Circular

RULES – FILED AND APPROVED JANUARY 14, 2019

COMMERCIAL AUTOMOBILE LI-CA-2019-003

KANSAS REVISION OF COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS FILED AND TO BE IMPLEMENTED

KEY MESSAGE

The revised increased limit factors representing a +1.1% change from the increased limit factors currently in effect are filed and acknowledged.

BACKGROUND

In circular LI-CA-2018-225, we provided you with information about the Commercial Automobile Liability increased limits experience review.

ISO ACTION

We have filed CA-2019-IALL1, which revises the increased limit factors for all Commercial Automobile Liability tables except for Zone-rated.

Refer to the attached explanatory material for complete details about the filing.

INSURANCE DEPARTMENT ACTION

The Insurance Department has acknowledged this revision as filed.

IMPORTANT NOTE

Change in Format

This circular offers several enhancements for customers. In addition to the PDF version, exhibits are now available in user-friendly Excel format rather than Word. Where possible, exhibits are linked together formulaically to clarify how calculations flow through the analysis and to enable customers to test the effects of different assumptions on the results.

To facilitate this change, the filing has been restructured. All explanatory text, for all sections of the filing, appears first; all exhibits are grouped together and appear thereafter. Exhibits have been labeled as Exhibit 1, Exhibit 2, etc., with the manual rule page exhibit labeled as Exhibit MP. Exhibits MP is provided in a separate Word file while the other exhibits are available in an Excel file. We invite customers to share feedback on this revised format and suggestions for further enhancements by contacting the individuals listed in the Contact Information block.

IMPORTANT NOTE ON RISK LOAD REFLECTION

The indicated increased limit factors in this document incorporate a procedure for reflecting the increased risk or variation in experience associated with higher limit policies in the increased limits ratemaking process. For all General Liability and Commercial Automobile Liability tables combined, this procedure generates increased limit factors that are on average 6.0% higher than the factors would be excluding any reflection of risk. The indicated Commercial Automobile increased limit factors in this state group are on average 4.8% higher than such factors would be excluding any reflection of risk.

The inclusion of risk load in increased limit factors may have implications on basic limit loss cost multipliers. Specifically, assuming industrywide averages and the ISO increased limit factors in this document, the inclusion of risk load may result in additional revenue of 4.8% for this Commercial Automobile Liability state group. All sources of revenue, including the revenue resulting from the risk load in these increased limit factors, should be kept in mind when determining loss cost multipliers.

EFFECTIVE DATE

The ISO revision is subject to the following rule of application:

These changes are applicable to all policies written on or after June 1, 2019.

COMPANY ACTION

If you have authorized us to file on your behalf and decide:

- To use our revision and effective date, you are not required to file anything with the Insurance Department.
- To use our revision with a different effective date, to use our revision with modification, or to not use our revision, you must make an appropriate submission with the Insurance Department.

For guidance on submission requirements, consult the ISO State Filing Handbook.

In all correspondence with the Insurance Department on this revision, you should refer to ISO Filing Designation Number CA-2019-IALL1, not this circular number. Communications with the regulator concerning a filing affecting multiple lines of business (i.e., CL, PL, AL filing designation) should specify the line(s) of business that you are addressing.

RATING SOFTWARE IMPACT

No new attributes are being introduced with this revision.

POLICYHOLDER NOTIFICATION

If you decide to implement this revision, you should check all applicable laws for the state(s) to which this revision applies, to determine whether or not a specific policyholder notice requirement may apply. Please note that circular LI-CL-2018-044 contains the ISO Guide To Renewals With Changed Conditions For Commercial Lines, which is available only as a guide to assist participating companies in complying with various conditional renewal statutes or regulations, for the major commercial lines of insurance serviced by ISO. The information in the Guide does not necessarily reflect all requirements or exceptions that may apply, and it is not intended as a substitute for your review of all applicable statutes and regulations concerning policyholder notification.

REVISION DISTRIBUTION

We will issue a Notice to Manualholders with an edition date of 6-19 (or the earliest possible subsequent date), along with any new and/or revised manual pages.

REFERENCE(S)

- LI-CL-2018-044 (11/27/2018) Revised Lead Time Requirements Listing
- LI-CA-2018-225 (08/31/2018) 2018 Commercial Automobile Liability Increased Limits Experience Level Indications Reviewed By Staff

ATTACHMENT(S)

Filing CA-2019-IALL1

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ACKNOWLEDGMENT OF ACTUARIAL QUALIFICATIONS

The American Academy of Actuaries' "Qualifications Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States" requires that an actuary issuing a Statement of Actuarial Opinion should include an acknowledgment with the opinion that he/she has met the qualification standards of the AAA. ISO considers this rules document a Statement of Actuarial Opinion; therefore we are including the following acknowledgment:

I, David Terné, am a Managing Director of Strategic Actuarial Operations for ISO and I, James Davidson, am an Actuarial Director for Commercial Automobile and Increased Limits for ISO. We are jointly responsible for the content of this Statement of Actuarial Opinion. We are both members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

DATA QUALITY

Statistical Plan data reported to ISO is first processed through a system of rigorous automated data verification processes so that only data that would be reliable is used. Subsequent to this initial data submission review, additional analyses involving more customized data reviews for this line were performed by staff. The ISO staff responsible for this increased limits review also reviewed the data for reasonableness and removed or corrected certain data where appropriate.

CONTACT INFORMATION

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Callers outside the United States, Canada, and the Caribbean may contact us using our global toll-free number (International Access Code + 800 48977489). For information on all ISO products, visit us at www.verisk.com/iso. To keep abreast of the latest Insurance Lines Services updates, view www.verisk.com/ils.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

EXECUTIVE SUMMARY

PURPOSE

This document:

- revises increased limit factors for all Commercial Automobile Liability tables except Zone-rated. These increased limit factors represent a 1.1% change from the increased limit factors currently in effect.
- provides the analyses used to derive these increased limit factors.

DEFINITION OF INCREASED LIMIT FACTORS

We publish liability loss costs at the basic limit. The basic limit for Commercial Automobile Liability is $100,000 per occurrence. The loss cost for a given policy limit is the product of the basic limit loss cost and the increased limit factor for that policy limit.

An increased limit factor is the ratio of two sums. The numerator is the cost to the insurer of writing a policy at the desired limit, including the average prospective indemnity, all loss adjustment expense and the risk load. The denominator is the sum of the same quantities at the basic limit. The average prospective indemnity reflects a per occurrence limit.

INCREASED LIMITS TABLES

We group classifications with similar increased limits experience into increased limits tables. For Commercial Automobile Liability, the tables are: (1) Light and Medium Trucks, (2) Heavy Trucks and Truck-Tractors, (3) Extra Heavy Trucks and Truck-Tractors, (4) Zone-rated Trucks, Truck-Tractors and Trailers, and (5) All Other Risks.

INCREASED LIMIT FACTOR CHANGES

The statewide increased limit factor changes are:

Table	Indicated Percent Change	Selected Percent Change
Light and Medium	0.5%	0.5%
Heavy	3.1%	3.1%
Extra Heavy	5.9%	5.9%
Zone-rated	-2.6%	0.0%
All Other	-0.5%	-0.5%
TOTAL	1.1%	1.1%

INDICATED VERSUS SELECTED

Indicated changes are based on standard ISO methodology. As stated above, we are not revising the current Zone-rated factors implemented in our prior filing. Otherwise, for each Commercial Automobile Liability table, the selected changes are the indicated changes.

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EXECUTIVE SUMMARY

PRIOR ISO REVISION

The most recent Commercial Automobile Liability increased limit factor revision is:

Filing CA-2017-IALL1

Date Implemented 6/1/2018

Changes

Indicated	6.3%
Selected	6.3%
Implemented	6.3%

RISK LOAD PROCEDURE

The indicated increased limit factors in this document incorporate a procedure for reflecting the increased risk or variation in experience associated with higher limit policies in the increased limits ratemaking process. For all General Liability and Commercial Automobile Liability tables combined, this procedure generates increased limit factors that are on average 6.0% higher than the factors would be excluding any reflection of risk. The indicated Commercial Automobile increased limit factors in this state group are on average 4.8% higher than such factors would be excluding any reflection of risk.

HISTORICAL SOURCE DATA

For this document, we use the following data:

- Commercial Automobile Liability increased limits data by state group. This state is part of State Group 2, which includes Arizona, Connecticut, Delaware, Idaho, Indiana, Iowa, Kansas, Nebraska, Tennessee, Washington and Wisconsin. We use multistate experience for certain calculations (including the determination of Zone-rated increased limit factors).
- Experience for accident dates between July 1, 2009 and June 30, 2017, and average payment dates between July 1, 2012 and June 30, 2017
- Experience for risks subject to Commercial Automobile Liability increased limits tables as reported to ISO under the Commercial Statistical Plan (CSP) - Full and Intermediate Levels and the Commercial Minimum Statistical Plan (CMSP) - Intermediate Level
- Umbrella and excess experience for risks reported in the ISO Annual Call for Excess and Umbrella Policy Claims and risks reported to ISO under the CSP - Full and Intermediate Levels and CMSP - Intermediate Level (supplements primary data for pricing higher policy limits)
- State group basic limit loss weights for the calculation of overall and by-table indicated changes

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EXECUTIVE SUMMARY

EFFECT ON MANUAL PAGES	Upon implementation of this filing, we will publish a revised manual page containing the filed Commercial Automobile Liability increased limit factors in Division One of the Commercial Lines Manual. The revised factors will appear in Rule 100 as Table 100.B.
CHANGE IN FORMAT	In this filing, all explanatory material appears first, followed by all exhibits. Explanatory pages are numbered B-1 through B-21, while exhibits are labeled Exhibit 1 through Exhibit 13 and a manual page reproduction is provided in Exhibit MP.
COMPANY DECISION	We encourage each insurer to decide independently whether the judgments made and the procedures or data used by ISO in developing increased limit factors are appropriate. We have included within this document the information upon which ISO relied in order to enable companies to make such independent judgments. The data underlying the enclosed material comes from all companies reporting to ISO. Therefore, the ISO statistical database is much bigger than any individual company's. A broader database enhances the validity of the ratemaking analysis. At the same time, an individual company may benefit from a comparison of its own experience to the aggregate ISO experience and may reach valid conclusions with respect to the manner in which its own costs can be expected to differ from ISO's projections based on the aggregate data. Some calculations included in this document involve areas of ISO staff judgment. Each company should carefully review and evaluate its own experience in order to determine whether the increased limit factors developed by ISO are appropriate for its use. This material has been developed exclusively by the staff of ISO.

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SCOPE OF REVISION

SUMMARY OF INCREASED LIMIT FACTOR CHANGES	**Exhibit 1** (*Summary of Increased Limit Factor Changes*) provides a summary of the current, indicated and selected increased limit factors for Light and Medium Trucks, Heavy Trucks and Truck-Tractors, Extra Heavy Trucks and Truck-Tractors, Zone-rated Risks and All Other Risks, as well as the overall statewide average indicated and filed changes for Commercial Automobile Liability combined.
SUMMARY OF REVISED INCREASED LIMIT FACTORS	**Exhibit MP** (*Manual Page*) displays the revised Commercial Automobile Liability increased limit factors as they will appear in the Commercial Lines Manual. The increased limit factors shown are the ratio of the sum of indemnity, allocated loss adjustment expense, unallocated loss adjustment expense and risk load at each specific limit to the same sum evaluated at the basic limit ($100,000). Therefore, the factor listed for the basic limit is 1.00.

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COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

SUPPORTING MATERIAL

OVERVIEW OF INCREASED LIMIT FACTOR CALCULATIONS

This overview describes the methods we use to calculate increased limit factors. ISO defines an increased limit factor (ILF) as the ratio of the expected cost (to the insurer) of a higher limit policy divided by the expected cost of a basic limit ($100,000) policy. The cost components of the increased limit factor calculation are:

- Limited Average Severity (LAS)

  The average indemnity per occurrence, limited to a given policy limit, at ultimate settlement value, and reflecting trend to the average accident date in the prospective experience period.

  In this document, we use the term "indemnity" to mean the amount paid to the claimant (excluding all loss adjustment expense). Indemnity is subject to policy limits. We construct an occurrence-size distribution that describes the indemnity before the effect of policy limits. By using this distribution, we can calculate expected future indemnity for any given policy limit.

- Allocated Loss Adjustment Expense (ALAE)

  The average claim settlement expense per occurrence for those expenses in the settlement process that can be assigned to an individual claim. The largest component of ALAE is legal defense costs.

- Unallocated Loss Adjustment Expense (ULAE)

  The average claim settlement expense per occurrence for those expenses in the settlement process that cannot be assigned to an individual claim (e.g., the salaries of claims adjusters).

- Risk Load (RL)

  A loading that varies by policy limit and reflects the greater risk of issuing higher limit policies, with the fundamental purpose of making each policy limit being written equally attractive to insurers. The ISO risk load model accomplishes this by offsetting the greater risk associated with higher limit policies with an appropriate risk load provision that increases as the policy limit increases. The procedure recognizes two kinds of risk:

  Process Risk - the inherent variability of the insurance process, reflected in the difference between actual losses and expected losses.

  Parameter Risk - the inherent variability of the estimation process, reflected in the difference between theoretical (true but unknown) expected losses and the estimated expected losses.

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SUPPORTING MATERIAL

INTRODUCTION (continued)

The ISO increased limit factor is the ratio of these costs at a specified limit divided by the corresponding costs at the basic limit. Given a basic limit *b*, the factor at occurrence policy limit *PL* is as follows:

$$ILF(PL) = \left[\frac{LAS(PL) + ALAE(PL) + ULAE(PL) + RL(PL)}{LAS(b) + ALAE(b) + ULAE(b) + RL(b)}\right]$$

Exhibits 2 through **6** (*Calculation of Increased Limit Factors*) show the indicated and selected increased limit factors for each increased limits table from ISO's 2018 Commercial Automobile Liability increased limits review. Also shown are the underlying components of the calculation by limit. An overview of these four components of the increased limit factor calculation follows.

USE OF STATE GROUP DATA

We calculate increased limit factors on a state group basis. This state is part of State Group 2, which includes Arizona, Connecticut, Delaware, Idaho, Indiana, Iowa, Kansas, Nebraska, Tennessee, Washington and Wisconsin.

As in the past, we determine indicated increased limit factors for Zone-rated Risks on a multistate basis, since those risks by their nature can lead to claims in any state. However, we use state group basic limit loss weights in calculating indicated Zone-rated percent changes compared to current factors, as with the other tables.

We use multistate data in making our severity trend and unallocated loss adjustment expense factor selections.

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SUPPORTING MATERIAL

DATA FOR INDEMNITY ANALYSIS

The limited average severity in this increased limits review is modeled using loss data reported to ISO under the Commercial Statistical Plan (CSP) - Full and Intermediate Levels and the Commercial Minimum Statistical Plan (CMSP) - Intermediate Level. We also include excss and umbrella data reported from the ISO Annual Call for Excess and Umbrella Policy Claims, the CSP - Full and Intermediate Levels and CMSP - Intermediate Level. This data enhances the credibility of our ILFs in the highest layers of loss that we calculated.

The data includes paid (settled) occurrences on occurrence coverage policies with accident dates between July 1, 2009 and June 30, 2017, and “average payment dates” between July 1, 2012 and June 30, 2017. The data is evaluated as of September 30, 2017.

We consider an occurrence to be settled if it has no outstanding reserve. If there are multiple payments, we consider the payment date to be the dollar-weighted average of the dates of the individual payments.

We use “payment lag” or “lag” to measure the amount of time between the accident and the payments made towards the loss settlement. A lag of 1 indicates that the average payment date is in the same accident year as the accident. A lag of 2 indicates that the average payment date falls in the following year, and so on.

For each occurrence, we determine the increased limits table, accident year, payment lag, indemnity amount, policy limit and any applicable attachment point.

COMPOSITE-RATED RISKS

Insurers report composite-rated risk (CRR) data to ISO without detailed class information. This means we cannot use class to assign CRR data to a specific table. However, a significant portion of our data is composite-rated; for this reason, and to enhance credibility, we include CRR data in our calculations of increased limit factors. Using the accident year, payment lag and indemnity amount of a given CRR occurrence, we can make a Bayesian estimate of the probability it belongs in each table based on its known characteristics.

We include CRR data in the analysis by assigning part of each such occurrence to the various tables using this Bayesian analysis. Thus, we might consider a single $100,000 occurrence from a composite-rated risk to be really 1/3 of a “Light and Medium” occurrence, 1/2 of a “Heavy” occurrence, and 1/6 of an “All Other” occurrence. In each case, the amount of the (fractional) occurrence would remain $100,000.

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EXCESS AND UMBRELLA DATA

As stated, we include umbrella and excess data from the CSP, CMSP and the ISO Annual Call for Excess and Umbrella Policy Claims. This data enhances the credibility of our increased limit factors but does not affect the lowest layers of the loss distribution.

These excess and umbrella policies have attachment points that exclude smaller losses much the same way as a large deductible would. While we can reconstruct the full size of loss for those occurrences greater than the attachment point of their policy, occurrences below the attachment point are not reported.

When we construct the empirical survival distribution, we exclude occurrences where the attachment points do not meet certain criteria, to avoid bias. We describe this in more detail later in this document. Also, because excess and umbrella data is not reported in class detail, we allocate the data to each table using the same Bayesian procedure that we apply for CRR data.

MIXED EXPONENTIAL MODEL

For each table, we fit a continuous distribution to the lag-weighted occurrence size distribution from the data. The resulting distribution produces the limited average severity component of the increased limit factor.

Using a continuous distribution (such as the mixed exponential) offers several advantages over using a purely empirical fit, including:

- calculation of LAS for all possible limits,
- smoothing of data,
- simplified handling of trend, and
- calculation of higher moments used in risk load.

The fitting procedure uses a mixture of exponential distributions to model indemnity. ISO found that the mixed exponential distribution is flexible and simple to use and provides a good fit to empirical data over a wide range of loss sizes.

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OVERVIEW OF MIXED EXPONENTIAL PROCESS

The major steps in the calculation of the limited average severities of the indemnity are:

1. Trend
Trending the indemnity amount of each occurrence to reflect the expected conditions during the period when the increased limit factors are assumed to be in effect.

2. Construction of the Empirical Survival Distributions
Using the trended data to calculate the empirical survival distributions by payment lag for each table.

3. Payment Lag Process
Combining the empirical distributions for each payment lag to produce an overall empirical survival distribution for each table.

4. Tail of the Distribution
Smoothing the tail of the lag-weighted empirical survival distribution for each table.

5. Fitting a Mixed Exponential Distribution
Fitting a mixed exponential curve to the overall empirical survival distribution for each table.

6. Final Limited Average Severities
Using the fitted mixed exponential distribution to generate limited average severities.

INDEMNITY SEVERITY TREND

For a given payment lag, we expect severity to increase by the inflation rate from accident year to accident year.

If annual inflation is 4.0%, an injury that cost $100,000 in 2017 would cost 1.04 x $100,000 in 2018. The probability of that injury stays the same – only the nominal value of it changes.

To bring different accident years to the same level, we project each occurrence from the average date of its accident year to April 1, 2020, one year beyond an assumed effective date of April 1, 2019 (date assumed for trending purposes). In this filing, we select an annual trend of +5.0% for each table. Our selection is based on a review of multistate Commercial Automobile Liability paid trend indications shown in **Exhibit 7** (*Trend Selection*).

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SUPPORTING MATERIAL

CONSTRUCTION OF THE EMPIRICAL SURVIVAL DISTRIBUTIONS

The construction of the empirical survival distributions is based on the Product-Limit Estimator described in Loss Models: From Data to Decisions[1]. First, paid (settled) occurrences are organized by accident year and payment lag and trended to the average accident date for which the loss distribution is desired.

Payment lags five and beyond generally have similar loss sizes and are combined to increase credibility. Other lags are handled individually. We further define payment lag and explain the reasons for its use later in this section.

Next, a survival distribution is constructed for each payment lag using discrete loss size layers. The probability that an occurrence exceeds the upper bound of a discrete layer given that it exceeds the lower bound of the layer is known as the conditional survival probability (CSP). The ground-up survival distribution is generated by multiplying the successive CSPs of the discrete layers.

This procedure allows for the easy inclusion of censored losses as well as excess and umbrella data. Two conditions must be met for an occurrence to be used in the calculation of the conditional survival probability in a layer of loss. These conditions are:

- The policy limit (plus attachment point) must be greater than or equal to the upper bound of the layer of loss. This avoids a downward severity bias by excluding losses that are precluded by their policy limit from penetrating the upper bound of a layer of loss.

- Only those occurrences with attachment points less than or equal to the lower bound of the layer of loss are included. This condition is necessary to avoid an upward severity bias since loss information below the attachment point is unknown.

ILLUSTRATION

An illustration should aid in the conceptual understanding of this construction.

Assume we have twelve occurrences, all for a single payment lag. We will calculate the empirical survival probabilities for three layers using combinations of conditional survival probabilities. The three layers used are \$10,000, \$20,000, and \$40,000. (In practice we begin with layers as small as \$10, but larger layers better illustrate the handling of excess data and policy limits.) The following two pages display sample calculations for these three layers. This example illustrates the treatment of excess data with attachment points.

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[1] Klugman, S. A., H. H. Panjer, and G. E. Willmot, *Loss Models: From Data to Decisions*, John Wiley and Sons, New York, 2004

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SUPPORTING MATERIAL

Illustrative Data (Trended) for one Payment Lag

Occurrence ID Number	Occurrence Size	Attachment Point	Policy Limit	Comment
1	5,000	0	15,000	
2	5,000	0	15,000	
3	15,000	0	15,000	Censored Data
4	5,000	7,500	15,000	Excess Data
5	5,000	0	30,000	
6	15,000	0	30,000	
7	25,000	0	30,000	
8	10,000	15,000	30,000	Excess Data
9	15,000	0	100,000	
10	25,000	0	100,000	
11	30,000	0	100,000	
12	50,000	15,000	100,000	Excess Data

Where attachment point is non-zero, we define policy limit as the maximum payment.

Conditional Survival Probabilities

	Condition:
CSP_{e1} (10,000 $\vert$ 0) = P(X ≥ 10,000 $\vert$ X > 0)	PL + AP ≥ 10,000 AP = 0
CSP_{e1} (20,000 $\vert$ 10,000) = P(X ≥ 20,000 $\vert$ X > 10,000)	PL + AP ≥ 20,000 AP ≤ 10,000
CSP_{e1} (40,000 $\vert$ 20,000) P(X ≥ 40,000 $\vert$ X > 20,000)	PL + AP ≥ 40,000 AP ≤ 20,000

where AP = attachment point, PL = policy limit, X= loss size, e_1 = empirical lag 1

Calculation of Conditional Survival Probability at $10,000

CSP_{e1} (10,000 | 0) = P(X ≥ 10,000 | X > 0) = number of occurrences with:
occurrence size + AP ≥ 10,000,
policy limit + AP ≥ 10,000, and AP = 0
number of occurrences with:
occurrence size + AP ≥ 0,
policy limit + AP ≥ 10,000, and AP = 0

= 6 (occurrences 3, 6, 7, 9, 10, 11)
9 (occurrences 1, 2, 3, 5, 6, 7, 9, 10, 11)

Only occurrences with policy limit plus attachment point greater than or equal to 10,000 are used. Only occurrences with attachment point equal to zero are used.

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Calculation of Conditional Survival Probability at $20,000

$$CSP_{e1}(20{,}000 \mid 10{,}000) = P(X \ge 20{,}000 \mid X > 10{,}000) = \frac{\text{number of occurrences with: occurrence size + AP} \ge 20{,}000\text{, policy limit + AP} \ge 20{,}000\text{, and AP} \le 10{,}000}{\text{number of occurrences with: occurrence size + AP} \ge 10{,}000\text{, policy limit + AP} \ge 20{,}000\text{, and AP} \le 10{,}000}$$

$$= \frac{3 \text{ (occurrences 7, 10, 11)}}{6 \text{ (occurrences 4, 6, 7, 9, 10, 11)}}$$

Only occurrences with policy limit plus attachment point greater than or equal to 20,000 are used. Only occurrences with attachment point less than or equal to 10,000 are used.

Calculation of Conditional Survival Probability at $40,000

$$CSP_{e1}(40{,}000 \mid 20{,}000) = P(X \ge 40{,}000 \mid X > 20{,}000) = \frac{\text{number of occurrences with: occurrence size + AP} \ge 40{,}000\text{, policy limit + AP} \ge 40{,}000\text{, and AP} \le 20{,}000}{\text{number of occurrences with: occurrence size + AP} \ge 20{,}000\text{, policy limit + AP} \ge 40{,}000\text{, and AP} \le 20{,}000}$$

$$= \frac{1 \text{ (occurrence 12)}}{4 \text{ (occurrences 8, 10, 11, 12)}}$$

Only occurrences with policy limit plus attachment point greater than or equal to 40,000 are used. Only occurrences with attachment point less than or equal to 20,000 are used.

Calculation of Empirical Survival Distribution

The CSPs generate the following empirical survival probabilities:

$$\begin{aligned} S_{e1}(10{,}000) &= P(X \ge 10{,}000) = CSP_{e1}(10{,}000 \mid 0) = P(X \ge 10{,}000 \mid X > 0) \\ &= 6/9 \end{aligned}$$

$$\begin{aligned} S_{e1}(20{,}000) &= P(X \ge 20{,}000) = CSP_{e1}(10{,}000 \mid 0) * CSP_{e1}(20{,}000 \mid 10{,}000) \\ &= P(X \ge 10{,}000 \mid X > 0) * P(X \ge 20{,}000 \mid X > 10{,}000) \\ &= 6/9 * 3/6 = 1/3 \end{aligned}$$

$$\begin{aligned} S_{e1}(40{,}000) &= P(X \ge 40{,}000) = CSP_{e1}(10{,}000 \mid 0) * CSP_{e1}(20{,}000 \mid 10{,}000) * CSP_{e1}(40{,}000 \mid 20{,}000) \\ &= P(X \ge 10{,}000 \mid X > 0) * P(X \ge 20{,}000 \mid X > 10{,}000) * P(X \ge 40{,}000 \mid X > 20{,}000) \\ &= 6/9 * 3/6 * 1/4 = 1/12 \end{aligned}$$

In practice, to generate the trended empirical loss distribution for each lag, we use sixty-eight discrete loss size layers to allow for a more refined selection of the tail-smoothing parameters, discussed in the Tail of the Distribution section.

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SUPPORTING MATERIAL

PAYMENT LAG PROCESS

Development for paid (settled) data has two aspects. One aspect is that many occurrences are paid within a short period of time after the accident occurs with a small number taking longer – sometimes much longer – to be paid. The second aspect is the tendency of larger occurrences to take longer to be paid.

To properly model an accident year at ultimate, we must include each payment lag with its appropriate weight. We do this by:

- accounting for the rate of payment using the probability-of-payment-lag model, and
- constructing severity distributions by payment lag.

A lag-weighting procedure combines the by-lag empirical loss distributions to generate an overall distribution. This procedure implicitly accounts for development, as all possible payment lags are represented and given weight at the prospective average accident date. We refer to the distribution of the overall survival probabilities by size of loss as the "empirical survival distribution function (SDF)".

PAYMENT LAG

Payment lag is the length of time between the date that an accident occurs and the date that the associated indemnity is paid. In the mixed exponential model, the average payment date is the dollar-weighted average of indemnity payments. ISO calculates payment lag based on the year in which an accident occurs and the year in which the occurrence is paid:

$$\text{Payment Lag} = (\text{Payment Year} - \text{Accident Year}) + 1$$

Payment lag can vary considerably by line of business and by type of claim. While most property claims are paid quickly, liability claims generally take longer to settle, particularly those involving protracted litigation. Among liability claims, there is considerable variation in payment lag.

DIFFERENCES IN LOSS SIZE BY PAYMENT LAG

Loss experience generally shows that the average loss size tends to increase with development age. For example, the average loss size for occurrences paid in lag 4 will tend to be considerably higher than the average loss size for those paid in lag 1.

The Mixed Exponential Methodology reflects this by fitting (the continuous mixed exponential distribution) to a lag-weighted empirical survival distribution. We do not directly fit to the severity distributions of individual lags.

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PAYMENT LAG DISTRIBUTION

The payment lag distribution is modeled to avoid distortions that may otherwise result from:

- differing exposure amounts by accident year,
- an asymmetrical experience period with fewer than five accident years for lags five through eight, and
- a finite number of lags (no data for lags beyond eight).

The lag-weighting procedure implicitly accounts for ultimate development, as all possible payment lags are represented and given weight at the prospective average accident date.

The payment lag model uses three parameters (R1, R2 and R3) to generate the weights given to the severity distribution associated with each payment lag. The parameters are represented as follows:

$$R1 = \frac{\text{expected percentage of claims/occurrences paid in lag 2}}{\text{expected percentage of claims/occurrences paid in lag 1}}$$

$$\mathrm{R2} = \frac{\text{expected percentage of claims/occurrences paid in lag 3}}{\text{expected percentage of claims/occurrences paid in lag 2}}$$

$$\mathrm{R3} = \frac{\text{expected percentage of claims/occurrences paid in lag (n + 1)}}{\text{expected percentage of claims/occurrences paid in lag (n)}}, \text{all } \mathrm{n} \geq 3$$

The weights for each lag are then determined as follows:

$$\text{lag 1 weight} = \frac{1}{\mathrm{k}}, \text{where } \mathrm{k} = \left(1 + \mathrm{R1} + \frac{\mathrm{R1} \times \mathrm{R2}}{1 - \mathrm{R3}}\right)$$

$$\text{lag 2 weight} = \frac{\mathrm{R1}}{\mathrm{k}}$$

$$\text{lag 3 weight} = \frac{\mathrm{R1} \times \mathrm{R2}}{\mathrm{k}}$$

$$\text{lag 4 weight} = \frac{\mathrm{R1} \times \mathrm{R2} \times \mathrm{R3}}{\mathrm{k}}$$

$$\text{lag 5 weight} = \frac{\mathrm{R1} \times \mathrm{R2} \times \left(\frac{\mathrm{R3}^2}{1 - \mathrm{R3}}\right)}{\mathrm{k}}$$

Note that the lag 5 weight includes lag 5 and all subsequent lags.

The lag weights represent the percentage of ground-up occurrences in each lag. Therefore, occurrences from umbrella or excess policies with non-zero attachment points are not included.

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METHOD OF ESTIMATION: PAYMENT LAG PARAMETERS

For stability, we calculate the payment lag parameters (R1, R2 and R3) via maximum likelihood. A non-CRR occurrence with accident year *a* and payment lag *l* is reflected in the likelihood function by the probability that the lag equals *l* given that the accident year equals *a*. This conditional probability can be easily expressed in terms of the payment lag parameters.

For a CRR occurrence, the probability that the loss comes from a given table is computed by the procedure described later in the Bayesian-related section. Each CRR occurrence generates several probabilities, one for each table. These probabilities are treated as fractional occurrences in the likelihood function.

Exhibit 8 *(Payment Lag Parameters and Lag Weights)* shows the resulting values of these parameters.

TAIL OF THE DISTRIBUTION

For the higher limits of liability, the empirical data is sparse. To account for this, and to limit random fluctuations between consecutive reviews in the higher limits, a procedure is used to adjust the tail of the empirical SDF.

We select a table-specific truncation point ($900,000 for Light and Medium Trucks, $700,000 for Heavy Trucks and Truck-Tractors, $900,000 for Extra Heavy Trucks and Truck-Tractors, $700,000 for Zone-rated Risks, and $1,000,000 for All Other Risks) above which the empirical SDF can be relatively less stable. Then we select a parametric curve family that successfully models the behavior of the empirical distribution in the layers around the truncation point. During this process, we examine which curve parameters would minimize the overall severity difference between the empirical and adjusted distributions.

We use the resulting curves to extrapolate the empirical distribution above the selected truncation points. The empirical distribution eblow the lower truncation point is unaffected by the procedure.

Essentially, this procedure smoothes the tail of the empirical distribution by extending relationships from the highest credible limits (those limits around the lower truncation point) to those limits above the lower truncation point. We then fit a mixed exponential distribution to the resulting SDF for each increased limits table.

FITTING A MIXED EXPONENTIAL DISTRIBUTION

ISO models the lag-weighted empirical survival distribution function for each table with the best-fitting mixed exponential distribution. The lag-weighted SDFs reflect smoothing. The resulting mixed exponential distribution produces the limited average severity component of the increased limit factor.

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THE SIMPLE EXPONENTIAL DISTRIBUTION

To understand the mixed exponential distribution, first consider the simple exponential distribution. The simple exponential is a one-parameter distribution. The formulas for the survival distribution function SDF(x) and the limited average severity (LAS) at a given policy limit (PL) for an exponential distribution with mean parameter μ are given by:

$$\mathrm{SDF}(x) = e^{-\left(\frac{x}{\mu}\right)} = 1 - \mathrm{CDF}(x)$$

$$\mathrm{LAS}(PL) = \mu\left[1 - e^{-\left(\frac{PL}{\mu}\right)}\right]$$

THE MIXED EXPONENTIAL DISTRIBUTION

The mixed exponential distribution is a weighted average of exponential distributions. Each exponential distribution has two parameters, a mean μ_i and a weight w_i. Since the SDF at zero is unity, the weights will sum to 1.000000.

The formulas for the survival distribution function and limited average severity for the mixed exponential distribution are the weighted averages of the respective single exponential formulas:

$$\mathrm{SDF}(x) = \sum_i \left[w_i e^{-\left(\frac{x}{\mu_i}\right)}\right]$$

$$\mathrm{LAS}(PL) = \sum_i w_i \mu_i \left[1 - e^{-\left(\frac{PL}{\mu_i}\right)}\right]$$

ISO found that the mixed exponential distribution is flexible and simple to use and provides a good fit to empirical data over a wide range of loss sizes. In fact, any distribution whose probability density function (pdf) has alternating derivatives,

$$\begin{aligned} \mathrm{pdf}(x) &> 0, \\ d\,\mathrm{pdf}(x)/dx &< 0, \\ d^2\,\mathrm{pdf}(x)/dx^2 &> 0, \\ d^3\,\mathrm{pdf}(x)/dx^3 &< 0, \text{ etc., for all } x > 0, \end{aligned}$$

can be constructed as a mixture of exponentials with positive means and weights. Such distributions (including the mixed Pareto, if it has a finite mean) can be thought of as special cases of the mixed exponential distribution.

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THE MIXED EXPONENTIAL DISTRIBUTION SEVERITY PARAMETERS

ISO estimates the mixed exponential distribution parameters using minimum distance estimation. We compare the model SDF to the empirical SDF at each discrete loss size layer resulting from the construction.

We seek a mixed exponential distribution that minimizes the weighted sum of the square of the differences of these survival probabilities (model minus empirical) taken at each loss size layer. This procedure is known as the “minimum distance” method.

The number of exponential distributions needed to produce an optimal fit to the empirical SDF may vary by table and can be as large as necessary.

To extend our mixed exponential fitting procedure into higher layers (above $10 million), we allow means up to $100 million, to follow the smoothed empirical distribution in layers above $10 million more closely. Allowing means up to $100 million will tend to increase the number of means (and weights) for the fitted distribution in a given table, while having minimal effect on limits up to $10 million, the highest limit for which we publish increased limit factor information.

Exhibit 9 (*Mixed Exponential Parameters*) displays the mixed exponential parameters (means and weights) for each increased limits table.

MAY NOT BE APPLICABLE FOR ALL POLICY LIMITS

ISO’s standard increased limits tables (shown in **Exhibits 2** through **6**) provide increased limit factors up to the $10,000,000 per occurrence policy limit. **We encourage the use of supplemental sources of information for analysis of layers above $10,000,000.**

FINAL LIMITED AVERAGE SEVERITIES

ISO calculates the limited average severities using the fitted mixed exponential distributions for each table. The Mixed Exponential Distribution section gives the formula for the limited average severity of a mixed exponential distribution. **Exhibit 9** (*Mixed Exponential Parameters*) shows the severity parameters used in this formula for each increased limits table.

Exhibit 10 (*Comparison of Limited Average Severities*) compares the fitted limited average severities to the empirical limited average severities. The empirical limited average severities are constructed in a manner analogous to the empirical survival distributions. The same conditions and assumptions are used in combination with actual trended loss amounts in each layer.

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BAYESIAN ANALYSIS

As stated, we utilize a Bayesian approach to allocate CRR, excess and umbrella occurrences to each increased limits table. For each payment lag, the Bayesian analysis is as follows:

$$\mathrm{P(Table|Indemnity)} = \frac{\mathrm{P(Indemnity|Table)} \times \mathrm{P(Table)}}{\sum \mathrm{P(Indemnity|Table)} \times \mathrm{P(Table)}}$$

The sum in the denominator is over all tables.

Here P(Table | Indemnity) is the conditional probability (within the payment lag) that an occurrence comes from the specified table, given the indemnity amount.

P(Table) is the marginal probability (within the payment lag) that an occurrence comes from the specified table.

Clearly, the table probabilities sum to one:

$$\sum \mathrm{P(Table \mid Indemnity)} = 1;$$

that is, 100% of each occurrence is allocated.

We estimate P(Table) as the ratio of two sums:

$$\mathrm{P(Table)} = \frac{\text{\# of occurrences with known table in this table}}{\text{\# of occurrences with known table in all tables}}$$

Here we restrict both the numerator and denominator to the payment lag under consideration.

BAYESIAN ALLOCATION AND EMPIRICAL SURVIVAL DISTRIBUTIONS

For an occurrence with unknown table not censored by policy limits, we use:

$$\mathrm{P(Indemnity \mid Table) = f(Indemnity\ Layer)},$$

where f(Indemnity Layer) is the empirical probability of an occurrence being in the indemnity layer. This empirical probability is the difference of the empirical SDF (for the table-payment lag combination) between the top and the bottom of the layer.

For an occurrence with unknown table censored by policy limits, we use:

$$\mathrm{P(Indemnity \mid Table) = SDF(Indemnity\ Layer)},$$

where SDF(Indemnity Layer) is the empirical SDF evaluated at the bottom of a layer, for the table-payment lag combination.

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ALLOCATED DATA IN PROBABILITY-OF-PAYMENT-LAG MODEL

We allocate CRR data to tables within an accident year and payment lag using the Bayesian analysis described in the previous section. We then have revised occurrence counts by accident year, payment lag and table. These counts include fractional occurrences from the CRR data. These counts are the raw data for our probability-of-payment-lag model.

We do not include excess and umbrella data in the probability-of-payment-lag model. This avoids bias from not including unreported occurrences smaller than the policy attachment points.

ALLOCATED LOSS ADJUSTMENT EXPENSE

The standard liability policy contains a policy limit which represents the maximum amount an insurer will pay for any loss for which the insured is liable. However, the limit does not apply to the loss adjustment expenses. For this reason, we estimate allocated loss adjustment expense (ALAE) per occurrence as a single amount that does not vary by policy limit.

For each table, we estimate ALAE per occurrence as the product of two numbers. The first number is the ratio of paid ALAE to paid total limits (all limits combined) indemnity. The second number is the average (across all policy limits) limited average severity calculated from the mixed exponential model.

To calculate the ALAE per occurrence, we first determine the ratio of dollars of ALAE to dollars of total limits indemnity for the seven next-to-latest available fiscal accident years. (The latest accident year is excluded from the calculation because its development is less stable.) We develop these ratios to ultimate maturity. To enhance stability, we employ a best 5-of-7 criterion and eliminate the lowest and highest ultimate ratios. We then average the remaining five ratios.

We employ an incremental development procedure to determine the ALAE to total limits indemnity loss ratio for each table. The procedure uses a triangle of incremental ALAE emergence (at each evaluation) as a percentage of ultimate total limits indemnity losses to determine additive incremental ALAE emergence ratios. Specifically, we calculate "incremental ALAE percentages" as the emergence of ALAE between two evaluation points, divided by ultimate paid indemnity losses. For example, we express the difference between historic ALAE evaluated at 27 months and ALAE evaluated at 15 months as a percentage of ultimate incurred indemnity losses. We determine similar percentages for the 27-to-39 month period, the 39-to-51 month period, etc. We then sum these percentages, finally combining them with the ratios from the most recent diagonals to determine the ratios of ALAE to total limits indemnity at ultimate.

The fitted total limits average severity for each table is a weighted-average of the limited average severities at the different policy limits. The weights are based on the number of occurrences from the second, third and fourth latest fiscal accident years.

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ALLOCATED LOSS ADJUSTMENT EXPENSE (Continued)

For each table, the multi-year average ALAE to total limits indemnity ratio is then multiplied by the final fitted total limits average severity to calculate the ALAE per occurrence provision used in computing the increased limit factors. The total limits average severity reflects trend to the average prospective accident date. This effectively contemplates trend in ALAE in a more stable manner than relying on a separate trend analysis of ALAE.

Exhibit 11 (*Calculation of Allocated Loss Adjustment Expense Per Occurrence*) shows the calculation of the allocated loss adjustment expense component for each table.

UNALLOCATED LOSS ADJUSTMENT EXPENSE

We calculate the unallocated loss adjustment expense at each limit of liability as a percentage of the sum of the limited average severity and the ALAE at that liability limit. For this filing, we select a ULAE load of 8.75% based on a five-year average of multistate financial data reported to ISO.

Exhibit 12 (*Development of Unallocated Loss Adjustment Expense Factor*) shows the derivation of this factor.

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RISK LOAD

Our increased limits methodology incorporates a procedure to reflect the relatively higher risk or variation in experience associated with higher limit policies. The model that we use, the Competitive Market Equilibrium Risk Load Model,[2] assumes that the insurance marketplace is competitive and efficient. In a competitive marketplace, individual insurers cannot influence the marketplace price. While individual insurers cannot influence the risk associated with a given policy limit, they will attempt to maximize their expected net revenue by choosing which lines and policy limits to write. This assumption is consistent with rational economic behavior and is reinforced by solvency regulation.

In an efficient marketplace, the supply of insurance matches the demand. ISO uses the distribution of basic limit losses by policy limit to represent the market demand for insurance at each limit. The model determines a set of risk loads that match supply and demand at each policy limit.

The variability of losses is caused by process risk and parameter risk:

- Process risk reflects the inherent uncertainty of the insurance process. Even if one could estimate expected losses exactly, actual losses will almost certainly differ from the expected. We derive the process risk component from the parameters of the indemnity severity distribution.

- Parameter risk reflects the risk of not estimating expected losses accurately. The derivation of the parameter risk component is based on the historical variation of losses.

These two risk elements combined comprise the total risk load at each policy limit.

ISO's risk load formulas use a parameter, lambda (λ), which governs the total amount of risk load over all policy limits for (non-professional) commercial liability tables. We determine lambda so that the ratio of the average indicated increased limit factor with risk load to the average indicated increased limit factor without risk load is equal to 1.06 for all General Liability and Commercial Automobile Liability tables combined. For this state group, increased limit factors with risk load are on average 4.8% higher than they would be if calculated excluding risk load.

Exhibit 13 (*Risk Load Parameters*) shows the parameters used in the calculation of risk load.

[2] Meyers, G. G., *Competitive Market Equilibrium Risk Load Model for Increased Limits Ratemaking*, Proceedings of the Casualty Actuarial Society, Volume LXXVIII, 1991

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RISK LOAD FORMULAS AND PARAMETERS

The following are the formulas underlying ISO's risk load model.

The risk load formulas incorporate parameter risk using a parameter transformation. In the following formulas, we use the notation AVSEV(PL,α) and SECM(PL,α) to represent the limited moments of a transformed loss size distribution. The distribution is transformed by multiplying all occurrences by the constant "α". AVSEV represents the limited average severity and SECM represents the limited second moment of the transformed distribution. The following formulas represent an approximation of the effect of parameter risk on the severity distribution:

$$\mathrm{AVSEV}(\mathrm{PL}, \alpha) = \alpha \times \mathrm{LAS}(\mathrm{PL}/\alpha)$$

$$\mathrm{SECM}(\mathrm{PL}, \alpha) = \alpha^2 \times \mathrm{SECM}(\mathrm{PL}/\alpha)$$

The formula for the LAS(PL) and SECM(PL) is as follows:

$$\mathrm{LAS}(\mathrm{PL}) = \sum w_i \mu_i \left[1 - e^{-\left(\frac{\mathrm{PL}}{\mu_i}\right)}\right]$$

$$\mathrm{SECM}(\mathrm{PL}) = \sum_i 2 w_i {\mu_i}^2 \left[1 - \left(1 + \frac{\mathrm{PL}}{\mu_i}\right) e^{-\left(\frac{\mathrm{PL}}{\mu_i}\right)}\right]$$

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RISK LOAD FORMULAS and PARAMETERS

(1) Total Risk Load
The vector of risk load amounts by limit for an increased limits table, R, is:

$$R = \lambda[\mathbf{U} + 2(\mathbf{V}^a \cdot \bar{\mathbf{n}}^a + \mathbf{V}^c \cdot \bar{\mathbf{n}}^c)]$$

where

λ = the factor which reflects the overall impact of risk load over General Liability and Commercial Automobile Liability. ISO selects this parameter so that the average increased limit factor with risk load divided by the average increased limit factor without risk load equals 1.06.

$\mathbf{U}$ = the vector of risk elements corresponding to process risk. Its j^{th} component is u_j, corresponding to the j^{th} limit. The calculation of $\mathbf{U}$ is described further on the following page.

$\mathbf{V}^a$ = the matrix describing severity parameter risk. The calculation of $\mathbf{V}^a$ is described further on the following page.

$\bar{\mathbf{n}}^a$ = the vector of the expected number of occurrences per insurer, in the particular increased limits table (within the state group). The j^{th} component of $\bar{\mathbf{n}}^a$ is computed as follows: the basic limit loss weight for that policy limit in the increased limits table (as a percentage) is multiplied by nbara, which is the expected number of occurrences per insurer per state group, in the particular increased limits table, for all limits combined.

$\mathbf{V}^c$ = the matrix describing frequency parameter risk. The calculation of $\mathbf{V}^c$ is described further on the following page.

$\bar{\mathbf{n}}^c$ = the vector of the expected average number of occurrences per insurer per state for all tables combined. The j^{th} component of $\bar{\mathbf{n}}^c$ is computed as follows: the basic limit loss weight for that policy limit in the increased limits table (as a percentage) is multiplied by nbarc, which is the expected average number of occurrences per insurer per state for all tables and limits combined.

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RISK LOAD FORMULAS AND PARAMETERS

(2) Process Risk Load

The process risk load component of the risk load is given by $\lambda \times \mathbf{U}$. The component, u_j, associated with the j^{th} limit, is

$$u_j = E_\alpha[SECM(PL_j,\alpha)] + [d \cdot E_\alpha[AVSEV(PL_j,\alpha)^2]]$$

where:

α	=	random variable representing severity parameter risk, with mean 1 and variance a.
a	=	.001, based on special ISO study.
1+d	=	variance-to-mean ratio for occurrence count distribution, contingent on parameters being known (in other words, if there were no frequency parameter risk, the variance-to-mean ratio would be 1 + d).
E_α	=	expected value across all values of α.

Let:

$$\alpha_1 = 1 - \sqrt{3a}\ ; \quad \alpha_2 = 1; \quad \alpha_3 = 1 + \sqrt{3a}\ ;$$

The Gauss-Hermite approximation[3] provides a discrete approximation for the expected value of a function $G(\alpha)$ across all values of the normally distributed variable α:

$$E_\alpha[G(\alpha)] \approx (1/6)G(\alpha_1) + (2/3)G(\alpha_2) + (1/6)G(\alpha_3)$$

for any function $G(\alpha)$.

(3) Parameter Risk Load

The parameter risk component of the risk load is given by $\lambda \times 2 \times (\mathbf{V}^a \cdot \bar{\mathbf{n}}^a + \mathbf{V}^c \cdot \bar{\mathbf{n}}^c)$.

Evaluation of $\mathbf{V}^a$

v^a_{ij}	=	element of $\mathbf{V}^a$ corresponding to limit i, limit j
	=	$E_\alpha[AVSEV(PL_i,\alpha) \cdot AVSEV(PL_j,\alpha)] - E_\alpha[AVSEV(PL_i,\alpha)] \cdot E_\alpha[AVSEV(PL_j,\alpha)]$

Evaluation of $\mathbf{V}^c$

v^c_{ij}	=	element of $\mathbf{V}^c$ corresponding to limit i, limit j
	=	$cE_\alpha[AVSEV(PL_i,\alpha) \cdot AVSEV(PL_j,\alpha)]$
c	=	parameter quantifying frequency parameter risk ("c" does for frequency what "a" does for severity). Values vary by line based on a special ISO study.

[3] Ralston, A., *A First Course in Numerical Analysis*, McGraw-Hill, 1965

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SUMMARY

In summary, we calculate limited average severities from a continuous model of occurrence size. In this model, we fit mixed exponential distributions to trended lag-weighted occurrence size distributions by table.

We calculate allocated loss adjustment expense per occurrence that does not vary by policy limit. We calculate unallocated loss adjustment expense by limit as a percentage of the sum of the limited average severity and allocated loss adjustment expense. We calculate risk load amounts reflecting process and parameter risk.

Finally, we calculate the sum of the average severity, allocated loss adjustment expense, unallocated loss adjustment expense and risk load. The ratio of this sum at the limit desired to this sum at the basic limit is the per occurrence increased limit factor.

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REVISED INCREASED LIMIT FACTORS

100. INCREASED LIABILITY LIMITS

Paragraph **B.** is replaced by the following:

Combined Single Limit Of Liability (000's)	**1. Light And Medium Trucks**	**2. Heavy Trucks And Truck-tractors**	**3. Extra-heavy Trucks And Truck-tractors**	**4. Trucks, Tractors, And Trailers Zone-rated**	**5. All Other Risks**
25	0.69	0.69	~~0.67~~0.66	0.66	0.69
75	~~0.95~~0.93	~~0.94~~0.93	0.92	0.92	~~0.94~~0.93
100	1.00	1.00	1.00	1.00	1.00
125	1.05	~~1.05~~1.06	~~1.06~~1.07	1.07	~~1.05~~1.06
150	1.10	~~1.10~~1.11	1.12	1.12	1.10
200	1.17	~~1.18~~1.19	~~1.21~~1.22	1.22	1.18
250	1.23	~~1.24~~1.25	~~1.29~~1.31	1.30	1.24
300	1.28	~~1.29~~1.30	~~1.36~~1.38	1.37	1.30
350	1.32	~~1.33~~1.35	~~1.42~~1.45	1.43	1.35
400	1.36	~~1.37~~1.39	~~1.47~~1.52	1.49	1.39
500	1.43	~~1.45~~1.47	~~1.57~~1.63	1.59	1.46
600	1.49	~~1.50~~1.53	~~1.67~~1.73	1.67	1.52
750	1.56	~~1.57~~1.61	~~1.78~~1.86	1.78	1.60
1,000	~~1.65~~1.66	~~1.67~~1.72	~~1.93~~2.04	1.92	~~1.70~~1.69
1,500	1.79	~~1.81~~1.87	~~2.15~~2.31	2.11	~~1.83~~1.82
2,000	~~1.88~~1.89	~~1.91~~1.99	~~2.31~~2.51	2.25	~~1.94~~1.92
2,500	~~1.96~~1.98	~~1.99~~2.09	~~2.43~~2.67	2.36	~~2.02~~1.99
3,000	~~2.02~~2.05	~~2.06~~2.17	~~2.53~~2.80	2.46	~~2.08~~2.06
5,000	~~2.22~~2.26	~~2.27~~2.43	~~2.86~~3.20	2.75	~~2.29~~2.26
7,500	~~2.39~~2.46	~~2.47~~2.69	~~3.16~~3.57	3.02	~~2.48~~2.45
10,000	~~2.54~~2.63	~~2.64~~2.91	~~3.40~~3.87	3.25	~~2.63~~2.61

Table 100.B. Increased Liability Limits

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SUMMARY OF INCREASED LIMIT FACTOR CHANGES

STATE GROUP 2

LIGHT AND MEDIUM TRUCKS

Policy Limit ($,000)	Basic Limit Loss Weight	Current Increased Limit Factor	Indicated Increased Limit Factor	Indicated Percent Change	Selected Increased Limit Factor	Selected Percent Change
100	0.0101	1.00	1.00	0.0%	1.00	0.0%
250	0.0005	1.23	1.23	0.0%	1.23	0.0%
300	0.0245	1.28	1.28	0.0%	1.28	0.0%
400	0.0006	1.36	1.36	0.0%	1.36	0.0%
500	0.0403	1.43	1.43	0.0%	1.43	0.0%
750	0.0031	1.56	1.56	0.0%	1.56	0.0%
1,000	0.8750	1.65	1.66	0.6%	1.66	0.6%
1,500	0.0004	1.79	1.79	0.0%	1.79	0.0%
2,000	0.0373	1.88	1.89	0.5%	1.89	0.5%
2,500	0.0000	1.96	1.98	1.0%	1.98	1.0%
3,000	0.0007	2.02	2.05	1.5%	2.05	1.5%
5,000	0.0075	2.22	2.26	1.8%	2.26	1.8%
7,500	0.0000	2.39	2.46	2.9%	2.46	2.9%
10,000	0.0000	2.54	2.63	3.5%	2.63	3.5%
TOTAL	1.0000	1.638	1.647	0.5%	1.647	0.5%

HEAVY TRUCKS AND TRUCK-TRACTORS

Policy Limit ($,000)	Basic Limit Loss Weight	Current Increased Limit Factor	Indicated Increased Limit Factor	Indicated Percent Change	Selected Increased Limit Factor	Selected Percent Change
100	0.0032	1.00	1.00	0.0%	1.00	0.0%
250	0.0008	1.24	1.25	0.8%	1.25	0.8%
300	0.0074	1.29	1.30	0.8%	1.30	0.8%
400	0.0001	1.37	1.39	1.5%	1.39	1.5%
500	0.0149	1.45	1.47	1.4%	1.47	1.4%
750	0.0059	1.57	1.61	2.5%	1.61	2.5%
1,000	0.9214	1.67	1.72	3.0%	1.72	3.0%
1,500	0.0002	1.81	1.87	3.3%	1.87	3.3%
2,000	0.0365	1.91	1.99	4.2%	1.99	4.2%
2,500	0.0000	1.99	2.09	5.0%	2.09	5.0%
3,000	0.0006	2.06	2.17	5.3%	2.17	5.3%
5,000	0.0083	2.27	2.43	7.0%	2.43	7.0%
7,500	0.0007	2.47	2.69	8.9%	2.69	8.9%
10,000	0.0000	2.64	2.91	10.2%	2.91	10.2%
TOTAL	1.0000	1.675	1.727	3.1%	1.727	3.1%

Explanation for this exhibit is provided on page A-1.

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SUMMARY OF INCREASED LIMIT FACTOR CHANGES

STATE GROUP 2

EXTRA HEAVY TRUCKS AND TRUCK-TRACTORS

Policy Limit ($,000)	Basic Limit Loss Weight	Current Increased Limit Factor	Indicated Increased Limit Factor	Indicated Percent Change	Selected Increased Limit Factor	Selected Percent Change
100	0.0004	1.00	1.00	0.0%	1.00	0.0%
250	0.0002	1.29	1.31	1.6%	1.31	1.6%
300	0.0010	1.36	1.38	1.5%	1.38	1.5%
400	0.0012	1.47	1.52	3.4%	1.52	3.4%
500	0.0125	1.57	1.63	3.8%	1.63	3.8%
750	0.0050	1.78	1.86	4.5%	1.86	4.5%
1,000	0.9339	1.93	2.04	5.7%	2.04	5.7%
1,500	0.0002	2.15	2.31	7.4%	2.31	7.4%
2,000	0.0320	2.31	2.51	8.7%	2.51	8.7%
2,500	0.0000	2.43	2.67	9.9%	2.67	9.9%
3,000	0.0012	2.53	2.80	10.7%	2.80	10.7%
5,000	0.0117	2.86	3.20	11.9%	3.20	11.9%
7,500	0.0007	3.16	3.57	13.0%	3.57	13.0%
10,000	0.0000	3.40	3.87	13.8%	3.87	13.8%
TOTAL	1.0000	1.948	2.063	5.9%	2.063	5.9%

ZONE-RATED RISKS

Policy Limit ($,000)	Basic Limit Loss Weight	Current Increased Limit Factor	Indicated Increased Limit Factor	Indicated Percent Change	Selected Increased Limit Factor[a]	Selected Percent Change[a]
100	0.0016	1.00	1.00	0.0%	1.00	0.0%
250	0.0002	1.30	1.29	-0.8%	1.30	0.0%
300	0.0006	1.37	1.36	-0.7%	1.37	0.0%
400	0.0000	1.49	1.47	-1.3%	1.49	0.0%
500	0.0045	1.59	1.56	-1.9%	1.59	0.0%
750	0.0026	1.78	1.74	-2.2%	1.78	0.0%
1,000	0.8765	1.92	1.87	-2.6%	1.92	0.0%
1,500	0.0002	2.11	2.06	-2.4%	2.11	0.0%
2,000	0.0588	2.25	2.19	-2.7%	2.25	0.0%
2,500	0.0000	2.36	2.30	-2.5%	2.36	0.0%
3,000	0.0464	2.46	2.39	-2.8%	2.46	0.0%
5,000	0.0086	2.75	2.67	-2.9%	2.75	0.0%
7,500	0.0000	3.02	2.93	-3.0%	3.02	0.0%
10,000	0.0000	3.25	3.15	-3.1%	3.25	0.0%
TOTAL	1.0000	1.968	1.916	-2.6%	1.968	0.0%

[a] We are not revising Zone-rated factors in this filing.

Explanation for this exhibit is provided on page A-1.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

SUMMARY OF INCREASED LIMIT FACTOR CHANGES

STATE GROUP 2

ALL OTHER RISKS

Policy Limit ($,000)	Basic Limit Loss Weight	Current Increased Limit Factor	Indicated Increased Limit Factor	Indicated Percent Change	Selected Increased Limit Factor	Selected Percent Change
100	0.0069	1.00	1.00	0.0%	1.00	0.0%
250	0.0003	1.24	1.24	0.0%	1.24	0.0%
300	0.0211	1.30	1.30	0.0%	1.30	0.0%
400	0.0024	1.39	1.39	0.0%	1.39	0.0%
500	0.0567	1.46	1.46	0.0%	1.46	0.0%
750	0.0021	1.60	1.60	0.0%	1.60	0.0%
1,000	0.8482	1.70	1.69	-0.6%	1.69	-0.6%
1,500	0.0134	1.83	1.82	-0.5%	1.82	-0.5%
2,000	0.0373	1.94	1.92	-1.0%	1.92	-1.0%
2,500	0.0000	2.02	1.99	-1.5%	1.99	-1.5%
3,000	0.0007	2.08	2.06	-1.0%	2.06	-1.0%
5,000	0.0109	2.29	2.26	-1.3%	2.26	-1.3%
7,500	0.0000	2.48	2.45	-1.2%	2.45	-1.2%
10,000	0.0000	2.63	2.61	-0.8%	2.61	-0.8%
TOTAL	1.0000	1.689	1.680	-0.5%	1.680	-0.5%

SUMMARY

Table	Basic Limit Loss Weight	Current Increased Limit Factor	Indicated Increased Limit Factor	Indicated Percent Change	Selected Increased Limit Factor	Selected Percent Change
Light and Medium	0.5334	1.638	1.647	0.5%	1.647	0.5%
Heavy	0.0863	1.675	1.727	3.1%	1.727	3.1%
Extra Heavy	0.1075	1.948	2.063	5.9%	2.063	5.9%
Zone-rated[a]	0.0260	1.968	1.916	-2.6%	1.968	0.0%
All Other	0.2468	1.689	1.680	-0.5%	1.680	-0.5%
TOTAL	1.0000	1.696	1.714	1.1%	1.715	1.1%

[a] We are not revising Zone-rated factors in this filing.

Explanation for this exhibit is provided on page A-1.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

CALCULATION OF INCREASED LIMIT FACTORS

STATE GROUP 2

LIGHT AND MEDIUM TRUCKS

(1) Policy Limit ($,000)	(2)[a] Limited Average Severity	(3) ALAE per Occurrence	(4) ULAE per Occurrence	(5) Process Risk Load	(6) Parameter Risk Load	(7)[b] Indicated Increased Limit Factor	(8) Selected Increased Limit Factor
100	10,141	1,055	980	81	83	1.00	1.00
250	12,587	1,055	1,194	219	104	1.23	1.23
300	13,111	1,055	1,240	268	108	1.28	1.28
400	13,960	1,055	1,314	369	115	1.36	1.36
500	14,632	1,055	1,373	471	121	1.43	1.43
750	15,859	1,055	1,480	729	131	1.56	1.56
1,000	16,707	1,055	1,554	980	139	1.66	1.66
1,500	17,831	1,055	1,653	1,452	149	1.79	1.79
2,000	18,568	1,055	1,717	1,887	156	1.89	1.89
2,500	19,107	1,055	1,764	2,299	160	1.98	1.98
3,000	19,529	1,055	1,801	2,693	164	2.05	2.05
5,000	20,622	1,055	1,897	4,145	174	2.26	2.26
7,500	21,404	1,055	1,965	5,783	181	2.46	2.46
10,000	21,917	1,055	2,010	7,301	185	2.63	2.63

[a] Reflects trend to prospective average accident date of April 1, 2020 and development to ultimate maturity.

[b] Derived by taking the ratio of columns [(2) + (3) + (4) + (5) + (6)] at the policy limit to columns [(2) + (3) + (4) + (5) + (6)] at the basic limit ($100,000).

Explanation for this exhibit is provided on pages B-1 and B-2.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

CALCULATION OF INCREASED LIMIT FACTORS

STATE GROUP 2

HEAVY TRUCKS AND TRUCK-TRACTORS

(1) Policy Limit ($,000)	(2)[a] Limited Average Severity	(3) ALAE per Occurrence	(4) ULAE per Occurrence	(5) Process Risk Load	(6) Parameter Risk Load	(7)[b] Indicated Increased Limit Factor	(8) Selected Increased Limit Factor
100	10,544	1,385	1,044	88	84	1.00	1.00
250	13,406	1,385	1,294	248	107	1.25	1.25
300	14,005	1,385	1,347	304	111	1.30	1.30
400	14,976	1,385	1,432	420	119	1.39	1.39
500	15,752	1,385	1,499	538	125	1.47	1.47
750	17,194	1,385	1,626	841	137	1.61	1.61
1,000	18,203	1,385	1,714	1,140	145	1.72	1.72
1,500	19,554	1,385	1,832	1,706	156	1.87	1.87
2,000	20,459	1,385	1,911	2,242	163	1.99	1.99
2,500	21,136	1,385	1,971	2,759	169	2.09	2.09
3,000	21,674	1,385	2,018	3,262	173	2.17	2.17
5,000	23,104	1,385	2,143	5,164	184	2.43	2.43
7,500	24,163	1,385	2,235	7,386	193	2.69	2.69
10,000	24,878	1,385	2,298	9,500	199	2.91	2.91

[a] Reflects trend to prospective average accident date of April 1, 2020 and development to ultimate maturity.

[b] Derived by taking the ratio of columns [(2) + (3) + (4) + (5) + (6)] at the policy limit to columns [(2) + (3) + (4) + (5) + (6)] at the basic limit ($100,000).

Explanation for this exhibit is provided on pages B-1 and B-2.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

CALCULATION OF INCREASED LIMIT FACTORS

STATE GROUP 2

EXTRA HEAVY TRUCKS AND TRUCK-TRACTORS

(1) Policy Limit ($,000)	(2)[a] Limited Average Severity	(3) ALAE per Occurrence	(4) ULAE per Occurrence	(5) Process Risk Load	(6) Parameter Risk Load	(7)[b] Indicated Increased Limit Factor	(8) Selected Increased Limit Factor
100	13,469	2,400	1,389	124	166	1.00	1.00
250	18,160	2,400	1,799	391	223	1.31	1.31
300	19,270	2,400	1,896	495	237	1.38	1.38
400	21,155	2,400	2,061	719	260	1.52	1.52
500	22,734	2,400	2,199	960	280	1.63	1.63
750	25,838	2,400	2,471	1,614	318	1.86	1.86
1,000	28,135	2,400	2,672	2,295	346	2.04	2.04
1,500	31,277	2,400	2,947	3,612	386	2.31	2.31
2,000	33,319	2,400	3,125	4,819	411	2.51	2.51
2,500	34,779	2,400	3,253	5,933	429	2.67	2.67
3,000	35,902	2,400	3,351	6,983	443	2.80	2.80
5,000	38,788	2,400	3,604	10,815	480	3.20	3.20
7,500	40,821	2,400	3,782	15,071	505	3.57	3.57
10,000	42,125	2,400	3,896	18,929	521	3.87	3.87

[a] Reflects trend to prospective average accident date of April 1, 2020 and development to ultimate maturity.

[b] Derived by taking the ratio of columns [(2) + (3) + (4) + (5) + (6)] at the policy limit to columns [(2) + (3) + (4) + (5) + (6)] at the basic limit ($100,000).

Explanation for this exhibit is provided on pages B-1 and B-2.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

CALCULATION OF INCREASED LIMIT FACTORS

STATE GROUP 2

ZONE-RATED RISKS

(1) Policy Limit ($,000)	(2)[a] Limited Average Severity	(3) ALAE per Occurrence	(4) ULAE per Occurrence	(5) Process Risk Load	(6) Parameter Risk Load	(7)[b] Indicated Increased Limit Factor	(8)[c] Selected Increased Limit Factor
100	15,585	3,612	1,680	150	212	1.00	1.00
250	20,943	3,612	2,149	452	286	1.29	1.30
300	22,127	3,612	2,252	563	302	1.36	1.37
400	24,080	3,612	2,423	795	329	1.47	1.49
500	25,656	3,612	2,561	1,036	350	1.56	1.59
750	28,564	3,612	2,815	1,647	391	1.74	1.78
1,000	30,557	3,612	2,990	2,236	418	1.87	1.92
1,500	33,144	3,612	3,216	3,320	455	2.06	2.11
2,000	34,816	3,612	3,362	4,309	478	2.19	2.25
2,500	36,036	3,612	3,469	5,240	495	2.30	2.36
3,000	36,988	3,612	3,553	6,129	509	2.39	2.46
5,000	39,437	3,612	3,767	9,380	543	2.67	2.75
7,500	41,170	3,612	3,918	13,012	567	2.93	3.02
10,000	42,302	3,612	4,017	16,360	583	3.15	3.25

[a] Reflects trend to prospective average accident date of April 1, 2020 and development to ultimate maturity.

[b] Derived by taking the ratio of columns [(2) + (3) + (4) + (5) + (6)] at the policy limit to columns [(2) + (3) + (4) + (5) + (6)] at the basic limit ($100,000).

[c] We are not revising Zone-rated factors in this filing, so the selected factors are those currently in effect.

Explanation for this exhibit is provided on pages B-1 and B-2.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

CALCULATION OF INCREASED LIMIT FACTORS

STATE GROUP 2

ALL OTHER RISKS

(1) Policy Limit ($,000)	(2)[a] Limited Average Severity	(3) ALAE per Occurrence	(4) ULAE per Occurrence	(5) Process Risk Load	(6) Parameter Risk Load	(7)[b] Indicated Increased Limit Factor	(8) Selected Increased Limit Factor
100	9,516	1,254	942	78	70	1.00	1.00
250	12,032	1,254	1,163	220	89	1.24	1.24
300	12,583	1,254	1,211	271	93	1.30	1.30
400	13,475	1,254	1,289	377	100	1.39	1.39
500	14,170	1,254	1,350	483	105	1.46	1.46
750	15,382	1,254	1,456	737	115	1.60	1.60
1,000	16,173	1,254	1,525	971	121	1.69	1.69
1,500	17,193	1,254	1,614	1,399	129	1.82	1.82
2,000	17,864	1,254	1,673	1,796	134	1.92	1.92
2,500	18,356	1,254	1,716	2,171	138	1.99	1.99
3,000	18,739	1,254	1,749	2,529	141	2.06	2.06
5,000	19,727	1,254	1,836	3,841	148	2.26	2.26
7,500	20,433	1,254	1,898	5,320	154	2.45	2.45
10,000	20,894	1,254	1,938	6,686	157	2.61	2.61

[a] Reflects trend to prospective average accident date of April 1, 2020 and development to ultimate maturity.

[b] Derived by taking the ratio of columns [(2) + (3) + (4) + (5) + (6)] at the policy limit to columns [(2) + (3) + (4) + (5) + (6)] at the basic limit ($100,000).

Explanation for this exhibit is provided on pages B-1 and B-2.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

TREND SELECTION
MULTISTATE AVERAGE CLAIM COST

PAID CALENDAR YEAR DATA

Year Ended	$1,000,000 Bodily Injury	Total Limits Bodily Injury	Total Limits Property Damage
12/31/2011	39,406.16	40,608.33	3,465.26
3/31/2012	39,336.01	40,469.41	3,573.82
6/30/2012	39,998.83	41,251.79	3,614.50
9/30/2012	39,938.42	40,886.96	3,650.77
12/31/2012	40,250.06	41,310.05	3,670.44
3/31/2013	40,563.83	41,569.68	3,696.11
6/30/2013	40,364.27	41,329.68	3,766.13
9/30/2013	40,704.95	41,979.20	3,812.94
12/31/2013	41,809.66	42,889.37	3,837.55
3/31/2014	42,312.41	43,367.13	3,848.62
6/30/2014	43,352.50	44,342.72	3,863.64
9/30/2014	43,715.16	44,383.73	3,915.81
12/31/2014	44,299.79	45,471.46	3,981.74
3/31/2015	45,062.93	46,666.58	4,024.02
6/30/2015	44,986.37	46,775.52	4,054.66
9/30/2015	45,206.59	47,177.05	4,089.13
12/31/2015	44,705.29	46,225.09	4,152.94
3/31/2016	45,005.40	46,835.38	4,262.17
6/30/2016	46,081.08	47,672.34	4,351.01
9/30/2016	47,068.86	48,626.39	4,389.51
12/31/2016	47,663.51	49,533.85	4,427.07
3/31/2017	47,902.07	49,675.43	4,484.57
6/30/2017	47,884.78	49,846.45	4,505.25
9/30/2017	47,818.78	49,987.00	4,563.68

9/30/2017 Claims		51,804	51,804	176,503
Average Annual Change	24 PT:	3.9%	4.2%	4.7%
	12 PT:	3.2%	3.5%	5.5%
Coefficient of Determination R^2	24 PT:	0.9692	0.9695	0.9875
	12 PT:	0.8659	0.8848	0.9797

Multistate data excludes Massachusetts.

TREND SELECTION: **+5.0%**

Explanation for this exhibit is provided on page B-5.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

PAYMENT LAG PARAMETERS AND LAG WEIGHTS[a]

STATE GROUP 2

Payment Lag Parameters

	Light and Medium	Heavy	Extra Heavy	Zone-rated (Multistate)	All Other
R1 =	0.26345196	0.28721305	0.33160911	0.43551875	0.24826472
R2 =	0.17165652	0.16554584	0.19404721	0.21142941	0.19605057
R3 =	0.42527204	0.41341012	0.41646886	0.39026207	0.42982521
k = 1+R1+((R1•R2)/(1-R3)) =	1.34213831	1.36826956	1.44188227	1.58653686	1.33362879

Generation of Lag Weights

		Light and Medium	Heavy	Extra Heavy	Zone-rated (Multistate)	All Other
Lag 1 =	1 / k =	0.74507969	0.73085014	0.69353789	0.63030367	0.74983385
Lag 2 =	R1 / k =	0.19629271	0.20990970	0.22998349	0.27450906	0.18615729
Lag 3 =	R1•R2/k =	0.03369492	0.03474968	0.04462765	0.05803929	0.03649624
Lag 4 =	R1•R2•R3/k =	0.01432951	0.01436587	0.01858603	0.02265053	0.01568700
Lag 5 =	R1•R2•($R3^2$/(1-R3))/k =	0.01060317	0.01012461	0.01326494	0.01449745	0.01182562
	TOTAL =	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

[a] The lag weight distribution includes allocated CRR data for all tables except Zone-rated.

Explanation for this exhibit is provided on page B-11.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

MIXED EXPONENTIAL PARAMETERS

Average Accident Date of April 1, 2020
STATE GROUP 2

Light and Medium		Heavy		Extra Heavy	
Mean	Weight	Mean	Weight	Mean	Weight
3,694	0.760100	4,281	0.797276	4,805	0.730615
19,950	0.181224	20,143	0.135788	22,929	0.195257
58,536	0.029785	79,547	0.048690	101,001	0.046173
131,376	0.014857	371,542	0.013348	600,077	0.022359
400,746	0.009947	1,089,778	0.003320	1,993,221	0.004235
1,053,604	0.002773	2,758,753	0.000991	5,899,953	0.001014
2,640,507	0.000887	6,549,470	0.000385	18,248,338	0.000282
6,718,522	0.000299	18,703,234	0.000157	92,846,193	0.000065
19,576,570	0.000102	100,000,000	0.000045		
100,000,000	0.000026				

Zone-rated (Multistate)		All Other	
Mean	Weight	Mean	Weight
5,686	0.717895	3,183	0.744545
23,508	0.170377	15,930	0.183235
77,116	0.073519	52,923	0.048070
378,032	0.029160	261,246	0.018631
1,127,384	0.006478	808,802	0.004004
2,957,772	0.001739	2,230,046	0.001050
7,256,744	0.000569	5,271,289	0.000233
20,153,138	0.000208	7,910,253	0.000121
100,000,000	0.000055	19,839,187	0.000088
		100,000,000	0.000023

Explanation for this exhibit is provided on page B-13.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

COMPARISON OF LIMITED AVERAGE SEVERITIES

STATE GROUP 2

	Light and Medium			Heavy		
Policy Limit ($,000)	Trended Empirical LAS	Fitted LAS	Percent Difference	Trended Empirical LAS	Fitted LAS	Percent Difference
100	10,276	10,141	-1.31%	10,639	10,544	-0.89%
250	12,716	12,587	-1.01%	13,504	13,406	-0.73%
300	13,239	13,111	-0.97%	14,094	14,005	-0.63%
400	14,091	13,960	-0.93%	15,069	14,976	-0.62%
500	14,765	14,632	-0.90%	15,844	15,752	-0.58%
1,000	16,847	16,707	-0.83%	18,307	18,203	-0.57%
1,500	17,970	17,831	-0.77%	19,654	19,554	-0.51%
2,000	18,708	18,568	-0.75%	20,561	20,459	-0.50%
2,500	19,248	19,107	-0.73%	21,238	21,136	-0.48%
3,000	19,669	19,529	-0.71%	21,776	21,674	-0.47%
5,000	20,764	20,622	-0.68%	23,205	23,104	-0.44%
10,000	22,062	21,917	-0.66%	24,980	24,878	-0.41%

	Extra Heavy			Zone-rated (Multistate)		
Policy Limit ($,000)	Trended Empirical LAS	Fitted LAS	Percent Difference	Trended Empirical LAS	Fitted LAS	Percent Difference
100	13,513	13,469	-0.33%	15,636	15,585	-0.33%
250	18,227	18,160	-0.37%	21,020	20,943	-0.37%
300	19,354	19,270	-0.43%	22,191	22,127	-0.29%
400	21,213	21,155	-0.27%	24,133	24,080	-0.22%
500	22,752	22,734	-0.08%	25,697	25,656	-0.16%
1,000	28,185	28,135	-0.18%	30,649	30,557	-0.30%
1,500	31,322	31,277	-0.14%	33,222	33,144	-0.23%
2,000	33,347	33,319	-0.08%	34,898	34,816	-0.23%
2,500	34,813	34,779	-0.10%	36,120	36,036	-0.23%
3,000	35,946	35,902	-0.12%	37,069	36,988	-0.22%
5,000	38,839	38,788	-0.13%	39,513	39,437	-0.19%
10,000	42,174	42,125	-0.12%	42,376	42,302	-0.17%

Explanation for this exhibit is provided on page B-13.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

COMPARISON OF LIMITED AVERAGE SEVERITIES

STATE GROUP 2

	All Other		
Policy Limit ($,000)	Trended Empirical LAS	Fitted LAS	Percent Difference
100	9,640	9,516	-1.29%
250	12,158	12,032	-1.04%
300	12,711	12,583	-1.01%
400	13,591	13,475	-0.85%
500	14,282	14,170	-0.78%
1,000	16,299	16,173	-0.77%
1,500	17,324	17,193	-0.76%
2,000	17,996	17,864	-0.73%
2,500	18,487	18,356	-0.71%
3,000	18,870	18,739	-0.69%
5,000	19,860	19,727	-0.67%
10,000	21,031	20,894	-0.65%

Explanation for this exhibit is provided on page B-13.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

CALCULATION OF ALLOCATED LOSS ADJUSTMENT EXPENSE PER OCCURRENCE

STATE GROUP 2

Ratios of Paid ALAE to Paid Total Limits Losses[a]

Fiscal Accident Year	Light and Medium	Heavy	Extra Heavy	Zone-rated (Multistate)	All Other
2010	0.07447	0.08002	0.08759	0.08861	0.08399
2011	0.06059	0.07332	0.08414	0.10157	0.07809
2012	0.05817	0.08000	0.07035	0.10494	0.09340
2013	0.06612	0.07574	0.09473	0.13719	0.07078
2014	0.06453	0.06743	0.09056	0.12405	0.07364
2015	0.06438	0.08098	0.08014	0.13245	0.08008
2016	0.06383	0.07123	0.08197	0.12365	0.07491
Best 5-of-7 Average	0.06389	0.07606	0.08488	0.11733	0.07814

Indicated ALAE per Occurrence

Table	(1) ALAE per Total Limits Indemnity	(2) Mixed Exponential Total Limits Average Severity[b]	(1) x (2) ALAE per Occurrence
Light and Medium	0.06389	16,511	1,055
Heavy	0.07606	18,205	1,385
Extra Heavy	0.08488	28,278	2,400
Zone-rated (Multistate)	0.11733	30,788	3,612
All Other	0.07814	16,047	1,254

[a] Derived from paid aggregate data developed to ultimate.

[b] Occurrence-weighted average of limited average severities from Exhibits 2-6.

Explanation for this exhibit is provided on pages B-15 and B-16.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

DEVELOPMENT OF UNALLOCATED LOSS ADJUSTMENT EXPENSE FACTOR

Calendar Year Experience

Bodily Injury

ITEM	2012	2013	2014	2015	2016	Five-Year Average
(1) Direct Losses Incurred	4,059,001	4,205,932	4,811,095	5,400,783	5,769,671	
(2) Allocated Loss Adjustment Expenses Incurred (ALAE)	458,941	481,717	517,613	610,635	670,289	
(3) Unallocated Loss Adjustment Expenses Incurred (ULAE)	383,262	432,507	471,784	479,398	479,146	
(4) Unallocated LAE as a ratio to Loss + Allocated LAE (3)/[(1)+(2)]	8.48%	9.23%	8.85%	7.97%	7.44%	8.40%

Property Damage

ITEM	2012	2013	2014	2015	2016	Five-Year Average
(1) Direct Losses Incurred	855,668	964,805	1,033,470	1,128,053	1,203,935	
(2) Allocated Loss Adjustment Expenses Incurred (ALAE)	57,874	70,950	69,317	85,116	71,849	
(3) Unallocated Loss Adjustment Expenses Incurred (ULAE)	108,187	112,861	128,692	129,040	123,937	
(4) Unallocated LAE as a ratio to Loss + Allocated LAE (3)/[(1)+(2)]	11.84%	10.90%	11.67%	10.64%	9.71%	10.95%

Bodily Injury and Property Damage Combined

ITEM	2012	2013	2014	2015	2016	Five-Year Average
(1) Direct Losses Incurred	4,914,669	5,170,737	5,844,565	6,528,836	6,973,606	
(2) Allocated Loss Adjustment Expenses Incurred (ALAE)	516,815	552,667	586,930	695,751	742,138	
(3) Unallocated Loss Adjustment Expenses Incurred (ULAE)	491,449	545,368	600,476	608,438	603,083	
(4) Unallocated LAE as a ratio to Loss + Allocated LAE (3)/[(1)+(2)]	9.05%	9.53%	9.34%	8.42%	7.82%	8.83%

Selected Bodily Injury and Property Damage Combined ULAE Factor: 0.0875

All items are from ISO Special Call Submissions for available national agency writers. All amounts displayed are in thousands of dollars.

Explanation for this exhibit is provided on page B-16.

KANSAS
COMMERCIAL AUTOMOBILE LIABILITY INCREASED LIMIT FACTORS

RISK LOAD PARAMETERS

ALL COMMERCIAL (NON-PROFESSIONAL) LIABILITY

Lambda(λ)[a]	=	1.7044E-07

COMMERCIAL AUTOMOBILE LIABILITY

Common Parameters

d	=	0
c	=	0.0025
a	=	0.001
nbarc	=	500

Values of nbara

Light and Medium	324.5
Heavy	47.2
Extra Heavy	47.0
Zone-rated (multistate)	84.3
All Other	164.5

[a] ISO determines lambda so that the ratio of the average increased limit factor with risk load to the average increased limit factor without risk load is equal to 1.06 for all General Liability and Commercial Automobile Liability tables combined.

Explanation for this exhibit is provided on pages B-17 through B-20.