it redistributes loss experience within a state/crop program."

The revision suggested by the applicant would apply the procedure only when losses are above the 90th percentile (as opposed to the 80th percentile currently) and change the load from a state load to a climate division load. Excess losses would be adjusted for highly unusual weather and a cat load would be calculated based on all counties in the climate division.

The revised procedure has the benefit of spreading catastrophe losses through areas of similar climate (as defined by an independent source), which eliminates the spreading from one area of a state to an area at the other end of the state that might not be subject to the same perils.

We note that this procedure is separate from the "disaster reserve load" that is applied to all policies to provide for a reasonable reserve.

<u>Operational Changes</u>: Consideration should be given to operational changes such as changes in the underwriting process, claim handling, case reserving and marketing practices that affect the continuity of the experience.

The 1994 law change has been considered throughout this review and its effect has been adjusted for.

<u>Actuarial Judgment</u>: Informed actuarial judgments can be used effectively in ratemaking. Such judgments may be applied throughout the ratemaking process and should be documented and available for disclosure.

The Applicant has adequately documented the judgments that have been made as well as the logic behind these judgments. This is particularly noticed in the selection of data where the Applicant has listed both pros and cons for review.

Discussion of Issues Surfaced in the Review of Items Listed in C.4

The following discussion addresses each of the items listed in Section C.4 of the Review of "Methodology Analysis for Weighting of Historical Experience". We present detailed discussion regarding matters that are within the scope of our knowledge as actuarial expert reviewers. When an item lies outside the scope of our knowledge, we indicate so in its corresponding discussion. The issues are reproduced in the order listed in C.4:

1. Actuarial soundness

A. Are adequate, credible and reliable rate-making data available?

There are two sets of data required for this analysis. RMA's loss history data is presently available and would continue to be used; the Applicant has recommended that the pre-1995 data be adjusted to reflect the change in volume of data insured after that point. The major revision in required data is for the calculation of the catastrophic component. Based on our review of the application, it would appear that this weather data is also available. In fact, the Applicant notes that several sources of historical weather data are available.

This Submission relies on data from the National Climatic Data Center's Time Bias Corrected Divisional Temperature-Precipitation-Drought Index, also called the Climate Division data. The Applicant believes this set of data best meets the following criteria:
1. Provides climate information across all geographies where loss experience is observed.
2. Provides climate information at sufficiently local scales to explain local loss experience.
3. Provides the longest possible temporal record of climate events to ensure adequate analysis of the frequency of both normal and extreme climates.
4. Provides specific climate variables that provide meaningful explanation of loss experience.
5. Is operationally and routinely updated for use in future analysis and weighting.

The Applicant does note the following weaknesses in using Climate Division data:
1. Climate division boundaries are not always delineated for climate homogeneity. Especially in the mountainous terrain of the western US, the boundaries follow drainage basins and all locations within those boundaries are not likely to have very similar climate characteristics as climate changes quickly with elevation.
2. The station network used for each division calculations is not constant. Stations move, cease operation, and new ones are introduced throughout the history of the observing network. This introduces some error with any divisional calculations.
3. Accuracy of division level data prior to 1931, when regression equations are used to estimate division-level data from statewide average data that were standard during that period.

Despite these weaknesses, the Applicant believes that Climate Division data provides the best operationally available climate information for crop loss analysis. It provides

serially complete national coverage (with no missing data) at a geographic scale sufficient to characterize local climate extremes with a period of record sufficient to identify the relative frequency of climate events that may be associated with loss experience.

This climate data set can that be combined with RMA's Statplan loss experience data, along with another data set that assigns counties to particular climate divisions (NOAA NCDC) to produce the necessary ratemaking data.

Is it likely that data will continue to be available?

Yes, the weather data is updated monthly by NOAA's National Climatic Data Center. We do note the Applicant points out that stations used are not constant as stations move and cease operation while others are introduced over time.

The remaining data exists at this time.

Is the data vulnerable to tampering if the proposed rate methodology is approved?

The data does not appear to be vulnerable to tampering. However, Oliver Wyman is not an expert in data security. According to this Submission, Climate Division data are produced using more than 5,000 National Weather Service cooperative observer gauge reports. This data is compiled for other purposes at this time. The remaining data already exists.

B. **Are the explicit and implicit assumptions used in the rating process reasonable?**

The assumptions used in the implementation report are reasonable and represent a refining of the concepts developed in the technical report as well as a response to comments on the technical report that were sent to the Applicant (and provided to Oliver Wyman in the course of our review). Several major assumptions are made by, and documented, by, the Applicant.

- An adjustment is made to put data prior to 1995 on the same level as other data. This adjustment was required by the change in federal law at that time and the resulting increase in insured acreage.
- The Applicant has assumed that shorter periods are appropriate for non-catastrophe periods while much longer periods should be used for catastrophe data. This is consistent with actuarial and statistical theory as you need a longer sample period for unusual events in order to ensure that the tail of the distribution will have enough sample points to produce a reasonable result.
- The Applicant is recommending the use of net acre weighting within probabilities. Weighted averages, such as these, are frequently used in actuarial calculations as it is generally inappropriate to give equal weight to a 1-acre farm and a 10,000-acre farm.
- The Applicant also recommends a 20-year moving average of loss data. This method gives weight only to recent experience as compared to using a longer period of time.

I

C. Are the technical analyses (e.g., stochastic and other simulations) technically correct?

We believe this to be the case. The methodology involved is quite complicated and we were provided only with selected output and not with the actual model itself. As such, there are a series of calculations (likely tens of thousands) that are made for this analysis that we were not able to review nor would we have been able to examine in the time allocated for this review. This produces a phenomenon commonly known as "Black Box" where the calculations are hidden within the model.

Based on the information that we reviewed, the analyses appear to be technically correct. This opinion is based on the reasonability of output.

Do they provide credible, relevant results?

Subject to the limitations described above, we believe this to be the cases. Results were obtained using common statistical models. We also note that the Applicant elects to not use the weather data at all if the data is not considered credible.

D. Is the data used for the analyses appropriate, reliable, and the best available?

Yes, the data used for the analyses is appropriate, reliable, and the best available. The weather data contained in this Submission is from the National Climatic Data Center's Time Bias Corrected Divisional Temperature-Precipitation-Drought Index, also called the Climate Division data. The benefits and weaknesses of this data have been outlined previously.

This climate data set is combined with RMA's Statplan loss experience data (which is currently being used) along with another data set that assigns counties to particular climate divisions (NOAA NCDC).

E. Does experience from prior years and relevant crops and areas support the validity of the proposed rates?

The document is incomplete in this regard as the Applicant provides only an estimate of the change in base rates for corn and soybeans, and only for four states (Illinois, Indiana, Iowa, and Minnesota), plus a national average.

Graphs in the application note that the rates for both corn and soybeans could change by greater than +/- 75%. For corn, the largest increases are seen in Northern New England, Western Kansas, and parts of Mississippi, Utah and Montana while the areas referenced in the table show large decreases, ranging from -30.7% in Iowa to -43.8% in Minnesota. The national average is -19.1%.

For soybeans, the largest increases are seen in Western Texas and Northern Florida while the areas referenced in the table show large decreases, ranging from -23.3% in

Indiana to -43.6% in Illinois.   The national average is -25.2%.   It appears that fewer areas will see increases >+25% for soybeans than for corn.

Indications for the other crops are not provided as "corn and soybeans are a priority for implementation".

F. Are the proposed premium rates likely to cover anticipated losses and a reasonable reserve?

As noted above, the applicant is projecting decreases of 19.1% for corn base premium rates and 25.2% for soybeans. We note that the changes impact "only the yield portion of a rate and would not alter the price risk portion of a revenue insurance rate". Additionally the changes do not include the catastrophic load.

However, we can not discern from the provided materials that the resulting rates will be adequate. Given the size of the overall decrease, we believe that the only way for the resulting rates to be adequate on a countrywide basis would be for the existing rates to be deemed excessive. We have not been provided with any data that would allow us to make such a determination.

We do note that the indicated changes assumed that there would be no "restrictions on the annual magnitude of the adjustment". While we have only seen the results for corn and for soybeans, and only at a high level graphical basis, it is clear that there would be significantly large rate changes for many insureds, both positive and negative, should this program be adopted.   As such, consideration should be given to enacting these changes in phases, to allow for a more orderly implementation of the process. We note that in response to a commenter, the Applicant notes that "we do propose symmetric limits on the magnitude of rate changes"; however, we could not find evidence of this proposal in the actual implementation document.

Based on our review, the "reasonable reserve" provision has been addressed in the past with a .88 disaster reserve load. This apparently was reviewed by an actuarial firm a few years ago. While a commenter raises the possibility of eliminating this load, it is not discussed as a potential change in this document.

G. Is the actuarial method appropriate for the insured risks?

Based on our review, the actuarial method does appear to be appropriate.   However, this conclusion is drawn simply from the review of the provided materials and not from an examination of the underlying model.

2. Questions Specific to This Review

There are no additional questions specific to this review

Appendix of Supporting Materials

Oliver Wyman has no additional supporting materials or calculations.

Biographies

Eric J. Hornick, FCAS, MAAA, FCA

Eric Hornick
Principal

Oliver Wyman Actuarial Consulting
48 South Service Road
Suite 310
Melville, NY 11747

Tel   631 577 0537
Fax   212 948 1499
Cell   516 946 4794

www.oliverwyman.com

Professional History
- Principal, Oliver Wyman Actuarial Consulting (2005-present)
- Senior Vice President, Guy Carpenter (2004-2005)
- Vice President, Centre Solutions (1998-2004)
- Various positions of increasing responsibility, Insurance Services Office, Inc. (1988-1998)

Professional Memberships
- Fellow of the Casualty Actuarial Society (2003)
- Associate of the Casualty Actuarial Society (1996)
- Member, American Academy of Actuaries (1996)
- Fellow, Conference of Consulting Actuaries (2005)

Education
- Union College, Bachelor of Science, Psychology, 1986

Eric Hornick is a Principal in the Melville, NY office of Oliver Wyman Actuarial Consulting, Inc.   He specializes in all lines of property/casualty insurance, including professional liability and workers compensation. His primary responsibilities are to provide actuarial consulting services to a variety of insurance, reinsurance and self-insured organizations. He serves as lead consultant and provides risk financing guidance on actuarial assignments.

Eric Hornick has provided actuarial services for over twenty years. Prior to joining Oliver Wyman, Eric was a Senior Vice President at our sister company, Guy Carpenter, where he provided actuarial expertise in support of Carpenter's brokerage operations. He joined Guy Carpenter after spending six years at Centre Solutions and ten years at Insurance Services Office, Inc.

Eric Hornick is a Fellow of the Casualty Actuarial Society, a Member of the American Academy of Actuaries and a Fellow of the Conference of Consulting Actuaries.

Professional Experience
- Experienced with nearly every line of insurance
- Regulatory actuarial consultant for the State of Vermont
- Lead consultant on a variety of self-insured programs and captive insurance companies
- Reinsurance expertise from seven years of experience with Centre Solutions and Guy Carpenter
- Professional liability and Workers compensation reserving and forecasting – actuarial reviews of liabilities and loss forecasts for various organizations.
- Reviewed Washington State Workers Compensation retrospective rating program
- Reviewed numerous crop application for RMA
- Qualified to provide opinions for statutory annual statements.

Speaking Engagements
- Issues in Reinsurance: Risk Transfer, Attestation and Documentation - 2006
- New York Workers Compensation Reform – 2007
- Actuarial Issues and Insights – 2007
- State of Washington – Retrospective Rating   - 2009 (internal)

Professional Activities
- Past President, Casualty Actuaries of Greater New York
- Past Chairperson, CAS Regional Affiliates Committee
- Past CAS Liaison to the Conference of Consulting Actuaries
- Committee on Sponsorships and Advertising
- Member, CAS Examination Committee
- Member, International Association of Insurance Receivers
- Member, New York Self Insurers Association

Scott J. Lefkowitz, FCAS, MAAA, FCA

Scott J. Lefkowitz
Director

48 South Service Road
Suite 310
Melville, NY 11747

Tel   631 577 0548
Fax   212 948 1521
Cell   516 532 2211

www.oliverwyman.com

Professional History
- Oliver Wyman (1993-present)
- National Council on Compensation Insurance (1989-1993)
- Milliman and Robertson (1987-1989)

Professional Memberships
- Fellow of the Casualty Actuarial Society (1998)
- American Academy of Actuaries (1993)
- Fellow of the Conference of Consulting Actuaries (2001)

Education
- University of Massachusetts, Master of Science Degree in Electrical Engineering (1981)
- State University of New York, Bachelor of Science Degree in Physics (1978)

Scott J. Lefkowitz is a Director of Oliver Wyman Actuarial Consulting, Inc. and Leader of the Melville, New York office. He specializes in all lines of property/casualty insurance and is regarded as an expert in the area of workers compensation. He is currently the managing consultant for a variety of clients, including state regulatory authorities, regulators, public entities, insurance companies and industrial firms.

Scott is a Fellow of the Casualty Actuarial Society, a member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries.

Professional Experience

Scott has over twenty years of actuarial experience in the insurance and risk management industry. Prior to joining Oliver Wyman, Scott was an Actuarial Manager at the National Council on Compensation Insurance. His responsibilities included many aspects of Workers Compensation ratemaking and reserving, as well as research activities dealing with the overall Workers Compensation system. Scott was also responsible for estimating the cost impact of legislative activity and reform, assisting in the preparation of expert witness testimony for several state rate filings, and the peer review of state rate filings. Scott began his actuarial career at Milliman and Robertson where his responsibilities included preparation of rate and reserve analyses for a number of insurance coverages.

Since joining Oliver Wyman in 1993, Scott has provided a broad range of actuarial consulting services to property and casualty insurance companies, investors, brokerage firms, government entities, self-insured corporations, self-insured groups, and state insurance departments. The services provided include:

- Rate studies
- Risk retention studies
- Captive feasibility studies
- Profitability studies
- Reserve analyses
- Self-insured funding studies
- Litigation support
- Expert witness testimony.

Speaking Engagements

Scott has spoken at CAS seminars.

Professional Activities

Scott has served on a number of committees of the Casualty Actuarial Society, including the Examination Committee, the Committee on the Theory of Risk and the Syllabus Committee.

Jill A. Labbadia

Jill A. Labbadia
Actuarial Consultant

48 South Service Road
Suite 310
Melville, NY 11747

Tel   631 577 0546
Fax   212 948 1514
Cell   631 807 9805

www.oliverwyman.com

Professional History
- Mercer Human Resource Consulting (2.5 Years)
- Oliver Wyman (2003–Present)

Education
- Bryant College, Bachelor of Science degree in Actuarial Mathematics, Minor in Economics, *magna cum laude* (2001)

Jill Labbadia is an Actuarial Consultant in the Melville, NY office of Oliver Wyman Actuarial Consulting, Inc. Her primary responsibilities include providing actuarial consulting services to a variety of self-insured organizations and public entities.

Jill is actively pursuing the examinations leading to the designation Associate of the Casualty Actuarial Society.

Professional Experience

Jill Labbadia has provided actuarial consulting services for over 10 years. Prior to joining Oliver Wyman, Jill Labbadia provided actuarial consulting services for the Retirement Practice of Mercer Human Resource Consulting (Mercer HR). While with Mercer HR, she reconciled data and valued plan assets and liabilities for her clients' annual pension valuations, completed government form filings for large and small clients, produced FAS 87 expense and disclosure reports, and calculated a wide array of retirement benefits for plan participants.

Her primary responsibilities at Oliver Wyman are to provide loss reserve analyses and loss projections for self-insured risks, captive insurance companies, and public entities, involving various lines of business; and loss reserve analyses and loss reserve projections associated with prospective acquisitions.

The services provided include:

- Reserve analyses
- Rate studies
- Cash flow studies
- Self-insured funding studies

Professional Activities

Attended a 2010 Conference for the New York Association of Self Insured Counties

5
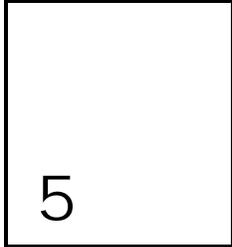
Acknowledgement

I, Eric J. Hornick, am a Principal for Oliver Wyman Actuarial Consulting Inc. I am a member of the American Academy of Actuaries, a Fellow of the Casualty Actuarial Society, and a Fellow of the Conference of Consulting Actuaries.

I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.
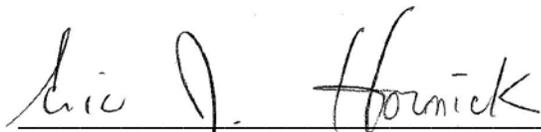
_____
Eric J. Hornick, FCAS, MAAA, FCA

OLIVER WYMAN

Consulting Actuaries
48 South Service Road, Suite 310
Melville, NY 11747
631 577-0537