Class Ratemaking for Workers Compensation: NCCI's New Methodology

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Abstract:

For the first time in many years, NCCI is revising the methodology used to determine class relativities in workers compensation loss cost filings.

This paper will describe the new methodology NCCI has developed, and reveal the research approach and analyses underlying the modifications NCCI will be implementing to several key class ratemaking components. The paper will discuss in detail how the traditional areas of class ratemaking were modified, namely loss development, limiting large claims and applying expected excess provisions, updating credibility standards, and the derivation of industry group differentials.

The paper will also focus on the new NCCI class ratemaking approach from an educational perspective for actuaries who are just becoming familiar with workers compensation. Exhibits are provided in Appendix B illustrating the stepwise derivation of a loss cost for a classification from beginning to end.

Keywords: workers compensation; NCCI ratemaking; NCCI loss cost filings; class ratemaking; loss development by part of body; expected excess by hazard group.

1. INTRODUCTION

NCCI has recently modified the methodology used to determine class relativities for workers compensation insurance. The last time the class relativity methodology was modified took place in 1993. At that time, NCCI implemented the following changes: a) the number of policy periods used in determining pure premiums for each class was increased from three to five, b) the underlying class credibility formulas were modified, and c) the number of industry groups used for targeting class loss cost changes was increased from three to five.

Some of my colleagues would jokingly quip that the number of people who understood these changes increased from three to five. So the primary motivation of this paper is to document the new NCCI class ratemaking methodology and the research analyses supporting it. Many of my colleagues at NCCI made very significant contributions to the overall success of this huge undertaking, and are duly mentioned in the acknowledgement. This could not have been possible without their valuable insights and support.

1.1 Research Context

The focus of this research is to document the various analyses and research approach used to support the modifications being implemented within the NCCI class ratemaking methodology. Current CAS literature that addresses some of the same issues include "Workers Compensation Ratemaking" by Sholom Feldblum, and "Workers Compensation Classification Credibilities" by Howard C. Mahler.

1.2 Objective

This paper updates the CAS literature on workers compensation ratemaking techniques, with particular attention to recent modifications in the NCCI class ratemaking methodology for handling large claims, improving the predictive ability of class loss development factors, and the approach used for updating certain other important components such as industry group differentials and credibility standards. To address its absence in the current CAS literature, this paper also provides a detailed stepwise illustration of the new workers compensation class ratemaking methodology. The methodology supporting the aggregate change in a state's overall indicated loss cost level will not be addressed in this paper. The new methodology for determining the seven hazard groups and the methodology for determining the expected excess loss factors also will not be addressed in this paper.

1.3 Outline

The remainder of the paper proceeds as follows. Section 2 will discuss the reasons and impetus for the changes made, the thought process NCCI has followed, the specific class ratemaking methodology changes being implemented, and the supporting research analyses and results. Section 3 contains two appendices of exhibits: Appendix A contains the supporting research exhibits and Appendix B contains exhibits that illustrate the new methodology for calculating the loss cost for a class code from beginning to end.

2. BACKGROUND AND METHODS

There were three motivational factors underlying the research approach that NCCI followed in making some recent significant changes to its class ratemaking methodologies. They were:

- To improve the predictive ability and adequacy of loss costs by class code.

- To provide year-to-year stability of loss cost changes by class code.
- To explore the potential of new data elements that NCCI began collecting in the 1996 Unit Report Expansion (URE), and try to utilize them accordingly.

2.1 Availability of New URE Data Elements

Many of the NCCI states approved the collection of the URE data elements in 1996. Thus, the first complete policy period available in most states is policy year 1997. Furthermore, some states did not approve the collection of URE data in their state for a few more years (the last state was approved as late as January 1, 2002). Thus, in a few states, the database is less complete historically, adding further to the challenges of our research agenda.

The following is a list of some, but not all, of the new URE data elements to be reported to NCCI by carriers and available to the NCCI actuaries:

- Paid ALAE (case reserves were optional)
- Paid losses separate from "paid + case" losses
- Injured part of body
- Nature of injury
- Cause of injury
- Deductible reimbursement amounts
- Lump sum indicator
- Etc.

More recently, effective with policy period 1999 and subsequent, carriers began mandatory reporting beyond a 5th report for all WCSP unit data and URE data elements on all open claims, up to and including a 10th report.

2.1 Overview of the Methodology Changes

Several significant changes to the NCCI class ratemaking are currently being targeted for implementation in 2009. The majority of changes are contained in the following six areas:

1. Loss development factors (LDF) will be derived using claim characteristics such as injured body part, the open and closed claim status at 1st report, and the injury type category.

2. The loss development triangles are being expanded from five reports out to 10 reports (eventually).
3. Large claims will be capped at $500,000 and expected excess factors (derived from the new seven hazard group mapping by class code) will be used to calculate ultimate losses.
4. Serious and non-serious pure premium components will no longer exist. There will only be indemnity and medical components.
5. The computation of the industry group differentials was slightly modified.
6. The full credibility standards for indicated and national pure premiums were slightly modified.

Each of these six major areas will be discussed in this paper, some in much more depth than others, and a summary of the analyses underlying the decisions will be presented.

2.2 Background: The Current Loss Development Approach

It is important to understand the nuances of the former approach to gain a better appreciation for the changes NCCI is now implementing and the reasoning behind the changes being made. The source data used is the NCCI Workers Compensation Statistical Plan (WCSP) data. The previous approach used by NCCI to generate loss development factors for class ratemaking was to segregate the dollars of loss generated from claims into two loss development categories. They were a) the serious grouping and b) the non-serious grouping. An arbitrary dollar value, referred to as the critical value, which varied significantly by state, was determined for each loss cost filing. All permanent partial claims whose indemnity dollar amount, as measured on a "paid + case" basis, exceeded the critical value were categorized to be included in the serious grouping, and referred to as major permanent partial claims. Four loss development triangles were compiled from the dollars of losses associated with these claims. The four triangles compiled were indemnity and medical, and each had a serious and non-serious component. The serious grouping consisted of all fatalities, all permanent total claims, and the major permanent partial claims (i.e. those claims whose indemnity dollar amounts exceeded the critical value). The non-serious grouping consisted of all temporary total claims, the remaining minor permanent partial claims, and the medical-only claims. Examples of each of the serious and non-serious loss development triangles for a large state are shown in Exhibit 1.

WCSP "paid + case" loss data is reported by carriers to NCCI at five different reports for open

claims. The losses are evaluated @18, @30, @42, @54, and @66 months, respectively. A tail factor was applied to the serious loss development triangles only, and was derived from NCCI financial call data used in the overall aggregate loss cost indication for the state. It was assumed that all loss development beyond the 5th report was inherently due to serious claims only. In order to balance to the financial data tail, a significantly large tail factor was applied to the serious losses to generate a 5th-to-ultimate, while a tail factor of unity was applied to the non-serious losses. An illustration of the derivation of the tail factor is also found in Exhibit 1.

The current loss development approach had four shortcomings, which made its serious and non-serious loss development groupings less than optimal. The key shortcomings were:

1. As claims matured, many claims would "cross over" the critical value at subsequent reports, and therefore be reassigned into the serious grouping, and thus, distort the predictive ability of the loss development factors in the serious and non-serious triangles.
2. Severity was not a good indicator of the propensity of a claim to develop in the future.
3. The medical dollar amount was ignored in determining whether or not a claim was categorized as serious or non-serious.
4. No distinction between serious and non-serious loss dollars was made within the medical loss triangles from 1st through 5th report. The only distinction between serious and non-serious medical was that a 5th-to-ultimate medical tail factor was applied to the medical loss dollars associated with the serious lost-time claims.

2.3 The Problem of Critical Value Crossover

The research approach began as a review of the critical value methodology, which had begun to be used in class ratemaking at NCCI in 1966. A previous attempt years earlier at improving the critical value methodology involved the idea of using an open and closed claim indicator, and only applying loss development to open claims. Although that idea was not embraced at the time, a better variation of it will be introduced to the reader later in the paper.

Exhibit 2 demonstrates the distorting impact that critical value "crossover" inflicts on a dataset of permanent partial claims countrywide. Claims below the critical value are deemed minor while those that exceed it are deemed major. Various link ratios were computed for comparison from 1st report to 4th report. The true distortion of critical value "crossover" is illustrated by the second and third rows of the indemnity and medical sections of Exhibit 2. These rows consist of claims where the

status changed from major to minor, and vice versa, between the 1st and 4th reports. Columns (4) and (5) on Exhibit 2 provide a stark contrast of the distortion critical value crossover can inflict on the predictive nature of a link ratio.

Although not illustrated in Exhibit 2, a "natural crossover" of claims moving between injury types may provide similar distortions to link ratios as claims evolve over time. It is common in workers compensation for a temporary total claim to eventually evolve into a permanent partial claim, or a medical-only claim at 1st report to potentially become a lost-time claim at subsequent reports. The manner in which NCCI's actuaries address natural crossover will be presented later in this paper. One of the goals of the new methodology was to try to mitigate "crossover" in order to generate loss development factors that were more predictive.

2.4 How We Solved the Crossover Problem

A fresh approach was begun by investigating a new field, the injured part of body, that NCCI began collecting on its Unit Report Expansion starting with policies effective in 1996. NCCI actuaries soon began researching to see if the injured body part provided any causal relationship upon predicting whether or not a claim's loss dollar amount developed upward at later reports. The initial approach NCCI took to research its loss development methodology proceeded as follows:

1. Extract a large volume of claims containing claim-specific information such as injury type, report level, injured body part, and associated dollars of incurred loss.
2. Review the impact that critical value "crossover" (illustrated earlier) and injury type "crossover" may have upon loss development factors.
3. Determine if claim severity is an indicator of the propensity of a claim to develop.
4. Analyze the injured body part to determine if it could provide value as a predictor of a claims' propensity to develop (or not develop).
5. Group the body part and injury type combinations into those more likely to develop and those not likely to develop so that the groupings are more predictive than the serious and non-serious groupings.
6. Update NCCI's Actuarial Committee and incorporate their feedback.

Note that at the outset, the impact of the claim status (open or closed) was not considered. As the main thrust of the initial research was analyzing body part and injury type combinations, and

mitigating the crossover problem, claim status was not incorporated until much later. How claim status was incorporated into the research will be described later on in the paper. Exhibits 2 through 9 reveal the initial research findings outlined in the steps above.

The analysis of the distortion to link ratios that "cross over" caused provided valuable insight. True loss development can best be determined if claims are not allowed to migrate across different development groups to the extent possible. As claims were moving over the critical value and across the injury types, a solution was posed as to how to research whether or not the injured body part was a determining characteristic of loss development. The solution was to "lock down" the entire dataset of claims being studied at each link ratio. Thus, the exact same set of claims were observed at adjacent reports, such as 1st to 2nd, and the loss development measured accordingly. Note, the set of claims used to observe the loss development from 2nd to 3rd report could be a different set of claims than those observed at 1st to 2nd report.

This approach was the key to determining which injured body parts developed more or less than others, and as you will later read, it also helped NCCI determine that two other key claim characteristics (claim status at 1st report and injury type) can also be associated with more or less dollars of loss development.

2.4.1 How Was the Injured Body Part Approach Determined?

Two new loss development triangle groupings were envisioned. The first was a grouping of claims whose injured body parts, and associated dollars of loss, were likely to develop upwards over time. The second grouping would consist of claims whose injured body parts, and associated dollars of loss, were not-likely-to-develop upwards over time. Grouping body parts together made sense as there were 55 body part codes in the WCSP, and credible volume at a state level by injured part of body was a concern. Loss development between the two groups would have to be compared relative to one another, as the losses in some states develop significantly more than others. For example, a back claim filed in a state having a lot of attorney involvement and longer durations would be expected to develop more than a similar back claim in a state with little or no attorney involvement and shorter durations. (As an example of duration, many states have time limits for benefits, such as 300 weeks or 425 weeks for permanent partial claims.)

The next step was to determine which of the 55 body part categories would be mapped into the likely-to-develop and not-likely-to-develop. A listing of all the body part codes and the grouping to which they were mapped is shown in Exhibit 6. One drawback in using the NCCI WCSP data for

determining loss development in a long-term line of insurance like workers compensation is that only five reports of losses are provided to NCCI by carriers, yet much of the loss development can and does take place beyond the 5th report. At times, certain analyses only used four reports of data simply because the 5th and final report was not yet reported to NCCI as the body part code was introduced in 1996 for the first time.

Two different analyses were completed for body part grouping. The result of the first analysis is shown in Exhibit 3. This analysis measured loss development dollars by fixing the set of claims from 1st through 4th report (at the time, 5th report was unavailable), quantifying the observed loss development per claim as follows:

$$\frac{(\text{Reported Losses @4}^{th} - \text{Reported Losses @1}^{st})}{\text{Number of claims}}$$

This approach provided an initial insight into which body parts developed more than others. Exhibit 3 shows that the following general areas of body parts contributed the largest amount of development per case: back, head, neck, multiple body, and internal organs. The downside of using this approach as the only measure for making body part decisions is that much loss development in workers compensation happens beyond 5th report, and until recently, carriers did not report WCSP data beyond the 5th. (Starting in 2005, NCCI began collecting 6th reports of open claims, and will eventually collect up to a 10th report. This expansion will be used to extend the class loss development triangles out beyond the 5th report, and eventually to a 10th).

Thus, a second measure was considered to fine-tune the decision making for determining groupings of body parts into likely-to-develop and not-likely-to-develop categories. The second measure was to determine what percentage of claims, sorted by body part, remained open at 5th report. Exhibits 4 and 5 illustrate these results for countrywide permanent partial and temporary total claims, respectively. Those body parts having a higher percentage of open claims at the 5th report were assumed to be more likely to develop.

Actuarial judgment also played a role in the final decisions to determine into which groupings the various body parts were ultimately placed. Some consideration was given to the fact that certain body parts are considered scheduled injuries in states having scheduled permanent partial injuries. Body parts like toes, fingers, hands, feet, arms, and legs are often mandated a pre-determined dollar amount in statutory benefit schedules, and therefore, are not likely to develop upward. Exhibit 6 summarizes the grouping to which each body part has been mapped.

2.4.2 How Was the Injury Type Considered?

More refinements to the grouping logic were researched after the body part mappings were completed. The first characteristic considered was the claim's injury type. In workers compensation, different levels of indemnity benefits are paid based upon the injury type. The injury types are: fatal (F), permanent total (PT), permanent partial (PP), temporary total (TT), and medical only (MO).

Two injury types initially examined in depth were TT and PP, as this is where the majority of claims and dollars of loss resides. Once the body parts were mapped to the likely-to-develop (L) and not-likely-to-develop (N) groupings, a few different tests were performed. The first was whether or not severity was a good indicator of the likelihood of a claim developing and the second was a test to see if the groupings of body parts produced link ratios that were larger for the L grouping than the N grouping. The second test would substantiate the mapping of body parts to the L and N groupings.

Exhibit 7 shows results for both tests, again on a countrywide basis. A critical value of $26,000 was selected.[1] The claims were fixed at each adjacent link ratio to eliminate both critical value and natural "crossover" and to allow us to observe the development pattern that resulted. The results shown on Exhibit 7 clearly illustrated three key observations: 1) claim severity itself is not a predictor of higher loss development, as evidenced that claims below $26,000 developed much greater for TT than those which began at a value greater than $26,000, 2) the medical pattern behaved differently than indemnity, in that the ldf from 1st to 5th was about the same whether above or below the $26,000, and 3) claims within the L grouping developed significantly more than claims in the N grouping for both PP and TT, as evidenced by the much higher link ratios.

At this point in the research process, the feedback from NCCI's Actuarial Committee was positive, and the Committee requested to see what the new groupings and their new development pattern would look like by state as compared to serious and non-serious loss development factors (LDF). Exhibits 8 (indemnity) and 9 (medical) provide the support for LDF comparisons for two states, identified only as a large state and a small state. Note the characteristics of the serious and non-serious development factors: "crossover" generates very large serious factors and very low non-serious factors. At the same time, relative to the serious and non-serious LDF, the likely-to-develop (L) and not-likely-to-develop (N) are much different: L produces LDF patterns that are much lower

[1] $26,000 was an indemnity dollar amount determined arbitrarily assuming a typical weekly indemnity benefit of $500 per week for 52 weeks.

than serious while N is much higher than the non-serious LDF. As will be shown later on in this paper, class equity is affected in that class codes with more serious losses, such as contracting codes, will experience reduced loss costs under the new loss development methodology while classes with more non-serious losses (office and clerical) will experience increased loss costs due solely to the change in loss development methodology. (Other components of the new methodology do provide an offsetting impact. The expected excess provision is a good example as it is greater for contracting codes than it is for office and clerical.)

Also note that for Exhibit 9, the previous methodology only provided a total LDF for medical from 1st to 5th. Under the new methodology, an improvement is generated in that LDFs are bifurcated into two homogeneous groupings with distinctly different loss development patterns; that is, L and N. This refinement should improve class equity.

Exhibits 8 and 9 show LDFs on an unlimited basis and on a limited (@ $500K) basis. This is because unlimited factors are used in the previous class ratemaking methodology. The new class ratemaking enhancements include limiting individual claims at $500K. Thus, a portion of the difference in the magnitude of LDF from previous to new methodology is due solely to a loss limitation being applied to the new NCCI class loss development methodology.

It is important to note that Exhibits 8 and 9 are illustrating LDF patterns using the following loss development groupings of claims:

$$\text{Likely (L)} = \text{Fatal} + \text{PT} + \text{PP-L} + \text{TT-L} \tag{2.1}$$

$$\text{Not Likely (N)} = \text{PP-N} + \text{TT-N} + \text{MO} \tag{2.2}$$

$$\text{Serious} = \text{Fatal} + \text{PT} + \text{Major PP} \tag{2.3}$$

$$\text{Non-Serious} = \text{Minor PP} + \text{TT} + \text{MO} \tag{2.4}$$

Because most fatal and permanent total claims are open at the 5th report, it was quickly decided to put them into the L grouping. This also coincided well with the previous serious grouping. The reasoning used for assigning medical-only claims to the N grouping was that almost all of them close out quickly, and thus, are unlikely to develop further.

The injury types that provided the NCCI actuaries with the biggest challenges were the permanent partial and temporary total claims. In most states, these two injury types comprise between 70% and 80% of all loss dollars incurred. These claims also are intricately connected as

many temporary total claims evolve into permanent partial claims as injured workers reach a point in time referred to as maximum medical improvement. It was for these reasons that the research on injured body part focused on these two injury types for the most part. The L and N groupings would also benefit from a fairly even distribution of loss volume if each of these injury types were assigned to either the L or the N, based on injured body part.

It was at this point in the research that some other NCCI colleagues were becoming heavily involved in the class ratemaking research, and began asking questions and probing into the details underlying the assignment of claims into the L and N groupings. The team started investigating injury type loss development patterns closely for the large state/small state analysis, and started questioning if other URE data elements could be used to further refine the L and N groupings. Some NCCI actuaries thought the fatal claims should be N and not L. Others thought temporary total claims should all be assigned to the N grouping. Others felt the disparity between the magnitude of the LDF for the L and N groupings was not large enough. So more research was conducted to try to resolve the issue of what is the optimal loss development grouping.

2.4.3 The Final Refinements to the Loss Development Groupings

Staff explored other URE data elements to determine if their presence could better determine the likelihood that a claim might develop upward. Some of the data elements explored were claims including ALAE, the nature of injury, and the cause of injury. None of these provided any solutions. However, there was one data element that was clearly connected with the propensity of a claim to develop (or not). And that was the open or closed claim status. The majority of development was coming from claims that were open at 1st report. It seemed so logical. Almost all actuaries, and non-actuaries, would agree that closed claims are not likely to develop (note that there are a small percentage of claims that do close and reopen in workers compensation). So the research continued.

A new countrywide (all NCCI states) data extract was created for policy years 1999 through 2002 at each available report level, and for 1999, that now encompassed six reports of data. Dollars of loss were compiled for each policy year and state as follows:

- By injury type at each report level
- By the claim status open (O) or closed (C) at first report and each subsequent report level

- By the body part category L or N
- Losses were limited at $500,000
- Indemnity and medical aggregated separately
- Only states and years in URE format (Oregon did not approve URE until 1-1-02.)

The loss dollars were aggregated countrywide. Claims having an injured body part that was assigned to the L grouping were referred to as "likely" body parts. Similarly, claims having an injured body part that was assigned to the N grouping were referred to as "not-likely" body parts.[2] All claims were "locked down" at each report level to examine the impact of true loss development, and therefore, not allowed to move across subcategories. Once "locked down" at the initial report, no claims were allowed to enter or leave the group throughout the entire observed development timeframe (i.e. 1st through 6th report or 2nd through 6th report). This is a different variation of the "lock down" than that used earlier in the initial research of injured part of body, where the set of claims was the same only for adjacent reports for determining a link ratio. The loss dollars were segregated into the following four subcategories and the LDF were computed:

- LO — "likely" body part and claim open at 1st report
- LC — "likely" body part and claim closed at 1st report
- NO — "not-likely" body part and claim open at 1st report
- NC — "not-likely" body part and claim closed at 1st report

Exhibits 10 and 11 display a myriad of LDF combinations that have become the heart and soul of the new loss development proposal. Every injury type is broken out into the four subcategories and for policy years 1999 and 2000, the LDF are illustrated from 1st – 6th and 1st - 5th, respectively. The LDF patterns provided NCCI with remarkable evidence suggesting further refinements to the loss develop groupings should be made. Several key observations and conclusions generated from the analysis illustrated on Exhibits 10 and 11 follow. Specifically, for permanent partial (PP), temporary total (TT), and medical-only (MO) claims:

1. Losses from claims in the L body part categories consistently develop much more than

[2] In the future, NCCI may rename the "likely" body parts as Part of Body Group A and the "not-likely" body parts as Part of Body Group B to differentiate the body part assignments from the loss development groupings.

its N counterpart. Thus, the body part assignments are sound.

2. Claims that were open (O) at 1st report develop much more than the closed (C) claims do. Thus, the combination of L and O at 1st report generates the largest LDF by far.

3. Focus on the arrows on Exhibit 10 for TTLC and PPLC. Claims that were L and closed (C) at 1st report align more closely with the TT-N and PP-N grouping. Thus, by moving claims having the combination of L and C at 1st report into the N grouping further refines the LDF patterns.

4. Exhibit 11, Option 1 demonstrates that a greater differentiation in LDF magnitude occurs when the likely closed (LC) claims were removed from PP and TT and placed in the N grouping. This is seen by a comparison of Option 1 relative to the grouping labeled "current" in the row above it. (Thus, within option 1, L = Fatal + PT + PPLO + TTLO.)

5. Although similar LDF patterns were observed for MO, it was decided to keep all MO claims in the N grouping for two reasons: a) only 1% of all losses shift, and b) some carriers may report their entire inventory of MO claims as closed claims when reporting WCSP data to NCCI, which could be problematic.

6. Claims from the permanent total (PT) and fatal injury types do <u>not</u> demonstrate the same pattern of loss development characteristics. That is, the L and N body part categories do not discern loss development patterns as it does in other injury types. The LDF behave in the opposite manner (i.e., L < N). Also, the opposite behavior happens with the open and closed claim status LDF (C > O).

The results of the last observation suggested that even more research should be conducted on the development patterns of fatal and PT claims. Natural "crossover" across injury types further complicates the analysis so three groups of fatal and PT claims were created and the LDF observed:

- Those claims which remained within the injury type across all report levels
- Those claims that moved into the fatal and PT injury types after initially being reported as another injury type at 1st report
- Those claims that migrated out of the injury type at later reports after initially being reported as fatal and PT at 1st report

In this analysis, the injury type of claims were observed at 6th report for PY 1999 and 5th

report for PY 2000. Assuming the most recent reported injury type is the best observation for these PT and fatal claims, we then observed the injury type of these claims at 1st report. Exhibit 12 shows the loss development patterns for the three groups of fatal claims while Exhibit 13 shows the same for the PT claims. Several key observations, conclusions, and reasoning follow that were generated from the analysis illustrated on Exhibits 12 and 13. And, importantly, the debate over whether fatal claims should be placed in the L or N grouping was resolved.

1st observation: Fatal claims (at 6th or 5th report), which were reported initially as a fatality at 1st report, distinctly developed downward from 1st through 6th (and 5th) report (see top section of Exhibit 12).

Conclusion #1: Move fatal claims at 1st report into the N grouping, and no longer assign them as likely-to-develop.

Reasoning: This one makes practical sense because only the dependents, if any, of the deceased worker receive benefits and these benefits are defined streams of payments over time in most states. A few states pay a predetermined lump sum of money to beneficiaries. Also, there is no need for carriers to estimate case reserves for future medical costs when the injured worker dies.

2nd observation: Claims that become fatalities at subsequent reports (2nd through 6th) developed significantly upward from 1st to 6th (and 5th) report (see middle section of Exhibit 12).

Conclusion #2: Claims that become fatalities at subsequent reports (2 nd through 6th and eventually 10th report) will continue to be categorized in the L grouping.

Reasoning: Claims of this nature were observed within all injury types, and conditions subsequently worsened to the point where the injured worker died. Large amounts of upward loss development dollars were observed, and medical costs become very large in many of these claims over time.

Note at the bottom of Exhibit 12 a small amount of claims reported as fatalities at the 1st report actually moved to other injury types at subsequent reports. Upon investigating several of them, it was concluded that compensability was actually an issue. In other words, some claims were contested as to whether or not the death was due to work-related causes. In a few other instances, the initial injury type was simply misreported and corrected. As a group, this small number of claims did develop downwards and will be assigned to the N grouping.

Now refer back to Exhibit 11, Option 2. It demonstrates that a greater differentiation in

LDF magnitude occurs, particularly for indemnity, when the fatal claims at 1st report were removed from the L grouping and placed in the N grouping. This is seen by a comparison of Option 2 relative to the groupings labeled "current" and Option 1 in the rows above it. (Thus, within option 2, L = Fatal – Fatal @1st + PT + PPLO + TTLO.)

3rd observation: An overwhelming number of PT claims (at 6th or 5th report), which were reported initially as other injury types at 1st report, developed significantly upward from 1st through 6th (and 5th) report (see middle section of Exhibit 13).

Conclusion #3: Categorize all PT claims, regardless of the report, into the L grouping.

Reasoning: Many PT claims were observed whereby they were initially reported as another injury type, and conditions subsequently worsened to the point where the injured worker became permanently totally disabled. Large amounts of upward loss development dollars were observed, and the medical costs become very large in many of these claims over time. Also, almost all PT claims were open at 1st report and were comprised mainly of Group A parts of body (i.e., likely).

It should be noted that a subset of PT claims that stayed within the PT injury type at all reports had a slight downward development (see top of Exhibit 13). After considering moving those out of the L grouping, similar to fatal at 1st report, it was decided to be appropriate to keep assigning them to the L grouping, as most were still open at a 6th report, and could eventually develop upwards out in the tail if the claimant's condition worsened in the future.

Thus, Option 2 on Exhibit 11 represents the proposed final L grouping, which excludes fatalities at 1st report, and includes all PT claims. The equation is as follows:

$$L = \text{Fatal} - \text{Fatal}\ @1^{st} + \text{PT} + \text{PPLO} + \text{TTLO}. \tag{2.5}$$

2.4.4 What about the Tail Factor?

The tail factor in workers compensation presents a formidable challenge to NCCI actuaries. In aggregate ratemaking, in order to determine a state's overall indicated change in loss cost or rate level, a tail factor is estimated separately for indemnity and medical and attached currently at a 19th report. NCCI financial call data is used as the source. However, only five reports of the WCSP data,

which is the basis for class relativities, was required to be reported to NCCI by its affiliated carriers. This has changed recently. Beginning with policy year 1999, NCCI is now collecting up to 10 reports of open claims.

For class ratemaking, in order to maintain consistency for a state's class relativities, the financial tail factor is used as a starting point. NCCI actuaries assume that 100% of loss development beyond the 5th report is due to development on the serious claims, and 0% due to development on non-serious claims. A 5th – ultimate LDF is computed from the state financial data, referred to below as Fin5U. Thus, the following formula is used for indemnity losses to determine the class ratemaking 5th – ultimate LDF, referred to below as $Class5U_I$. It is applied to serious losses at 5th report.

$$Class5U_I = [SER\$_I + (SER\$_I + NS\$_I) * (Fin5U_I - 1.000)] / SER\$_I. \quad (2.6)$$

Where,

$SER\$_I$ = two years of limited "paid+case" serious indemnity loss dollars on-leveled and developed to 5th report for the state;

$NS\$_I$ = two years of limited "paid+case" non-serious indemnity loss dollars on-leveled and developed to 5th report for the state;

$Class5U_I$ = unlimited 5th – ultimate indemnity (I) tail factor applied to <u>serious</u> losses at 5th report for each class code. No tail is applied to non-serious losses;

$Fin5U_I$ = Unlimited statewide financial data 5th – ultimate tail factor for indemnity (I).

The same exact approach is also used to determine a 5th – ultimate tail factor for medical losses, but is not shown here. Only the subscript would change from (I) to (M). Also note that although individual claims are limited in the current NCCI ratemaking at five times the state's serious average cost per case, loss development factors are unlimited. By rearranging the formula, the following is derived:

$$Class5U_I = Fin5U_I + [(NS\$_I / SER\$_I) * (Fin5U_I - 1.000)] \quad (2.7)$$

Note that the magnitude of the class tail factor is inversely proportional to the percentage of serious losses in a state relative to the non-serious losses. The lower the percentage of serious losses, the higher the class ratemaking tail factor that is applied to the serious losses. Again, recall Exhibits 8 and 9, and how much higher the serious LDF-to-ultimate towered above the likely-to-develop LDF-to-ultimate in the bar charts. A good portion of that phenomenon is due to the pro rata share of serious and non-serious losses in a state. States with lower percentages of serious losses relative to non-serious generally have a much higher serious tail factor applied, all else equal. As you will see shortly, the new class ratemaking loss development methodology will modify that phenomenon of a highly leveraged tail factor.

The tail factor under the new methodology starts with a similar formula to determine the class ratemaking 5th – ultimate LDF, referred to below as Class5U. The notation is analogous except the likely-to-develop (L) and the not-likely-to-develop (N) groupings are substituted for serious and non-serious. From an analysis of other states, initial indications are that the pro rata share for L and N is closer to 50% than for serious and non-serious.

The previous methodology assumed that all loss development in the tail beyond 5th report is due to serious claims only. This implies that 100% of the tail loss dollars were applied to serious and 0% applied to non-serious. NCCI is modifying this assumption to be that a percentage of tail development, *y*, will be applied to the N grouping dollars of loss and (1-*y*) will be applied to the L grouping dollars of loss. This practicality allows a portion of tail development to be applied to the not-likely-to-develop losses. Thus, two new class ratemaking tail factors could be applied at 5th report, one for L and one for N. The formulas are as follows:

$$\text{Class5U}_{L,I} = [L\$_I + (1\text{-}y)*(L\$_I + NL\$_I)* (\text{Fin5U}_I - 1.000)] \,/\, L\$_I. \quad (2.8)$$

$$\text{Class5U}_{N,I} = [NL\$_I + y*(L\$_I + NL\$_I)* (\text{Fin5U}_I - 1.000)] \,/\, NL\$_I. \quad (2.9)$$

Where,

$L\$_I$ = two years of limited likely-to-develop "paid+case" indemnity loss dollars on-leveled and developed to 5th report for the state.

$NL\$_I$ = two years of limited not-likely-to-develop "paid+case" indemnity loss dollars on-leveled and developed to 5th report for the state.

$Class5UL_{L,I}$ = a likely-to-develop 5th – ultimate indemnity (I) tail factor applied to likely-to-

develop losses at 5th report for each class code. It is limited at state threshold T.

Class5UL$_{N,\ I}$ = A not-likely-to-develop 5th – ultimate indemnity (I) tail factor applied to not-likely-to-develop losses at 5th report for each class code. It is limited at state threshold T.

Fin5U$_I$ = Limited (at T) statewide financial data 5th – ultimate tail factor for indemnity (I).

y = percentage between 0% and 100% used to allocate a portion of tail development dollars to the not-likely-to-develop grouping.

Note that the new methodology uses limited loss development dollars (all claims are limited at $500K at all report levels). The previous methodology only limited loss dollars at the latest report, while LDF were unlimited. The same exact approach is also used to determine a 5th – ultimate tail factor for medical losses, but is not shown here. Only the subscript would change from (I) to (M).

As NCCI collects URE data out to a 10th report, *y* could vary in magnitude as the tail attachment moves out toward 10th report. For example, at 5th report, *y* may be a higher percentage than what *y* would be at 10th report. It is also a consideration worth noting that *y* could vary between indemnity and medical. Based on very recent research observing actual WCSP loss development patterns through 7th report, NCCI is initially using a value of 20% for *y* for both indemnity and medical for all tail attachment points out to 10th report. Thus, 80% of the total dollars of tail development will be assigned to the likely-to-develop loss triangle, and 20% of the dollars to the not-likely triangle. NCCI will revisit this assumption when more WCSP unit reports are available through 10th report.

The formulas above may be written in a more general form to account for the various tail attachment points that may be used in the future. Let each tail attachment point be time *t*, *t* = 5,6,7,8,9,10. Then the formulas above may be rewritten as follows:

$$\text{Class } tU_{L,I} = [L\$_I + (1\text{-}y)*(L\$_I + NL\$_I)* (\text{Fin } tU_I - 1.000)] \ / \ L\$_I \qquad (2.10)$$

$$\text{Class } tU_{N,I} = [NL\$_I + y*(L\$_I + NL\$_I)* (\text{Fin } tU_I - 1.000)] \ / \ NL\$_I \qquad (2.11)$$

Where,

*L$*$_I$ = two years of limited likely-to-develop "paid+case" indemnity loss dollars on-leveled and developed to *t*th report for the state.

$NL\$_I$ = two years of limited not-likely-to-develop "paid+case" indemnity loss dollars on-leveled and developed to t^{th} report for the state.

Class $tU_{L,\ I}$ = A likely-to-develop t^{th} – ultimate indemnity (I) tail factor applied to likely-to-develop losses at t^{th} report for each class code. It is limited at state threshold T.

Class $tU_{N,\ I}$ = A not-likely-to-develop t^{th} – ultimate indemnity (I) tail factor applied to not-likely-to-develop losses at t^{th} report for each class code. It is limited at state threshold T.

Fin tU_I = Limited (at T) statewide financial data t^{th} – ultimate tail factor for indemnity (I).

y = percentage between 0% and 100% used to allocate a portion of tail development dollars to the not-likely-to-develop grouping.

t = time t representing the report level of WCSP data at which the attachment point for the class ratemaking tail is applied. t = 5,6,7,8,9,10

One improvement in the revised tail factor is the distribution of losses between L and N are more evenly distributed than the previous serious and non-serious distribution. This should help temper the leverage on the LDF in the new methodology. The tail factor is an area that warrants continued research, and should improve as 10 reports of data are analyzed.

2.4.5 Summary of the New Loss Development Proposal

Table 1 summarizes all of the decisions that were researched, discussed, and made by NCCI up to this point in the paper. It introduces the Part of Body Group A and Group B terminology to refer to parts of body that are assigned to the likely-to-develop (L) and the not-likely-to-develop groupings (N), respectively. POB Group A consists of claims that have a greater potential to develop upward over time such as injuries to the back, head, shoulders, trunk, and multiple body parts. POB Group B consists of all others.

Under NCCI's new loss development methodology, claim dollars will be assigned to one of four development categories (listed below). The assignment will be a function of three claim characteristics: (1) injury type, (2) part of body, and (3) claim status (open vs. closed).

- Medical — Likely-to-develop
- Medical — Not-Likely-to-Develop
- Indemnity — Likely-to-Develop
- Indemnity — Not-Likely-to-Develop

Table 1

Injury Type	Claim Status	Part of Body	LDF Grouping
1st Report			
Fatal	Open	Group A	Not Likely
"	Open	Group B	Not Likely
"	Closed	Group A	Not Likely
"	Closed	Group B	Not Likely
Permanent Total (PT)	Open	Group A	Likely
"	Open	Group B	Likely
"	Closed	Group A	Likely
"	Closed	Group B	Likely
Permanent Partial (PPD)	Open	Group A	Likely
"	Open	Group B	Not Likely
"	Closed	Group A	Not Likely
"	Closed	Group B	Not Likely
Temporary Total (TT)	Open	Group A	Likely
"	Open	Group B	Not Likely
"	Closed	Group A	Not Likely
"	Closed	Group B	Not Likely
Medical Only (MO)	Open	Group A	Not Likely
"	Open	Group B	Not Likely
"	Closed	Group A	Not Likely
"	Closed	Group B	Not Likely

At subsequent reports (2nd through 10th), as noted above, only changes in injury type will be monitored for the purpose of assigning claims to development grouping. The claim status (open vs. closed) and body part, both evaluated at 1st report, will be used for the purpose of determining the development category, regardless of what is reported on a subsequent report.

The term "arising" refers to claims for which there is no 1st report that are reported as of 2nd report or subsequent. For the purpose of assigning claims to a development category, these claims will be assumed to be open at 1st report. The body part will be based upon the initial report submitted to NCCI. The injury type will be monitored at all reports.

Note the new loss development methodology will significantly reduce, but not completely eliminate, instances of crossover. The following list provides a few common examples of how crossover may still occur under the new methodology in certain injury types:

- Medical Only (MO) — MO claims in POB Group A, open at 1st report, which become any other injury type at a later report, will move from N to L. Another example is a lost-time claim, open at 1 st report and in POB Group A, which closes as a medical only. This claim would move from L to N.
- Temporary Total (TT) — Crossover would occur on TT claims that evolve into a PT or fatality at a later report that were originally categorized in the N grouping.
- Permanent Partial (PP) — Crossover would occur on PP claims that evolve into a PT or fatality at a later report that were originally categorized in the N grouping.

These examples represent the most common crossover examples. A few other less likely (no pun intended) cases could be conjured as well.

Exhibits 23a through 23f illustrate the loss development pattern of the new loss development methodology for a "test" state. Note this is a different state than the triangles illustrated in exhibit 1 for a "large" state. The reader should be able to discern the differences in the loss development patterns and the magnitude and derivation of the tail factor.

2.4.6 Advantages and Disadvantages of the New Loss Development Groupings

The most important advantage the new loss development methodology provides is better, more predictive loss development factors. Expanding the triangles out to 10th report should also improve the predictive ability. Much crossover has been mitigated due to the elimination of the critical value, and the new data element combination of body part, injury type, and claim status has improved the LDF groupings. Most importantly, class equity should improve as the class codes with more head, back, trunk, multiple body, etc., types of injuries will be charged more than class codes with other less complex injuries, all else equal. Thus, loss costs should be more predictive in the future.

The use of injured body part in conjunction with the open and closed claim status also adds

a practical sense of logic to it all that most regulators and insurance industry actuaries and non-actuaries should readily understand.

About the only disadvantage the new methodology has is that as claims evolve over time, and change injury types, some crossover from one grouping to another can still occur on occasion.

2.5 Lower Loss Limits, Expected Excess, and the New Seven Hazard Groups

The previous class ratemaking methodology limited large claims for a class code at a loss limit equal to five times the state's serious average cost per case. For the NCCI states, these limits ranged from $300,000 to about $1M during the 2006 filing season. A multi-claim occurrence was capped at twice the single claim limit. The claims underlying the loss development factors were unlimited. It should also be noted that the excess dollars removed from the individual class codes were distributed to the industry group to which the class code belonged. Thus, the indicated losses used within the industry group differential calculations were put back on an unlimited basis by deriving an unlimited-to-limited ratio for each industry group. In summary, the previous class ratemaking methodology limited large claims on a class code basis and in most other aspects of the ratemaking, unlimited loss dollars were used.

The new ratemaking methodology is changing much of that. The most noteworthy changes are as follows:

1. Standardizing the single claim loss limit for class codes across NCCI states to be $500,000 (and the multi-claim occurrence to be three times the single claim limit).
2. Basing loss development factors on claims limited at $500,000.
3. Use of a multiplicative factor based on excess ratios to estimate the expected losses excess of $500K using excess ratios from the new seven hazard group mapping.
4. Removing the unlimited-to-limited ratio from the class and industry group differential calculations, and replacing it with expected excess.

This section of the paper will discuss and summarize the analyses and reasoning underlying these decisions.

2.5.1 Applying the Loss Limitations to Individual Claims

In workers compensation ratemaking, losses are separately analyzed by type of benefit; namely,

indemnity and medical losses. NCCI uses proportional capping to allocate limited claim amounts. This method of capping large claims for class ratemaking remains similar under the new methodology. The WCSP losses used in class ratemaking are "paid+case". Limited loss amounts for claims above the threshold will be allocated to indemnity and medical in the proportion that their values contribute to the total unlimited value of the claim and the threshold. In order to understand the mechanics of how claims are limited, the following hypothetical illustrative example is included:

Illustration 1: A $1.5M single claim has pierced the threshold on a "paid+case" basis; State threshold = $500K:

UNLIMITED LOSSES ($000s)	**Paid**	**Case**	**Total**
Indemnity	100	200	300
Medical	300	900	1,200
Total	400	1,100	1,500

In this situation, the resultant limited amounts are as follows:

LIMITED LOSSES ($000s)	**Total**
Indemnity	100
Medical	400
Total	500

In Illustration 1, the formula for limited "paid+case" amounts for indemnity and medical are:

Limited Indemnity = (300 / 1,500) x 0.5M = 100.

Limited Medical = (1,200 / 1,500) x 0.5M = 400.

Note that the NCCI procedure for capping large claims in the financial data is different than for class ratemaking. The financial data procedure uses a "paid first-case reserve second" approach that uses proportional capping. Although an illustration of the multi-claim occurrence capping is not

included here, proportional capping amongst the claims is applied. The threshold was changed to be three times the single claim limit mainly because the previous single claim limit (i.e., five times the state's serious average cost per case) times two is about $1.5M on average across NCCI states. With the change of the single claim limit to 0.5M, the choice of three times the single claim limit kept the multi-claim cap approximately the same as in the past.

2.5.2 Application of the Excess Ratios

Adjusted per claim excess ratios will be used in calculating unlimited ultimate losses from limited ultimate losses. Excess losses are defined as the sum of the excess portion of claims above a given per claim threshold. NCCI produces proposed excess ratios with each loss cost or rate filing.

The excess ratio, XS_T, for a given threshold T, is defined as:

$$XS_T = \frac{\text{Expected Excess Losses Above Threshold } T}{\text{Expected Total Unlimited Losses}} \tag{2.12}$$

The threshold T is proposed to be $500,000 in all states for class ratemaking claim limitations. The ratio of excess losses to total unlimited losses is at an ultimate value. The excess ratio applied is on a per claim basis and varies by state. This differs from an excess loss factor as excess loss factors are on a per occurrence basis, and also may include a provision for expenses. For a more detailed discussion of the methodology underlying NCCI excess ratios, see the Fall 2006 CAS *Forum* paper by Engl and Corro titled, "The 2004 NCCI Excess Loss Factors" [1].

The adjusted, per claim excess ratio is applied as a factor, $1/ (1 - XS_{500K})$, to limited (@500K) ultimate losses that have been developed, on-leveled, and trended to the midpoint of the proposed filing effective period. Similarly, the excess ratio applied has also been trended to the midpoint of the proposed filing effective period. Within each policy period in the experience period, the same factor $1/ (1 - XS_{500K})$ is applied to both indemnity and medical losses, since the size-of-loss distributions are on a combined indemnity and medical basis.

NCCI uses five policy periods as the experience period for each class code. Excess ratios are <u>not</u> adjusted when applied to different experience period years for purposes of calculating pure premiums for class ratemaking. Therefore, in a given filing, the same excess ratio factor is applied to each of the five years in the experience period. NCCI considered de-trending the threshold as is

done in the state's overall indicated loss cost level change. By de-trending the threshold in the loss development history, the proportion of losses above the threshold is preserved. But unlike the aggregate ratemaking, where thresholds are de-trended 20 years, and the impact of de-trending can be significant, the impact of de-trending across the five policy periods used in class ratemaking resulted in a negligible impact on class relativities. Practically speaking, it would add a lot of complication to de-trend the five policy periods for little or no added value. For this reason, NCCI chose not to de-trend in its class ratemaking.

For many years, the excess ratios were determined for each of the four hazard groups in each state: that is, hazard groups I, II, III, and IV. The vast majority of classes were assigned to HG II and III. In 2006, NCCI filed a countrywide item-filing, B-1403, which was successfully approved in all NCCI states and adopted by other independent bureau states as well. Based upon an analysis of countrywide excess ratios by class code, an entirely new mapping of class codes to seven hazard groups was implemented in 2007. This item-filing is referred to as the NCCI Hazard Group Remapping. One of the advantages that the new mapping provides is a much more uniform distribution of class codes across the hazard groups.

The seven new hazard groups are referred to as A, B, C, D, E, F, and G. Class codes having the highest excess ratios were mapped to G and may be considered the most hazardous classes. Class codes having the lowest excess ratios were mapped to hazard group A and may be considered the least hazardous classes. As you will soon see, the new hazard groups will be used to provide an excellent refinement for use in the future class ratemaking. This is because excess ratios are now produced for every state for all seven hazard groups. For a more detailed discussion of the methodology underlying the NCCI hazard group mapping, see the paper by NCCI staff titled, "NCCI's 2007 Hazard Group Mapping" submitted for publication [2].

2.5.3 Simulation and Expected Excess

The factor $1/ (1 - XS_{500K})$ was selected by NCCI for use in the new class ratemaking to derive expected unlimited ultimate losses by class code based on limited (@500K) ultimate losses. It was selected after reviewing results from 16 different potential capping and excess spreading alternatives analyzed using a Monte Carlo simulation technique. Some alternatives used expected excess while others used actual excess. Other alternatives capped individual claims at three different

loss limits: $300K, $500K, and $1.0M. One alternative used unlimited losses. Exhibit 14 illustrates all of the options considered and analyzed.

The simulation approach of testing the alternatives was completed as follows:

1. Five years of simulated losses were produced for every class code in two large states and two small states.

2. The claim counts were based on actual national incidence rates for the class code. A Poisson distribution was assumed with lambda equal to the national incidence rate by injury type multiplied by actual payroll for the class in each state.

3. The new excess ratio loss distributions by injury type by state (per Corro and Engl) were used for determining the average cost per case. In determining the state distributions, each class was scaled to the state's average cost per case adjusted for hazard group.

4. One hundred different simulation trials by class code were produced. Each simulation generates five years of unlimited loss data for the given class.

5. The simulated claims' loss data was then modified by the specific capping alternative to provide modified expected unlimited losses.

6. The performance of each alternative was assessed using four overall metrics. Two of the metrics measured loss cost adequacy and two measured loss cost stability across the 100 simulation trials.

The following are the four metrics that were used to assess the success of the various alternatives for limiting claims and allocating the excess.

Adequacy Metric 1: Desired range [-0.25, +0.25]

$$\frac{\overline{L}^{(k)} - \mu}{\mu} \tag{2.13}$$

Where,

L_n = 5 years of simulated losses for the nth trial whereby n = [1, 2, …100]

$L_n^{(k)}$ = 5 years of simulated losses for the nth trial whereby the losses were capped as in alternative k for limiting losses and allocating the excess (see Exhibit 14 for alternatives).

μ = hypothetical mean expected losses for a class code based on simulated frequency and actual severity times actual class payroll for that state.

$\overline{L}^{(k)}$ = the average losses for a specific class code over N simulations for alternative k.

Mathematically, it equals:

$$\overline{L}^{(k)} = \left(\sum_{n=1}^{N} L_n^{(k)}\right) / N. \tag{2.14}$$

Adequacy Metric 2: Desired range [0, +0.50]

$$= \sum_{n=1}^{N} \left| L_n^{(k)} - u \right| / 100u. \tag{2.15}$$

This metric differs from the first in that the high and low values cannot cancel out due to the absolute value.

Stability Metric 1: Desired range [0, +0.10]

$$CV_c^{(k)} = \frac{\text{standard deviation}}{\text{mean}} = \frac{\sqrt{\sum_{n=1}^{N} (L_{n,c}^{(k)} - \overline{L}_c^{(k)})^2}}{\overline{L}_c^{(k)}} \quad (2.16)$$

Where,

$CV_c^{(k)}$ = the coefficient of variation for class code c under alternative k.

$L_{n,c}^{(k)}$ = 5 years of simulated losses for the nth trial for class c whereby the losses were capped as in alternative k for limiting losses and allocating the excess.

$\overline{L}_c^{(k)}$ = average of simulated losses for alternative k over all simulations

Thus, stability metric 1 is the coefficient of variation for a specific class under the conditions of alternative k for capping claims and allocating the excess.

Stability Metric 2: Desired range [0, +0.50]

$$\frac{\sum_{n,m} \frac{\left| L_{n,c}^{(k)} - L_{m,c}^{(k)} \right|}{u_c}}{N(N-1)} \quad (2.17)$$

Where,

$L_{n,c}^{(k)}$ = 5 years of simulated losses for the *n*th trial for class c whereby the losses were capped as in alternative *k* for limiting losses and allocating the excess.

$L_{m,c}^{(k)}$ = 5 years of simulated losses for the *m*th trial for class *c* whereby the losses were capped as in alternative *k* for limiting losses and allocating the excess.

μ_c = hypothetical mean expected losses for a class code based on simulated frequency and actual severity times actual class payroll for that state.

For the performance measurement of stability metric 2, the average absolute change in losses for a class is computed across all combinations of the 100 simulations for each alternative *k*.

2.5.4 Choosing the Final Alternative

Exhibits 15a) and 15b) were included to provide an illustrative example of the type of exhibits that were generated and observed for all four of the metrics for each state studied. Several statistics were analyzed such as minimum and maximum values, the classes which comprised these outliers, and various different percentile levels such as the 90th, 10th, and the median. It was noted which capping and excess-spreading alternatives were succeeding the most and which ones were not succeeding. For example, on Exhibit 14a) alternative *k* = 0, which uses unlimited losses, performed most poorly as measured by the stability metric 1. Alternatives 11 and 12, which use expected excess, performed the best. Exhibits similar to 15b) were produced for each alternative so that we understood how many classes were changing within an industry group and by how much. This exhibit shows a drill down on Alternative 12 for adequacy metric 1. Outlier classes were sometimes reviewed, and often a class that performed poorly was a very small volume class. Typically, the outlier class had no losses for almost all of the simulation trials but a few. This is a real-life challenge that the various credibility formulae attempt to address. For the sake of brevity, the author has only chosen but a few examples simply to illustrate for the reader the type of analyses that were completed to select between alternatives for capping and allocating excess.

The final two loss limits NCCI considered were $300,000 and $500,000. The $1M loss limit was eliminated based on class stability considerations. It would have increased the loss limit significantly in most states. The expected excess at $300,000 was very significant upon reviewing the results of indicated pure premiums by class code in states with high excess ratios. The choice of the $500,000 limit provided a nice balance between allowing a significant amount of actual loss experience of the class code into the pure premium calculation combined with less reliance on the expected excess provision. It was significantly lower than the loss limit used today, namely that based on five times the state serious average cost per case (SACC). Test results also revealed that actual excess losses were closer to expected excess losses at $500,000 than the lower loss limit. It also aligned well with the fact that the 95th percentile of all countrywide large claims over a five year period was 2.5 times the SACC, one-half of the previous loss limitation. NCCI decided to target the 95th percentile, or approximately $500,000. Another practical consideration was that the loss limit coincides with the loss limit on the NCCI Large Loss Call #31. The choice of loss limit will be reviewed in the future upon review of the results of the new methodology, and may be updated for inflation periodically.

After reviewing the results of indicated pure premiums derived under the best performing alternatives for several states, Alternative 11 was chosen by NCCI to be the methodology for allocating the excess losses (over $500K) on a class code basis. The main reasons for this decision were:

1. Alternative 11 performed very well on the four metrics.
2. The use of the multiplicative excess factor, $1/ (1 - XS_{500K})$, is consistent with the methodology used for determining the overall statewide indicated loss cost change.
3. Given two class codes of similar size within the same hazard group in a state, the class with greater primary losses would receive a greater proportional share of excess losses under alternative 11.
4. After application of the three-way credibility procedure, alternative 11 produced very similar results compared to the other leading alternatives.

One final adjustment was made to the multiplicative excess factor methodology. Recall that the NCCI excess ratios are produced on a combined indemnity and medical basis. This implies that the excess split of losses into indemnity and medical under Alternative 11 is equivalent to the primary split of indemnity and medical. As varying amounts of credibility will be applied separately for indemnity and medical in the new class ratemaking methodology, a refinement was needed to account for the fact that the majority of excess loss in workers compensation is due to the medical component.

One more analysis was prepared to study this and the result is shown in Exhibit 16. This analysis shows only claims excess of $500,000 and the indemnity and medical split of primary and excess dollars. Note the results show an approximate split of the excess dollars to be around 71% medical. Similar results were derived using WCSP data.

NCCI decided it was desirable to apply the $1/ (1 - XS_{500K})$ factor to indemnity and medical primary losses by class code initially to preserve the correct total excess dollar amount. An adjustment is then made to transfer 40% of the total excess dollars produced within the indemnity pure premium component to the medical pure premium component. The practical reasons for transferring 40% of the indemnity excess dollars include the following considerations:

- It preserves state and class differences as it is a function of the actual primary indemnity and medical split.
- It achieves the desired higher proportion of medical excess (i.e., close to the 70% figure across all states combined).
- It never results in a medical excess provision percentage that falls below the medical primary provision percentage for any class or state.
- It mirrors the reality that more of the excess dollars are medical.

2.5.5 Implications on the Industry Group (IG) Differential Methodology

NCCI is maintaining its IG differential methodology, and it will look very similar to how it is done under the current methodology. The value that the IG differential calculation adds to class ratemaking is:

- It reflects wage trend differences by industry group.
- The industry group rate change is applied to determine the present-on-rate-level pure premiums, which are important for low credibility class codes.
- It was the point where losses were brought to an unlimited basis in the previous methodology.

The majority of the calculation will look the same as before. Oversimplified, the IG differential is a ratio of five years of indicated losses from WCSP data to five years of expected losses, both brought to the proposed level. As a result of the methodology changes discussed to this point, a few changes had to be addressed within the calculations. They were:

1. The unlimited-to-limited ratio by IG was removed.
2. The new loss development groupings were applied to bring indicated losses to an ultimate level limited at $500K.
3. The ultimate losses limited at $500K will be brought to an expected unlimited level via the multiplicative excess factor and transfer of 40% of the indemnity excess to medical.
4. The full credibility standard was changed to 12,000 lost-time cases. It previously ranged from 7,000 to 11,000 by IG. This will be discussed further in the credibility section of the paper.

An example of the IG differential exhibit is found in Appendix B, which displays the calculation of a loss cost for a class code under the new methodology.

2.6 New Credibility Standards

It was mentioned early in the paper that in 1993 NCCI modified the credibility formulas

used in the class ratemaking. This is because changes were made to the experience period and number of industry groups, both going from three to five. The past formulas were derived using a limited fluctuation approach. The full approach is quite involved and a full expose may be found in NCCI Actuarial Committee Agenda, dated June 7, 1993 (ACT-93-7) [3]. This paper will present a very high-level overview of the past approach, and the challenges NCCI faced updating the credibility standards this time around.

The new class ratemaking approach is adding stabilizing features that, all else equal, suggest the full credibility standards should be modified to provide more credibility on pure premiums. Those features include:

- a lower loss limit of $500K should reduce class fluctuations
- less volatile loss development factors due to reduced crossover and the introduction of a $500K loss limit
- less variance in excess losses by using expected excess factors

There was also a change within the new class ratemaking that may suggest reduced credibility on pure premiums:

- Eliminating the serious and non-serious pure premiums and creating a more heterogeneous indemnity pure premium.

The challenge NCCI faced was how to modify the full credibility standards, and by how much, for the changes being made without having the benefit of being able to observe the results of the new methodology over a substantial period of time.

2.6.1 Background of Previous Class Credibility Formulae

The previous methodology determined full credibility standards in 1993 based on the actual variability of indicated pure premiums over five successive rate revisions as measured by a

coefficient of variation (*CV*). The rate revisions were all brought to a common level of the latest revision. An average of the expected number of claims (*N*) for each class over the five revisions was computed by dividing its expected losses by its average cost per case in that revision.

Next, the expected number of claims by class was plotted on the *x*-axis versus the *CV* on the *y*-axis and regression statistics observed for several states. At the end, the following model was used:

$$\ln CV = a \ln N + b \tag{2.18}$$

Where,

CV = coefficient of variation of indicated pure premiums over five rate revisions

N = expected number of claims

N_f = full credibility standard

Rearranging the formula and exponentiating, the partial credibility z, assigned to the indicated pure premium in order to limit variability to an acceptable amount is:

$$Z = CV \text{ acceptable}/CV \text{ actual} = (N_f^{\,a}\, e^{\,b} / N^a\, e^{\,b}) = [N/N_f]^{-a} \tag{2.19}$$

The acceptable value for the *CV* was .10, chosen so as to limit the fluctuation of the pure premiums to within +/- 25% (NCCI swing limits) 95% of the time. The exponent, *a*, was computed as the slope of the regression line, and was determined to be approximately -0.4 using 95% confidence intervals. Thus, the final formula used today for all NCCI states is:

$$Z = [N/N_f]^{0.4} \tag{2.20}$$

The table below provides the full credibility standards previously in effect for the state class indicated pure premiums.

Table 1: Indicated Pure Premiums

Partial Pure Premium	**Full Credibility Standard N_f**
Serious	125
Non-Serious	350
Medical	750

The value N_f is applied to the average cost per case for each partial pure premium to derive a full credibility standard (FCS) of expected losses used across all class codes in each state's loss cost filing. The numerator of the class credibility formula is the class expected losses determined by the payroll for a class times its underlying pure premium. One unusual nuance was that the medical partial pure premium FCS used the non-serious indemnity average cost per case. This is being changed, as will soon be described in this paper.

2.6.3 Class Credibility Changes for the State Indicated Pure Premium

The new methodology is eliminating the critical value which helped determine the serious and non-serious partial pure premiums. The new methodology is reducing the number of pure premiums to two: indemnity and medical. So the question was raised as to what credibility to assign to each, given the observed results of the new methodology were not available.

As mentioned earlier, there were stabilizing changes being put in place for the new ratemaking, and a countering influence from the added heterogeneity of the indemnity pure premium. Thus, the decision was made to compute new credibility standards that maintained approximately the same credibility as was applied in the previous ratemaking. Longer term, after five years of the new methodology can be observed, new regressions of the fluctuations of indicated pure premiums can be calculated.

NCCI ran the same regression methodology for six states of various sizes using more recent data under the previous ratemaking methodology. But a new twist was added. Revised indicated full credibility standards were derived for serious, non-serious, and for the new combined indemnity pure premium. Over time, the indicated FCS was significantly higher using the recent data. See Exhibit 17 for the results. NCCI actuaries then assumed that the stabilizing forces of the new methodology would offset the need to move to the higher indicated FCS of the regressions. From Exhibit 17, new indicated standards were derived and a ratio of current to indicated was computed. For indemnity, that ratio was 61%, which was then applied to the indication of 1,397 to derive 850 after rounding. For medical, the ratio of 56% was applied to 719 to derive a rounded value of 400.

Table 2: Indicated Pure Premiums-New Methodology

Partial Pure Premium	**New Full Credibility Standard N_f**
Indemnity	850
Medical	400

Note that N_f will still be multiplied by the state average cost per case to determine expected losses. However, for medical, the medical average cost per case will be used in lieu of the non-serious average cost per case. This more appropriately indexes the medical FCS over time. The medical average cost per case is computed using total medical dollars of loss (including medical-only losses) divided by lost-time claim counts, similar to the calculations NCCI computes in most other areas.

The regressions indicated that the 0.4 power rule is still appropriate. The remaining credibility decisions include maintaining the 0.4 power rule shown earlier and the three-way credibility weighting procedure between the indicated, national, and present-on-rate-level pure premiums. In no case is the national credibility permitted to exceed 50% of the complement of the state credibility.

2.6.4 Class Credibility Changes for the National Pure Premium

The credibility decisions for national pure premiums followed a very similar path. As background, the FCS for national pure premiums, also derived in 1993, use the actual number of lost-time claims, not expected claims and expected losses.

Without going through more detailed calculations, the table below provides the full credibility standards previously in effect for the national pure premiums.

Table 3: National Pure Premiums

Partial Pure Premium	**Full Credibility Standard N_f** **Actual # of Lost-Time Claims**
Serious	175
Non-Serious	500
Medical	1,000

Table 4: National Pure Premiums: New Methodology

Partial Pure Premium	**Full Credibility Standard N_f** **Actual # of Lost-Time Claims**
Indemnity	1,150
Medical	1,000

Revised national pure premium full credibility standards were derived for serious, non-serious, and a combined indemnity pure premium. The indicated FCS for the national using the

regressions was significantly higher using the recent data, just as with the state indicated pure premium. See Exhibit 18 for the results. Similarly, NCCI actuaries then assumed that the stabilizing forces of the new methodology would offset the need to move to the higher indicated FCS of the regressions. From Exhibit 18, the new indicated national standards were derived and a ratio of current to indicated was computed. For indemnity, that ratio was 54%, which was then applied to the indication of 2,127 to derive 1,150 after rounding. For medical, the ratio of 65% was applied to 1548 to derive a rounded value of 1,000.

The final step was to ensure that on average, a state's overall credibility was remaining similar in magnitude after the changes to the new FCS. Exhibits 19 and 20 show the average credibility across the six states tested for indemnity and medical, respectively. The top 50 classes were also excluded to ensure the credibility of small volume classes was not changing much as well. These results showed that both state indicated pure premium and national pure premium credibility were approximately the same, which was the objective.

2.6.5 Industry Group Credibility Changes

The full credibility standard was changed to 12,000 lost-time cases in the new methodology, uniform for all industry groups. It previously ranged from 7,000 to 11,000 by IG. The previous FCS was based on the following square root rule where the probability, p, of the IG differential being within k= +/-.075 was 95%:

$$Z = \text{Min}\left[(N_i / N_{f,i})^{0.5}, 100\%\right] \tag{2.21}$$

Where,

$Z_{i,s}$ = the credibility assigned to industry group i within state s

N_i = the actual number of lost-time claims for industry group i

$N_{f,i}$ = full credibility standard for industry group i

Much of the theory underlying the square root rule is described in Gary Venter's "Limited Fluctuations" approach, found in the "Credibility" chapter of *Foundations of Casualty Actuarial Science* [4]. The previous full credibility standards are in the table below.

Table 5: Previous FCS for IG Differentials

Industry Group	**Full Credibility Standard N_f**
Manufacturing	10,000
Contracting	8,000
Office & Clerical	7,000
Goods & Services	9,000
Miscellaneous	11,000

To the extent that an industry group's number of lost-time claims was less than the FCS, a value for $z_{i,s}$ is computed using the square root rule, whereby $0 \leq z_{i,s} \leq 1$. The complement of credibility, $1-z_{i,s}$, is assigned unity, or no change. In practice, the IG differential is judgmentally tempered to be between [.90, 1.10].

The new FCS of 12,000 was based on an analysis of five successive years of five IG differential fluctuations across 36 states. Exhibit 21 displays the results of applying various values of p and k, and the FCS that was indicated within each combination. The final selection by NCCI was to continue to use the same p and k (i.e., 95% and k=+/-.075). This resulted in 12,000 lost-time claims. Although this put a little less weight on the state's IG differentials than the past methodology did, this was deemed appropriate given the volatility observed within an industry group in successive filings in the sample of data.

2.7 The Impact of the Methodology Changes

One of the last steps in the process was to test the results of two states, a large and a small state, to determine the impact that all of the methodology changes had on class loss costs. Each major change was measured individually and naturally, the final results were observed in a cumulative manner. The results were determined by class and by industry group. The targeted aggregate statewide overall change was the same for both the previous and new methodologies. The national and present on-rate-level pure premiums were based on the previous methodology. Only the indicated pure premiums reflected the new methodology because at this time, it was not possible to construct national pure premiums using the new methodology.

Exhibit 22a illustrates the observed results for the large state, which has many class codes receiving 100% credibility for the indicated pure premium. Focus on the two industry groups contracting and office and clerical. Key observations include:

- Column (2) of Exhibit 22a shows the new loss development methodology produced lower LDFs for classes that have a propensity to have serious claims, such as contractors, than for office and clerical.

- The expected excess provision in column (3) offsets the loss development to a degree by applying a higher multiplicative expected excess provision to contractors than the provision applied to office and clerical.

- The count of class codes in Exhibit 22b shows that the majority of all classes in the large state changed between +/- 7.5% from the previous to new methodologies.

- The change in credibility methodology had a very small impact.

These were only a few of many other results which were explored. Other analyses included a review of the change in indicated pure premiums only, which were more volatile than final loss costs, the imposition of swing limits, and a drill down on class codes with larger changes than normal. NCCI plans on testing more states in the future prior to implementation.

2.8 The Pros and Cons of the Methodology Changes

Implementing large modifications to class ratemaking brings with it many positive enhancements including more stability from year to year on a class code level. Long-term loss cost adequacy should also be improved by some of the innovations leveraged from the expected excess from the new seven hazard group mapping and the new loss development methodology. The use of new data elements like injured body part helps to invigorate the methodologies.

The cons to making such a large number of changes will be the challenge of explaining the new methodology to regulatory entities, and obtaining their buy-in, as the loss costs underlying the new methodology, although very much improved, may generate unpalatable premium changes in the year of implementation for certain regulators and the employers within their jurisdictions.

2.9 Possible Future Enhancements to NCCI Class Ratemaking

The credibility formulas are a ripe area for further research. Once several rate revisions have been observed under the new methodology, much more work can be done to derive new standards and revisit the three-way credibility formula. Other areas include revisiting the body part mappings after NCCI collects 10 reports of WCSP data, as well as the tail factor. Other areas that will need continuous monitoring over time include the loss limit, and the transfer of a percentage of excess dollars from indemnity to medical, and the groupings of likely-to-develop and not- likely-to-develop.

Although the analysis is not presented in this paper, the potential use of allocated loss adjustment expense (defense and cost containment expense) was explored thoroughly. The observed result was that the value that it would add to class relativities was minimal relative to issues its inclusion may create, particularly with experience rating modifier calculations.

3. CONCLUSIONS

This paper documents several important changes that are being implemented in the class ratemaking process used to determine workers compensation loss cost and rate changes by class. The changes NCCI is implementing support the long-term goals of adequacy and stability of loss costs and rates, and help to consistently estimate class relativities from state to state in the

ratemaking methodology.

This paper also serves to provide an illustration of the derivation of a loss cost for a class code in workers compensation using NCCI' s new methodology.

Acknowledgment

The author acknowledges the work of Jim Davis, who was project leader for much of the project, and helped present the results of this work with me. The author also acknowledges the contributions to this paper by Pam Barlow and Chris Poteet for their innovative efforts on the body part loss development research. The author also acknowledges excellent contributions to this paper by Jon Evans and Chris Poteet for the credibility research presented in the paper. I would also like to thank Damon Raben and Delano Brown for their critique of our research along the way, and helping to implement it, and to Dan Corro for the creative simulation work on excess. Finally, much appreciation to Barbara Ferns for her assistance with exhibits.

5. REFERENCES

[1] Engl, and Dan Corro, "The 2004 NCCI Excess Loss Factors," Casualty Actuarial Society Fall *Forum,* **2006**.
[2] NCCI Staff, "NCCI's 2007 Hazard Group Mapping" submitted for publication.
[3] NCCI Actuarial Committee Agenda, ACT-93-7, June 7, 1993.
[4] Venter, Gary, "Credibility," Chapter in *Foundations of Casualty Actuarial Science*, 1st Ed. (Casualty Actuarial Society: New York, **1990**).

Abbreviations and notations

AY — accident year
C — refers to a claim closed at 1st report
CAS — Casualty Actuarial Society
Class $tU_{L,I}$ = A likely-to-develop t^{th} – ultimate indemnity (*I*) tail factor applied to likely-to-develop losses at t^{th} report for each class code. It is limited at state threshold *T*.
Class $tU_{N,I}$ = A not-likely-to-develop t^{th} – ultimate indemnity (*I*) tail factor applied to not-likely-to-develop losses at t^{th} report for each class code. It is limited at state threshold *T*.
$CV_c^{(k)}$ — the coefficient of variation for class *c* under alternative (*k*)
CV — coefficient of variation of indicated pure premiums based upon five successive rate revisions
DSR — Designated Statistical Reporting level of NCCI
FCS — full credibility standard
Fa — claims reported within the fatal injury type
Fin tU_I = Limited (at *T*) statewide financial data t^{th} – ultimate tail factor for indemnity (*I*)
HG — hazard group
IG — industry group
k — acceptable tolerance around a mean value
L — reference to likely-to-develop grouping
LC — "likely" body part and claim closed at 1st report
LDF — loss development factors
LO — "likely" body part and claim open at 1st report
$L\$_I$ = two years of limited likely-to-develop "paid+case" indemnity loss dollars on-leveled and developed to t^{th} report for the state
L_n = five years of simulated losses for the *n*th trial whereby $n = [1, 2, \ldots, 100]$
$\overline{L}^{(k)}$ = the average losses for a specific class code over *N* simulations for alternative *k*
$\overline{L}^{(k)}_c$ = the average of simulated losses for alternative *k* over all simulations
$L_{m,c}^{(k)}$ — five years of simulated losses for the *m*th trial for class *c* whereby the losses were capped as in alternative *k*
$L_{m,c}^{(k)}$ — five years of simulated losses for the *m*th trial for class *c* whereby the losses were capped as in alternative *k*.
M — $millions
MO — claims reported within the medical-only injury type
N = the expected number of lost-time claims for a class
N_f = full credibility standard
N_i, *i* = full credibility standard for industry group *i*
N_i = the actual number of lost-time claims for industry group *i*
N — reference to the not-likely-to-develop grouping in terms of loss development.
NC — "not-likely" body part and claim closed at 1st report
NCCI — National Council on Compensation Insurance, Inc.
$NL\$_I$ = two years of limited not-likely-to-develop "paid+case" indemnity loss dollars on-leveled and developed to t^{th} report for the state
NO — "not-likely" body part and claim open at 1st report
$NS\$_I$ = two years of limited "paid+case" non-serious indemnity loss dollars on-leveled and developed to 5th report for the state

O — refers to a claim open at 1st report
p — probability
POB — the injured part of body as reported on the claim
POB Group A — claims with a greater potential to develop upward
POB Group B — claims with less potential to develop upward
PP — claims reported within the permanent partial injury type
PT — claims reported within the permanent total injury type
PY — policy year
SACC — state serious average cost per case
$SER\$_I$ = two years of limited "paid+case" serious indemnity loss dollars on-leveled and developed to the 5th report for the state
t = time t representing the report level of WCSP data at which the attachment point for the class ratemaking tail is applied. t = 5,6,7,8,9,10
T — dollar threshold for capping large claims
TT —claims reported within the temporary total injury type
μ = hypothetical mean expected losses for a class code based on simulated frequency and severity times actual class payroll for that state
URE — Unit Report Expansion
WCSP — NCCI's Workers Compensation Statistical Plan
XS_T — Per Claim adjusted excess ratio at threshold T
y = percentage between 0% and 100% used to allocate a portion of tail development dollars to the not-likely-to-develop grouping
z — partial credibility assigned to a pure premium
$Z_{i,s}$ = the credibility assigned to industry group i within state s

Biography of the Author

Tom Daley is Director and Actuary at NCCI, Inc. He is currently responsible for both applied research and implementation of the new methodologies in class ratemaking for all NCCI states, as well as handling state actuary loss cost and rate filing duties in several other states. He has a B.S. degree in Mathematics from the Pennsylvania State University. He is an Associate of the CAS and a Member of the American Academy of Actuaries.

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Appendix A: Research Exhibits 1- 23

Appendix B: Derivation of a Loss Cost for a Class Code

UNLIMITED INDEMNITY LOSS DEVELOPMENT

Exhibit 1a

Serious **Large State**

1st Report Start: 1/1/2003
1st Report End: 12/31/2003

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report
1/98-12/98			460,401,442	535,321,008	574,106,684
1/99-12/99		340,191,451	489,175,745	560,465,442	592,806,690
1/00-12/00	141,410,721	312,882,740	450,176,823	526,656,041	
1/1-12/1	128,481,157	295,773,844	438,063,233		
1/2-12/2	108,611,922	260,153,546			
1/3-12/3	105,915,019				

Link Ratios	1:2	2:3	3:4	4:5
1/98-12/98			1.163	1.072
1/99-12/99		1.438	1.146	1.058
1/00-12/00	2.213	1.439	1.170	
1/1-12/1	2.302	1.481		
1/2-12/2	2.395			

AVERAGE DEV.	1:2	2:3	3:4	4:5
2 Year Averages	2.349	1.460	1.158	1.065

2 YR. DEV. TO ULT.	1:U	2:U	3:U	4:U	5:U
Unadjusted	5.082	2.164	1.482	1.280	1.202

UNLIMITED INDEMNITY LOSS DEVELOPMENT

Non-Serious **Large State**

1st Report Start: 1/1/2003
1st Report End: 12/31/2003

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report
1/98-12/98			437,508,261	432,646,920	431,589,463
1/99-12/99		507,462,094	503,838,453	499,819,176	498,146,055
1/00-12/00	513,724,388	580,792,681	577,827,036	573,577,900	
1/1-12/1	491,994,692	545,990,644	542,748,392		
1/2-12/2	484,992,408	535,107,606			
1/3-12/3	454,969,833				

Link Ratios	1:2	2:3	3:4	4:5
1/98-12/98			0.989	0.998
1/99-12/99		0.993	0.992	0.997
1/00-12/00	1.131	0.995	0.993	
1/1-12/1	1.110	0.994		
1/2-12/2	1.103			

AVERAGE DEV.	1:2	2:3	3:4	4:5
2 Year Averages	1.107	0.995	0.993	0.998

2 YR. DEV. TO ULT.	1:U	2:U	3:U	4:U	5:U
Unadjusted	1.092	0.986	0.991	0.998	1.000

Source: NCCI WCSP Data

SERIOUS DEVELOPMENT TO ULTIMATE Large State

Exhibit 1b

Unlimited Indemnity

(using 2-year average development)

FIRST REPOR 1/3-12/3	(1) Incurred Losses	(2) Development 1:5	(3) Amendment Factor	(4) Modified Losses (1)x((2)x(3))
Fatal	13,262,549	4.228	1.098	61,564,752
Permanent To	22,327,493	4.228	0.752	70,979,100
Major	70,324,977	4.228	0.907	269,696,287
Minor	135,337,672	1.092	0.907	133,984,295
Temporary To	319,632,161	1.092	0.983	342,965,309
Medical Only				
Contract Medical				

SECOND REP 1/2-12/2	(5) Incurred Losses	(6) Development 2:5	(7) Amendment Factor	(8) Modified Losses (5)x((6)x(7))
Fatal	11,800,628	1.800	1.258	26,716,622
Permanent To	57,888,155	1.800	0.569	59,277,471
Major	190,464,763	1.800	0.807	276,745,301
Minor	182,412,684	0.986	0.807	145,200,496
Temporary To	352,694,922	0.986	0.960	334,002,091
Medical Only				
Contract Medical				

CALCULATION OF SERIOUS FIFTH-TO-ULTIMATE	
(9) Combined Serious Losses	764,979,533
(10) Combined Non-Serious Losses	956,152,191
(11) Combined Total Losses	1,721,131,724
(12) Financial Data Fifth-to-Ultimate Development Factors	1.090
(13) Fifth-to-Ultimate Loss Development (13) = ((12)-1)x(11)	154,901,855
(14) Fifth-to-Ultimate Serious Loss Development Factors (14) = ((9)+(13))/(9)	1.202

Source: NCCI WCSP Data

Exhibit 1c

UNLIMITED MEDICAL LOSS DEVELOPMENT

Total Medical — Large State

1st Report Start: 1/1/2003
1st Report End: 12/31/2003

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report
1/98-12/98			1,074,507,205	1,121,412,973	1,151,169,235
1/99-12/99		1,079,216,508	1,170,231,395	1,227,727,033	1,264,629,064
1/00-12/00	970,315,928	1,161,418,120	1,243,492,848	1,303,639,595	
1/1-12/1	977,360,304	1,142,236,135	1,243,998,714		
1/2-12/2	1,016,625,606	1,187,960,564			
1/3-12/3	1,037,743,388				

Link Ratios	1:2	2:3	3:4	4:5
1/98-12/98			1.044	1.027
1/99-12/99		1.084	1.049	1.030
1/00-12/00	1.197	1.071	1.048	
1/1-12/1	1.169	1.089		
1/2-12/2	1.169			

AVERAGE DEV.	1:2	2:3	3:4	4:5
2 Year Averages	1.169	1.080	1.049	1.029

Serious Development for Ratemaking	1:U	2:U	3:U	4:U	5:U
2-Year Unadjusted	3.431	2.935	2.718	2.592	2.519

Serious = Total Medical development to 5th report x Serious Medical 5th to Ultimate Tail Factor

NonSerious Development for Ratemaking	1:U	2:U	3:U	4:U	5:U
2-Year Unadjusted	1.362	1.165	1.079	1.029	1.000

Non-Serious = Total Medical development to 5th report

Source: NCCI WCSP Data

Exhibit 1d

SERIOUS DEVELOPMENT TO ULTIMATE

Unlimited Medical Large State

(using 2-year average development)

FIRST REPORT 1/3-12/3	(1) Incurred Losses	(2) Development 1:5	(3) Amendment Factor	(4) Modified Losses (1)x((2)x(3))
Fatal	3,769,846	1.362	1.008	5,175,999
Permanent Total	56,418,886	1.362	1.008	77,463,130
Major	92,132,869	1.362	1.008	126,498,429
Minor	202,853,463	1.362	1.008	278,517,805
Temporary Total	520,564,524	1.362	1.008	714,735,091
Medical Only	161,960,455	1.362	1.008	222,371,705
Contract Medical	43,345	1.362	1.008	59,513

SECOND REPORT 1/2-12/2	(5) Incurred Losses	(6) Development 2:5	(7) Amendment Factor	(8) Modified Losses (5)x((6)x(7))
Fatal	4,270,256	1.165	0.973	4,842,470
Permanent Total	91,136,323	1.165	0.973	103,348,590
Major	185,339,531	1.165	0.973	210,175,028
Minor	248,061,494	1.165	0.973	281,301,734
Temporary Total	507,060,323	1.165	0.973	575,006,406
Medical Only	152,090,873	1.165	0.973	172,471,050
Contract Medical	1,764	1.165	0.973	2,000

CALCULATION OF SERIOUS FIFTH-TO-ULTIMATE	
(9) Combined Serious Losses	527,503,646
(10) Combined Non-Serious Losses	2,244,465,304
(11) Combined Total Losses	2,771,968,950
(12) Financial Data Fifth-to-Ultimate Development Factors	1.289
(13) Fifth-to-Ultimate Loss Development **(13) = ((12)-1)x(11)**	801,099,027
(14) Fifth-to-Ultimate Serious Loss Development Factors **(14) = ((9)+(13))/(9)**	2.519

Source: NCCI WCSP Data

Exhibit 2

Illustration of Critical Value "Crossover"
Permanent Partial Claims Only

Policy Year 1997
Countrywide - NCCI States

Status of Claim @ 1st	Status of Claim @ 4th	(1) **Indemnity $** @ 1st	(2) **Indemnity $** @ 4th	(3) (2)/(1) **Indemnity** Link Ratio	(4) Link Ratio Based on Status @ 1st	(5) Link Ratio Incl. Crossover	
Major	Major	613,981,619	820,980,453	1.337	1.156	2.033	*
Major	minor	149,179,971	60,947,235	0.409			
minor	Major	207,820,368	730,279,392	3.514	1.339		
minor	minor	1,186,650,173	1,137,543,165	0.959		0.859	**

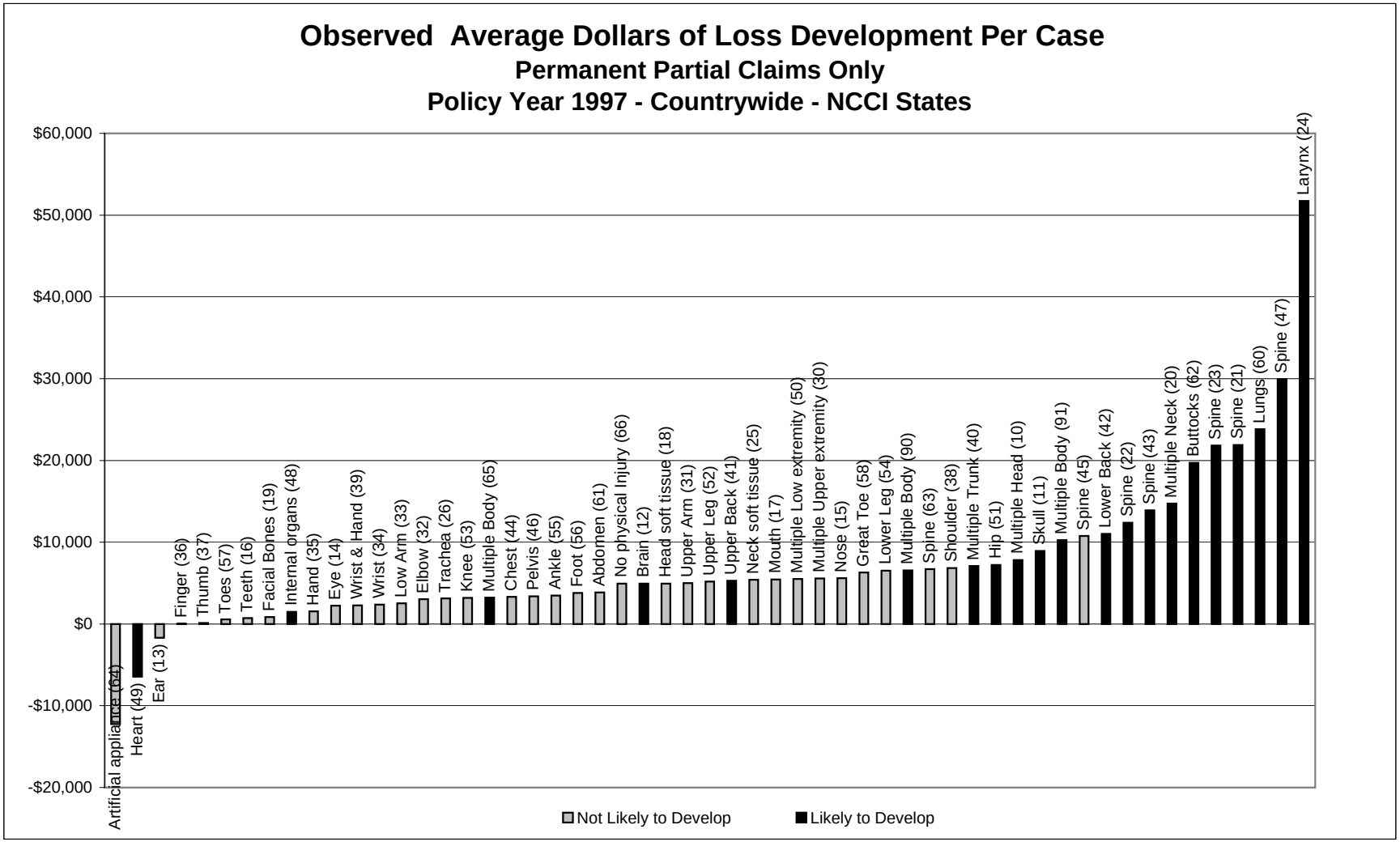
Status of Claim @ 1st	Status of Claim @ 4th	(1) **Medical $** @ 1st	(2) **Medical $** @ 4th	(3) (2)/(1) **Medical** Link Ratio	(4) Link Ratio Based on Status @ 1st	(5) Link Ratio Incl. Crossover
Major	Major	420,359,014	500,436,333	1.190	1.100	1.743
Major	minor	92,457,889	63,417,464	0.686		
minor	Major	211,613,060	393,182,703	1.858	1.075	
minor	minor	1,154,460,758	1,074,742,398	0.931		0.833

* 2.033=(820,980,453+730,279,392)/(613,981,619+149,179,971)
** 0.859=(60,947,235+1,137,543,165)/(207,820,368+1,186,650,173)

Range of Critical Values across NCCI states = [$20K, $90K]

Source: NCCI WCSP Data

Exhibit 3



Source: NCCI WCSP Data
(##) - Part of Body code

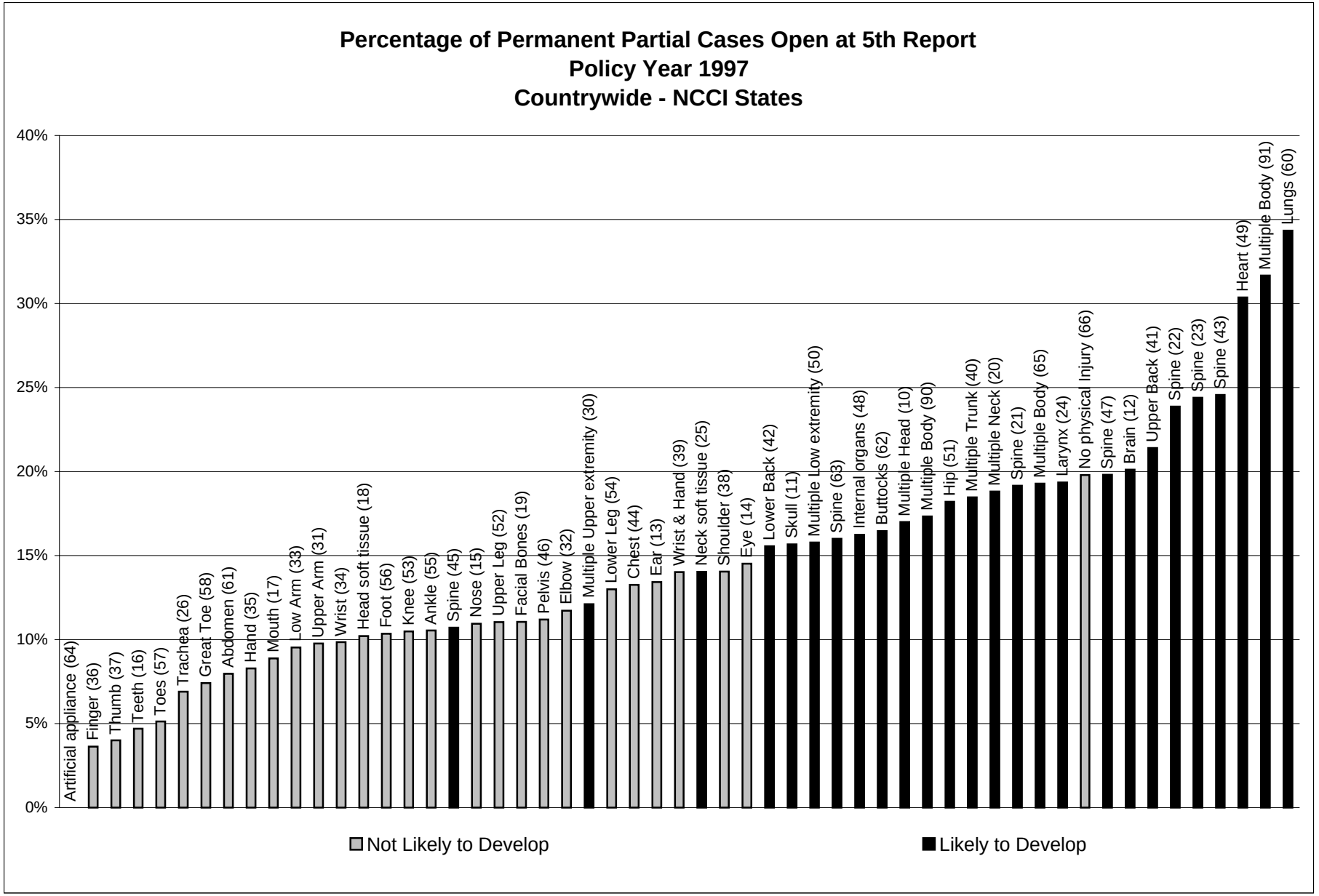
Exhibit 4a

Permanent Partial Cases Open at 5th Report
Policy Year 1997
Countrywide

Injured Body Part (code)	Cases	% Open @ 5th Report
Artificial appliance (64)	4	0.0%
Finger (36)	14,638	3.6%
Thumb (37)	3,427	4.0%
Teeth (16)	234	4.7%
Toes (57)	975	5.1%
Trachea (26)	29	6.9%
Great Toe (58)	108	7.4%
Abdomen (61)	640	8.0%
Hand (35)	9,314	8.3%
Mouth (17)	214	8.9%
Low Arm (33)	4,502	9.5%
Upper Arm (31)	11,259	9.8%
Wrist (34)	12,583	9.9%
Head soft tissue (18)	1,009	10.2%
Foot (56)	5,073	10.3%
Knee (53)	20,363	10.5%
Ankle (55)	5,680	10.5%
Spine (45)	299	10.7%
Nose (15)	265	10.9%
Upper Leg (52)	797	11.0%
Facial Bones (19)	344	11.0%
Pelvis (46)	1,072	11.2%
Elbow (32)	4,095	11.7%
Multiple Upper extremity (30)	5,123	12.1%
Lower Leg (54)	3,787	13.0%
Chest (44)	1,245	13.3%
Ear (13)	939	13.4%
Wrist & Hand (39)	778	14.0%
Neck soft tissue (25)	798	14.0%
Shoulder (38)	4,843	14.0%
Eye (14)	1,240	14.5%
Lower Back (42)	32,287	15.6%
Skull (11)	862	15.7%
Multiple Low extremity (50)	1,914	15.8%
Spine (63)	150	16.0%
Internal organs (48)	930	16.2%
Buttocks (62)	79	16.5%
Multiple Head (10)	1,607	17.0%
Multiple Body (90)	17,372	17.3%
Hip (51)	1,505	18.2%
Multiple Trunk (40)	2,768	18.5%
Multiple Neck (20)	1,930	18.8%
Spine (21)	402	19.2%
Multiple Body (65)	830	19.3%
Larynx (24)	31	19.4%
No physical Injury (66)	96	19.8%
Spine (47)	202	19.8%
Brain (12)	348	20.1%
Upper Back (41)	3,309	21.4%
Spine (22)	905	23.9%
Spine (23)	82	24.4%
Spine (43)	2,154	24.6%
Heart (49)	168	30.4%
Multiple Body (91)	300	31.7%
Lungs (60)	201	34.3%
TOTAL	**186,109**	

Source: NCCI WCSP Data

Exhibit 4b



Source: NCCI WCSP Data

Exhibit 5a

Temporary Total Cases Open at 5th Report
Policy Year 1997
Countrywide

Injured Body Part	Cases	% Open @ 5th Report
Artificial appliance (64)	5	0.0%
Great Toe (58)	320	1.3%
Abdomen (61)	5,100	2.4%
Pelvis (46)	6,792	2.8%
Thumb (37)	8,026	3.0%
Finger (36)	28,496	3.1%
Ankle (55)	22,323	3.3%
Toes (57)	5,030	3.4%
Foot (56)	17,922	3.9%
Upper Leg (52)	3,402	4.0%
Spine (45)	1,355	4.4%
Chest (44)	7,675	4.7%
Hand (35)	23,433	4.8%
Internal organs (48)	7,210	5.0%
Elbow (32)	8,709	5.1%
Lower Leg (54)	10,306	5.6%
Eye (14)	4,550	5.6%
Low Arm (33)	10,379	5.7%
Knee (53)	38,104	5.7%
Upper Arm (31)	24,281	5.8%
Nose (15)	895	5.9%
Wrist (34)	23,847	6.0%
Multiple Trunk (40)	9,064	6.0%
Lower Back (42)	107,245	6.2%
Head soft tissue (18)	2,532	6.3%
Shoulder (38)	6,514	6.6%
Facial Bones (19)	683	6.9%
Skull (11)	2,495	7.1%
Spine (63)	465	7.3%
Trachea (26)	94	7.4%
Mouth (17)	468	7.7%
Multiple Upper extremity (30)	8,815	7.7%
Neck soft tissue (25)	2,337	7.7%
Hip (51)	3,966	7.8%
Upper Back (41)	10,139	7.8%
Wrist & Hand (39)	924	8.3%
Multiple Neck (20)	4,544	8.7%
Spine (23)	171	9.4%
Teeth (16)	361	9.4%
Multiple Body (90)	47,079	9.8%
Multiple Low extremity (50)	5,011	10.3%
Multiple Body (65)	2,484	10.5%
Spine (43)	1,268	11.0%
Buttocks (62)	255	11.0%
Ear (13)	953	11.1%
Larynx (24)	132	11.4%
Spine (21)	866	12.4%
Multiple Body (91)	993	12.6%
Spine (22)	1,027	13.2%
No physical Injury (66)	222	14.0%
Spine (47)	300	14.3%
Brain (12)	675	16.3%
Multiple Head (10)	5,108	19.3%
Lungs (60)	340	22.9%
Heart (49)	352	25.3%
TOTAL	**486,042**	

Source: NCCI WCSP Data

Exhibit 5b

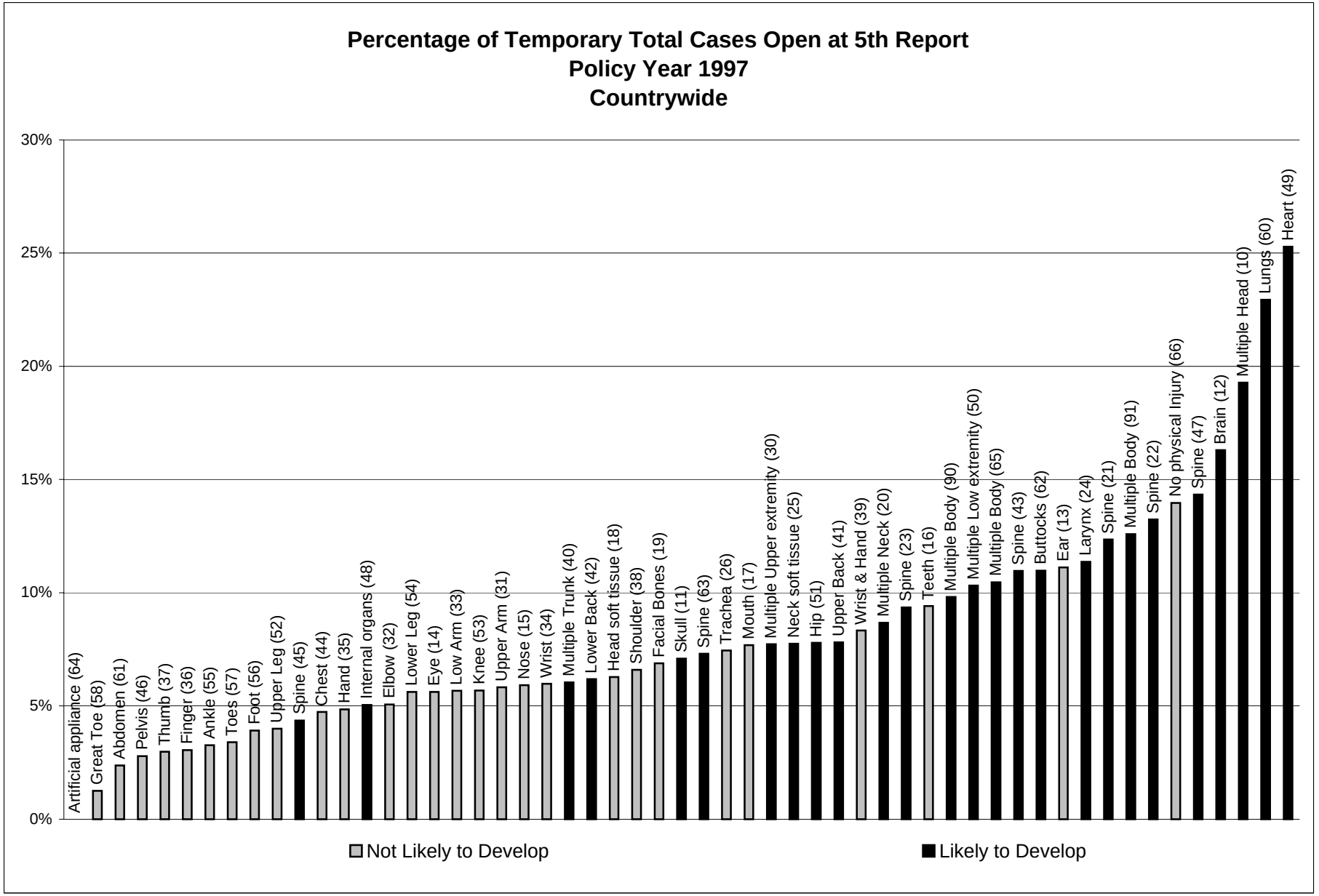

Percentage of Temporary Total Cases Open at 5th Report
Policy Year 1997
Countrywide
30%
25%
20%
15%
10%
5%
0%
Artificial appliance (64)
Great Toe (58)
Abdomen (61)
Pelvis (46)
Thumb (37)
Finger (36)
Ankle (55)
Toes (57)
Foot (56)
Upper Leg (52)
Spine (45)
Chest (44)
Hand (35)
Internal organs (48)
Elbow (32)
Lower Leg (54)
Eye (14)
Low Arm (33)
Knee (53)
Upper Arm (31)
Nose (15)
Wrist (34)
Multiple Trunk (40)
Lower Back (42)
Head soft tissue (18)
Shoulder (38)
Facial Bones (19)
Skull (11)
Spine (63)
Trachea (26)
Mouth (17)
Multiple Upper extremity (30)
Neck soft tissue (25)
Hip (51)
Upper Back (41)
Wrist & Hand (39)
Multiple Neck (20)
Spine (23)
Teeth (16)
Multiple Body (90)
Multiple Low extremity (50)
Multiple Body (65)
Spine (43)
Buttocks (62)
Ear (13)
Larynx (24)
Spine (21)
Multiple Body (91)
Spine (22)
No physical Injury (66)
Spine (47)
Brain (12)
Multiple Head (10)
Lungs (60)
Heart (49)
Not Likely to Develop
Likely to Develop

Exhibit 6

URE WORKERS COMPENSATION STATISTICAL PLAN
Part of Body—Injury Codes and Descriptions

Code*		Narrative Description
I.	**Head**	
10	Multiple Head Injury	Any combination of Head injuries
11	Skull	
12	Brain	
13	Ear(s)	Includes: Hearing, Inside Eardrum
14	Eye(s)	Includes: Optic Nerves, Vision, Eyelids
15	Nose	Includes: Nasal Passage, Sinus, Sense of Smell
16	Teeth	
17	Mouth	Includes: Lips, Tongue, Throat, Taste
18	Soft tissue	
19	Facial Bones	Includes: Jaw
II.	**Neck**	
20	Multiple Neck Injury	Any combination of Neck injuries
21	Vertebrae	Includes: Spinal Column Bone, "Cervical Segment"
22	Disc	Includes: Spinal Column cartilage, "Cervical Segment"
23	Spinal Cord	Includes: Nerve Tissue, "Cervical Segment"
24	Larynx	Includes: Cartilage and Vocal Cords
25	Soft Tissue	Other than Larynx or Trachea
26	Trachea	
III.	**Upper Extremities**	
30	Multiple Upper Extremities	Any combination of Upper Extremity injuries, excluding Hands and Wrists combined
31	Upper Arm	Humerus and Corresponding Muscles, excluding Clavicle and Scapula
32	Elbow	Radial Head
33	Lower Arm	Forearm—Radius, Ulna and Corresponding Muscles
34	Wrist	Carpals and Corresponding Muscles
35	Hand	Metacarpals and Corresponding Muscles - excluding Wrist or Fingers
36	Finger(s)	Other than Thumb and Corresponding Muscles
37	Thumb	
38	Shoulder(s)	Armpit, Rotator Cuff, Trapezius, Clavicle, Scapula
39	Wrist(s) & Hand(s)	
IV.	**Trunk**	
40	Multiple Trunk	Any combination of Trunk injuries
41	Upper Back Area	(Thoracic Area) Upper Back Muscles, excluding Vertebrae, Disc, Spinal Cord
42	Lower Back Area	(Lumbar Area and Lumbo Sacral) Lower Back Muscles, excluding Sacrum, Coccyx, Pelvis, Vertebrae, Disc, Spinal

* Shaded areas are part of body codes considered "likely to develop."

Exhibit 6

URE WORKERS COMPENSATION STATISTICAL PLAN
Part of Body—Injury Codes and Descriptions

Code*		Narrative Description
		Cord
43	Disc	Spinal Column Cartilage other than Cervical Segment
44	Chest	Including Ribs, Sternum, Soft Tissue
45	Sacrum and Coccyx	Final Nine Vertebrae - Fused
46	Pelvis	
47	Spinal Cord	Nerve Tissue other than Cervical Segment
48	Internal Organs	Other than Heart and Lungs
49	Heart	
60	Lungs	
61	Abdomen	Excluding Injury to Internal Organs Including Groin
62	Buttocks	Soft Tissue
63	Lumbar and/or Sacral Vertebrae (Vertebra NOC Trunk	Bone Portion of the Spinal Column
V.	**Lower Extremities**	
50	Multiple Lower Extremities	Any combination of Lower Extremity injuries
51	Hip	
52	Upper Leg	Femur and Corresponding Muscles
53	Knee	Patella
54	Lower Leg	Tibia, Fibula and Corresponding Muscles
55	Ankle	Tarsals
56	Foot	Metatarsals, Heel, Achilles Tendon and Corresponding Muscles - excluding Ankle or Toes
57	Toes	
58	Great Toe	
VI.	**Multiple Body Parts**	
64	Artificial Appliance	Braces, etc.
65	Insufficient Info to Properly Identify - Unclassified	Insufficient information to identify part affected
66	No Physical Injury	Mental Disorder
90	Multiple Body Parts (Including Body Systems & Body Parts)	Applies when more than one Major Body Part has been affected, such as an Arm and a Leg and Multiple Internal Organs
91	Body Systems and Multiple Body Systems	Applies when functioning of an Entire Body System has been affected without specific injury to any other part, as in the case of Poisoning, Corrosive Action, Inflammation, Affecting Internal Organs, Damage to Nerve Centers, etc.; does NOT apply when the systemic damage results from an External Injury affecting an External Part such as a Back Injury that includes damage to the Nerves of the Spinal Cord

* Shaded areas are part of body codes considered "likely to develop."

Exhibit 7

Loss Development on a fixed set of claims
Policy Year 1997
Countrywide

Cumulative 1st to 5th report *

	ind_dev	med_dev
PP-L	1.387	1.183
PP-N	1.234	1.028
TT-L<=26K	1.797	1.170
TT-N<=26K	1.373	1.014
TT-L>26K	1.226	1.168
TT-N>26K	1.084	0.953
TT-L	1.522	1.170
TT-N	1.271	1.001
TT<=26K	1.548	1.080
TT>26K	1.162	1.083

* Loss devlopment factors exclude all crossover.

Exhibit 8a

Large State
Indemnity Loss Development
1st to 5th

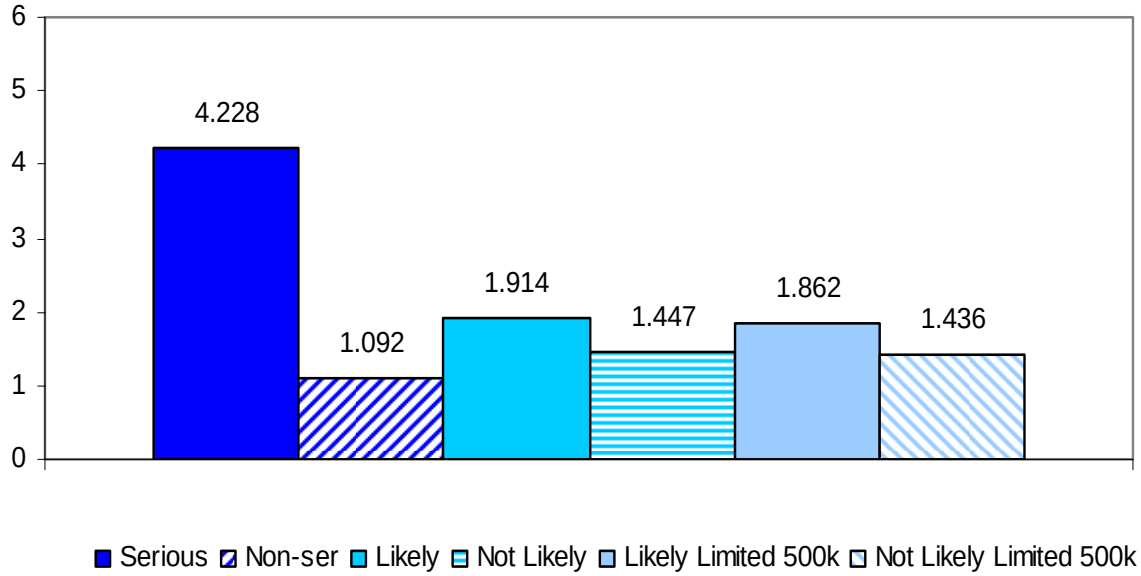


Exhibit 8b

Large State
Indemnity Loss Development

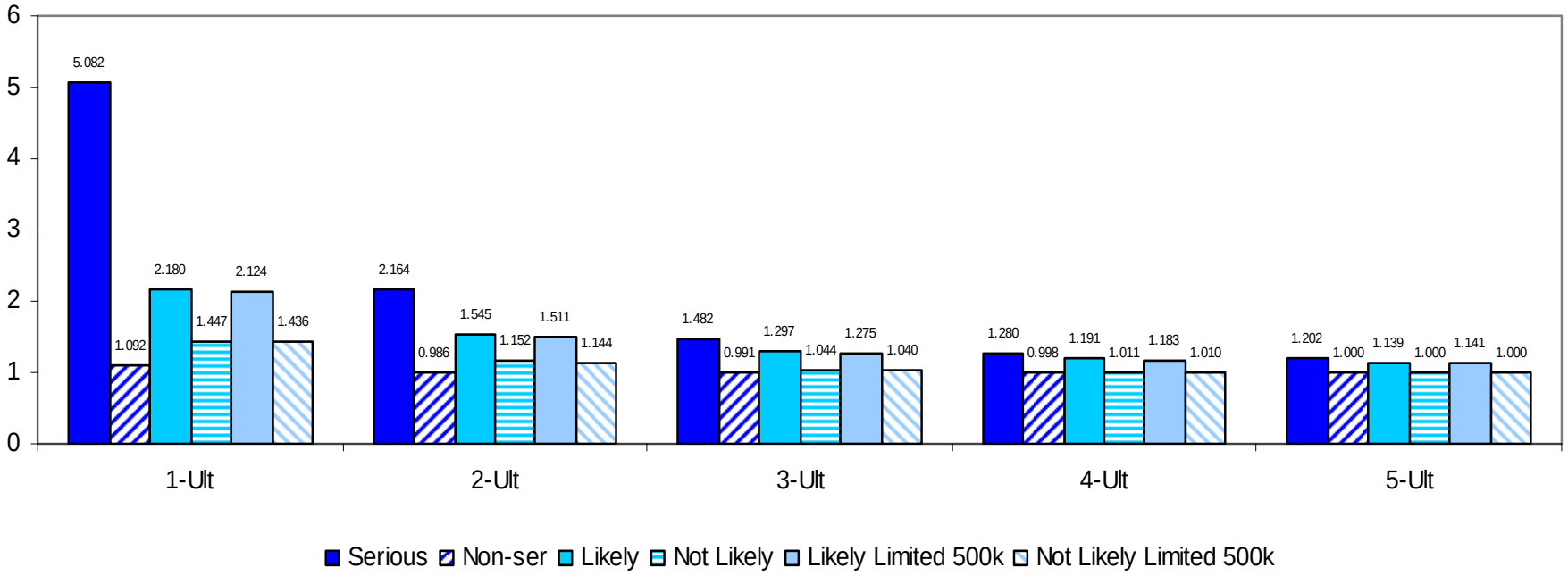


Exhibit 8c

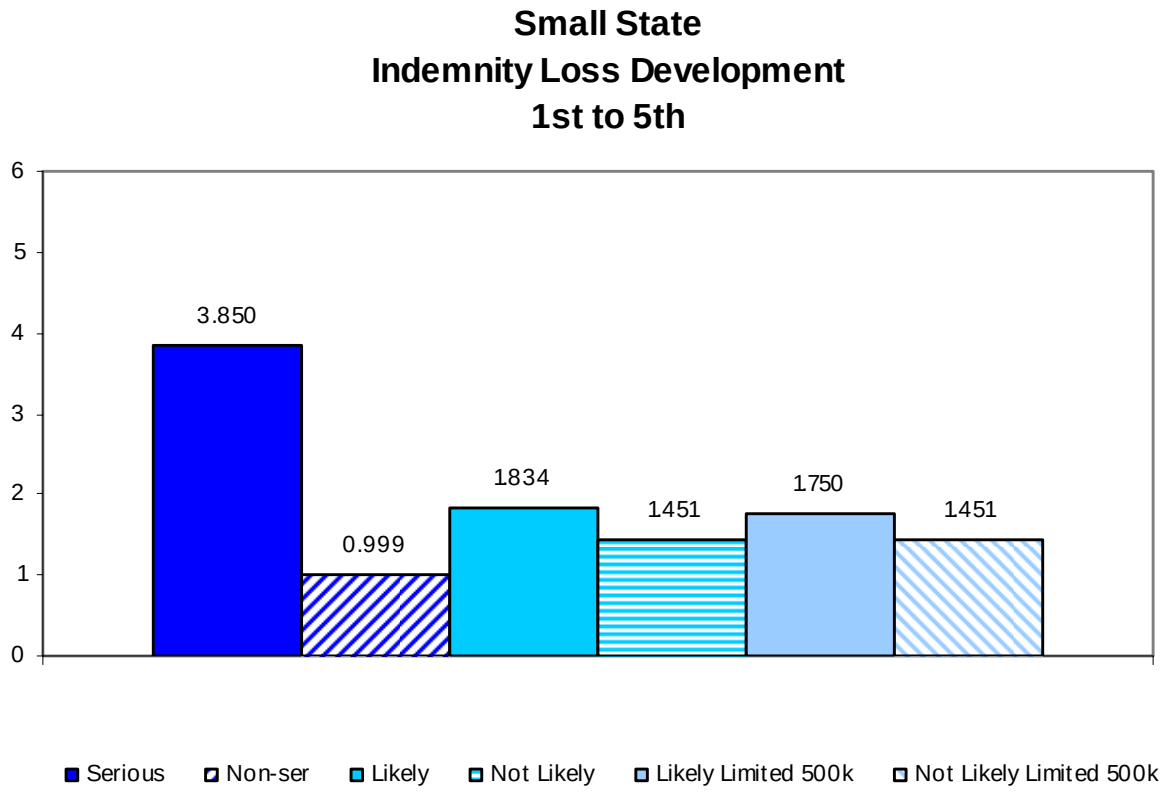

Small State
Indemnity Loss Development
1st to 5th
6
5
4
3
2
1
0
3.850
0.999
1834
1451
1750
1451
Serious
Non-ser
Likely
Not Likely
Likely Limited 500k
Not Likely Limited 500k

Exhibit 8d

Small State
Indemnity Loss Development

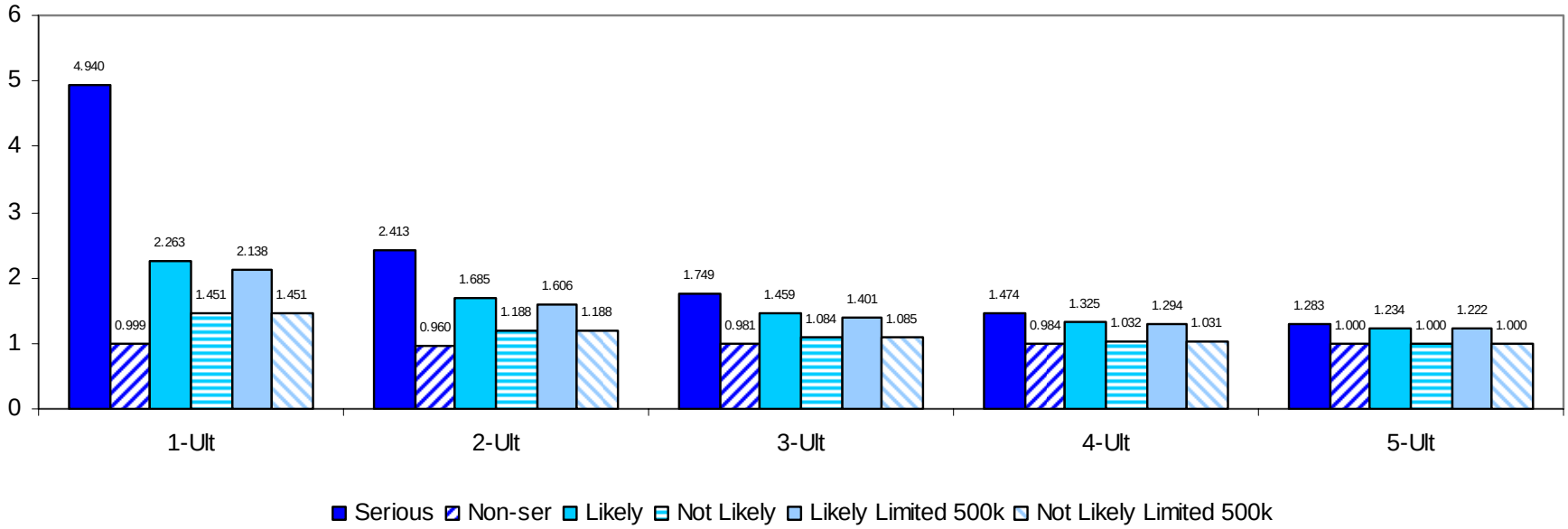


Exhibit 9a

Large State
Medical Loss Development
1st to 5th

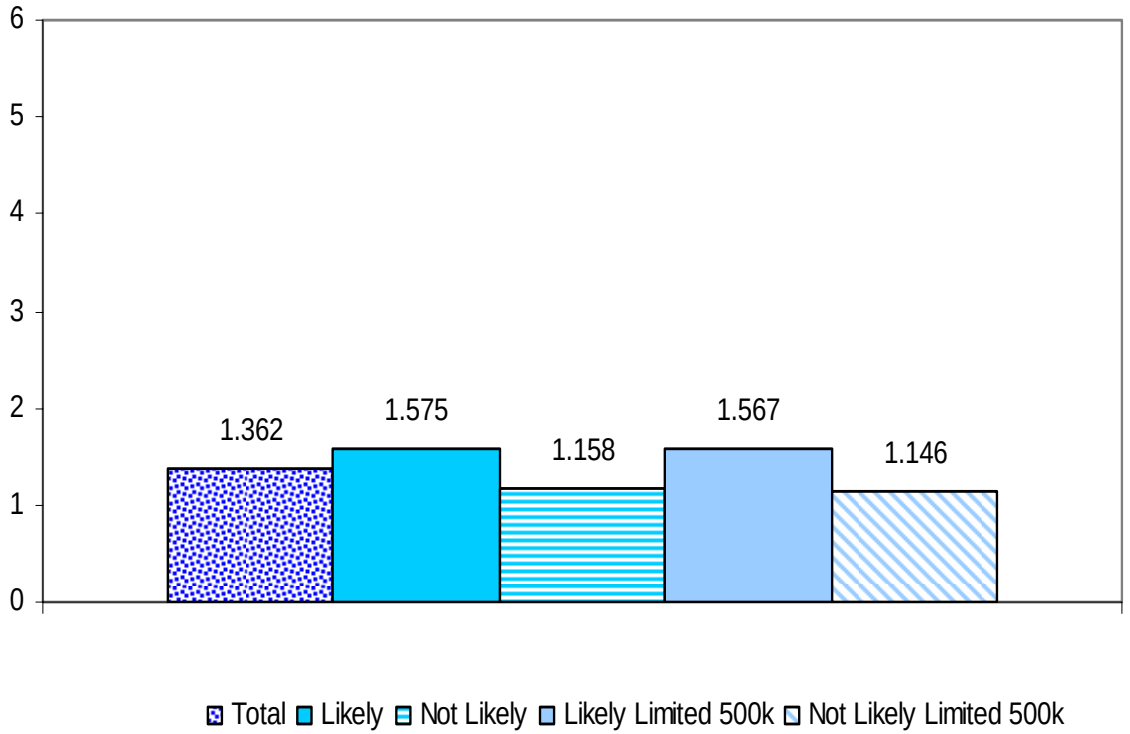


Exhibit 9b

Large State
Medical Loss Development

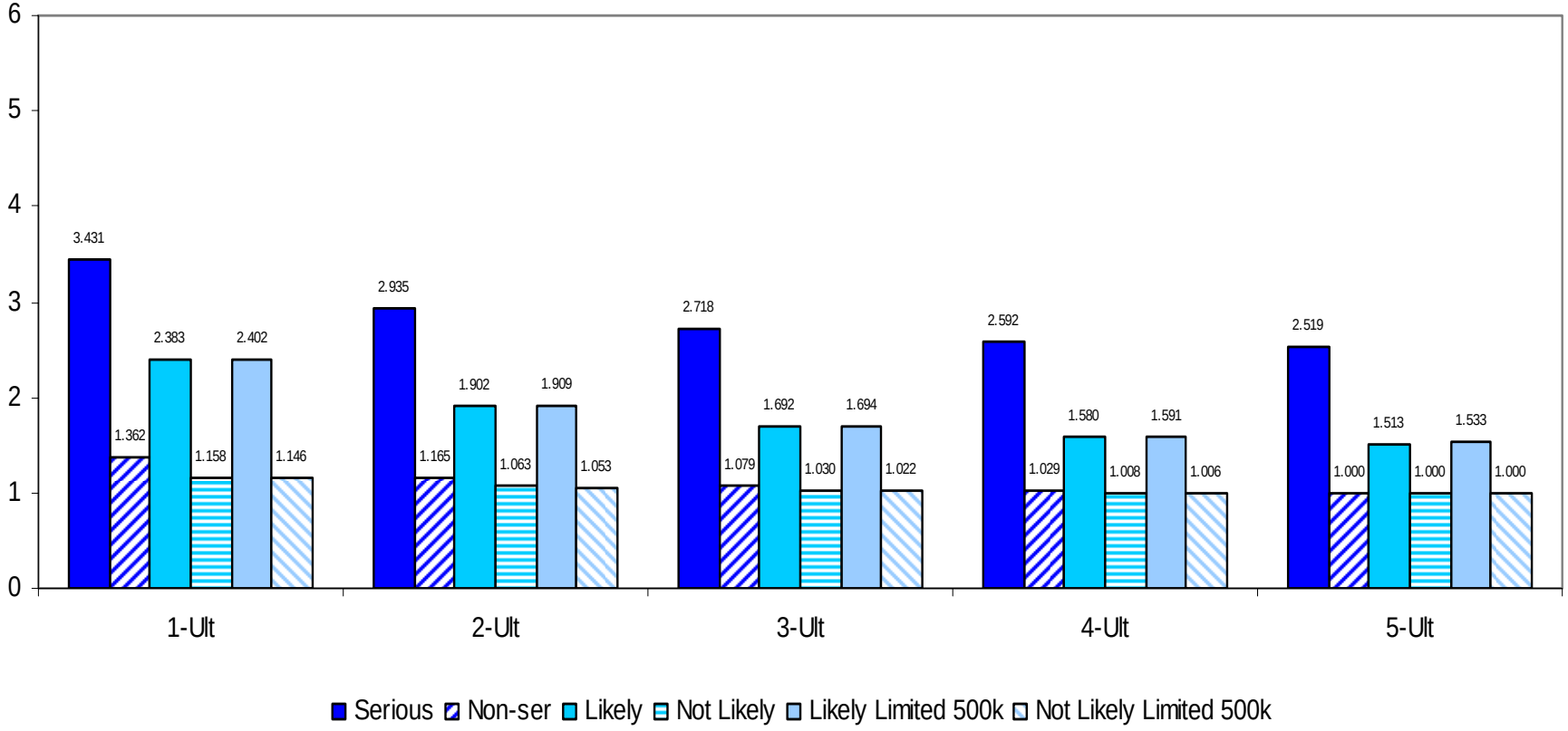


Exhibit 9c

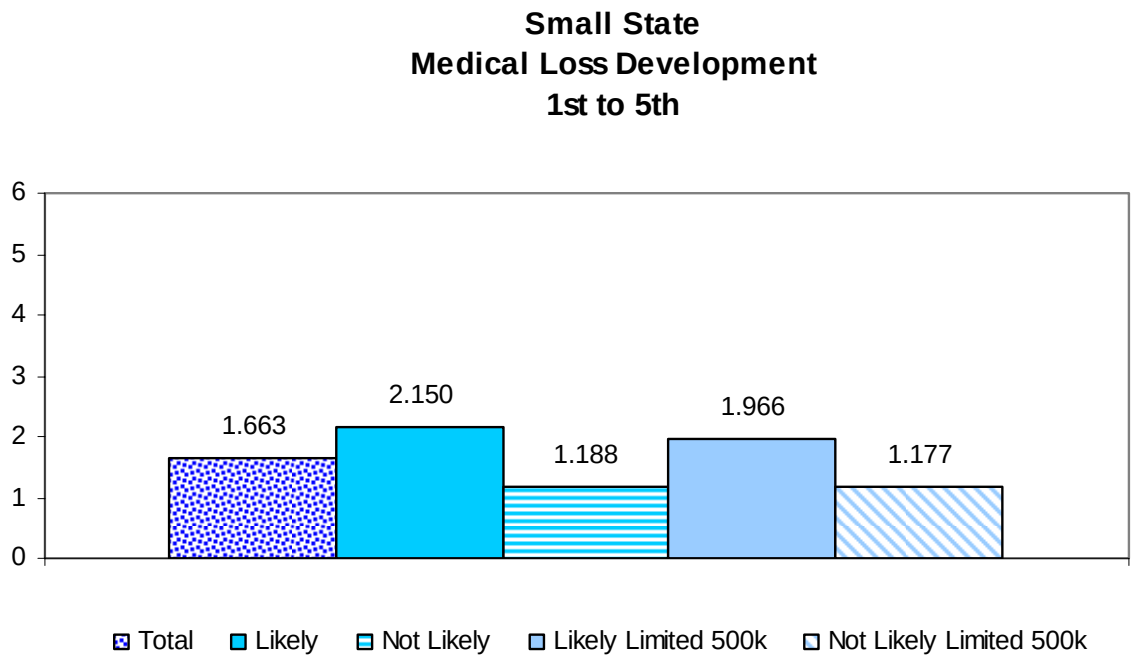

Small State
Medical Loss Development
1st to 5th
6
5
4
3
2
1
0
1.663
2.150
1.188
1.966
1.177
Total
Likely
Not Likely
Likely Limited 500k
Not Likely Limited 500k

Exhibit 9d

Small State
Medical Loss Development

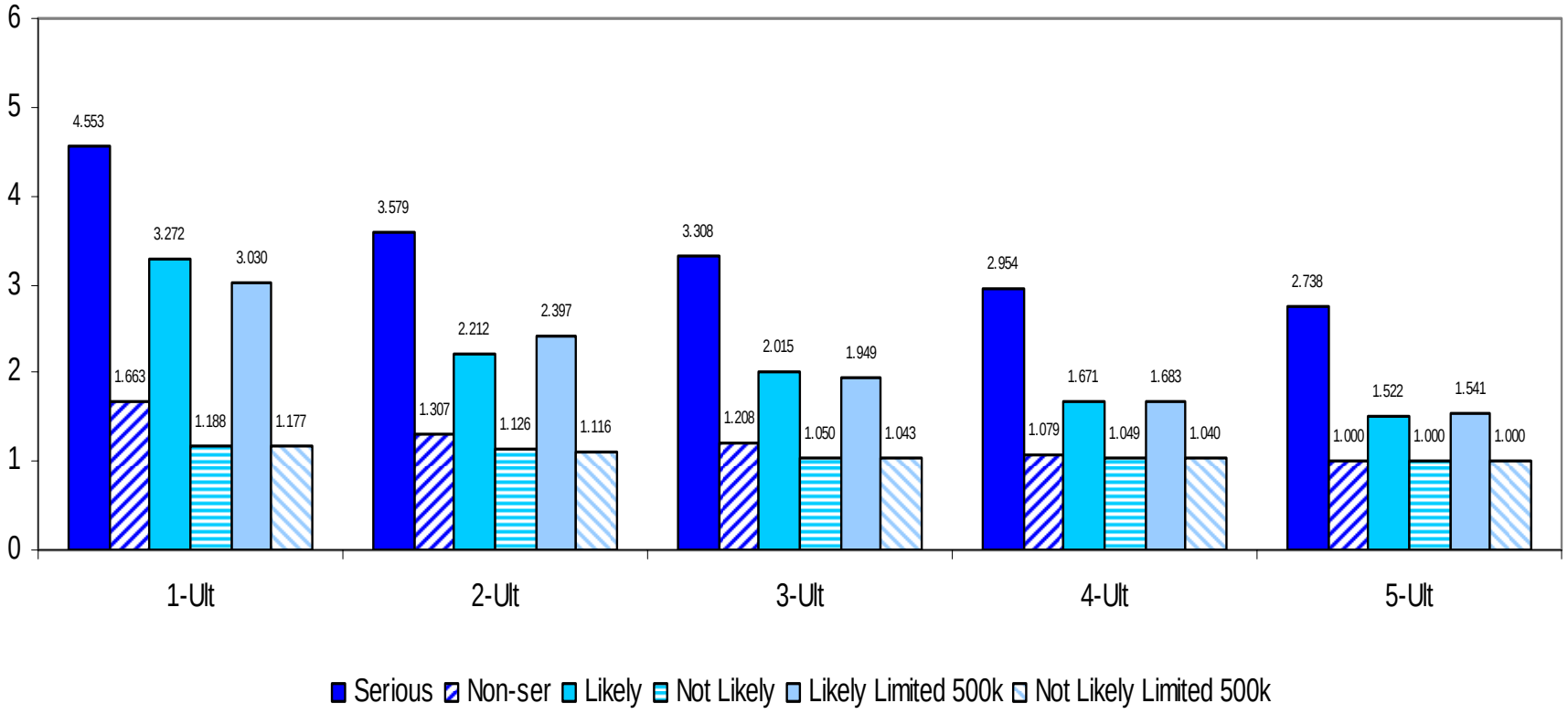


Exhibit 10

ANALYSIS OF LOSS DEVELOPMENT
BY INJURY TYPE, PART OF BODY TYPE, AND OPEN/CLOSED (at 1st report)
STATISTICAL PLAN DATA - CLASS RATEMAKING

Summary Results

Analysis of Claim Status:

Claims Locked at 1st — Development 1st to x (1:x) -- Limited Incurred Losses

Injury Type Category	Description	Ind 1999 1:6	Ind 2000 1:5	Med 1999 1:6	Med 2000 1:5	I+M 1999 1:6	I+M 2000 1:5
TTLO	TT Likely Body Part, Open at 1st	1.680	1.670	1.268	1.277	1.467	1.467
TTLC	TT Likely Body Part, Closed at 1st	1.196	1.184	1.125	1.116	1.158	1.147
TTNO	TT Not Likely Body Part, Open at 1st	1.475	1.465	1.089	1.085	1.267	1.260
TTNC	TT Not Likely Body Part, Closed at 1st	1.140	1.124	1.085	1.074	1.108	1.095
TTL	TT Likely Body Part	1.577	1.569	1.235	1.241	1.398	1.398
TTN	TT Not Likely Body Part	1.378	1.370	1.088	1.082	1.218	1.212
PPLO	PP Likely Body Part, Open at 1st	1.483	1.494	1.252	1.266	1.375	1.388
PPLC	PP Likely Body Part, Closed at 1st	1.100	1.064	1.125	1.101	1.110	1.078
PPNO	PP Not Likely Body Part, Open at 1st	1.325	1.324	1.047	1.058	1.188	1.192
PPNC	PP Not Likely Body Part, Closed at 1st	1.068	1.061	1.071	1.063	1.069	1.062
PPL	PP Likely Body Part	1.425	1.428	1.237	1.246	1.339	1.345
PPN	PP Not Likely Body Part	1.270	1.268	1.052	1.059	1.163	1.165
MoLO	Mo Likely Body Part, Open at 1st	---	---	1.552	1.592	2.629	2.822
MoLC	Mo Likely Body Part, Closed at 1st	---	---	1.204	1.175	1.428	1.379
MoNO	Mo Not Likely Body Part, Open at 1st	---	---	1.188	1.265	1.914	2.082
MoNC	Mo Not Likely Body Part, Closed at 1st	---	---	1.111	1.118	1.232	1.230
MoL	Mo Likely Body Part	---	---	1.270	1.252	1.668	1.645
MoN	Mo Not Likely Body Part	---	---	1.120	1.135	1.318	1.333
FaLO	Fa Likely Body Part, Open at 1st	0.884	0.914	0.710	0.829	0.868	0.906
FaLC	Fa Likely Body Part, Closed at 1st	1.047	1.089	1.051	0.997	1.047	1.073
FaNO	Fa Not Likely Body Part, Open at 1st	0.948	0.933	0.847	0.994	0.928	0.942
FaNC	Fa Not Likely Body Part, Closed at 1st	1.018	0.999	1.095	1.018	1.040	1.004
FaL	Fa Likely Body Part	0.899	0.926	0.750	0.852	0.885	0.919
FaN	Fa Not Likely Body Part	0.953	0.937	0.875	0.996	0.937	0.947
PTLO	PT Likely Body Part, Open at 1st	0.895	0.900	0.942	0.966	0.922	0.937
PTLC	PT Likely Body Part, Closed at 1st	0.994	0.989	0.984	1.008	0.990	0.997
PTNO	PT Not Likely Body Part, Open at 1st	0.937	0.960	0.957	0.873	0.948	0.915
PTNC	PT Not Likely Body Part, Closed at 1st	1.015	0.981	1.048	0.985	1.029	0.983
PTL	PT Likely Body Part	0.904	0.906	0.944	0.967	0.926	0.940
PTN	PT Not Likely Body Part	0.949	0.962	0.967	0.882	0.958	0.920

Notes: Injury Type Category = Injury Type + Body Part category + Claim Status at 1st

Injury Types:
- Fa = Fatal
- PT = Permanent Total
- PP = Permanent Partial
- TT = Temporary Total
- Mo = Medical Only

Body Part Categories:
- N = Not likely body part
- L = Likely body part

Claim Status:
- C = Closed at 1st
- O = Open at 1st

Data: All NCCI ratemaking states
Excludes carriers not reporting in URE format
Applies the single claim loss limitation at $500K

Exhibit 11

ANALYSIS OF LOSS DEVELOPMENT
BY INJURY TYPE, PART OF BODY TYPE, AND OPEN/CLOSED (at 1st report)
STATISTICAL PLAN DATA - CLASS RATEMAKING

Summary Results

Analysis of Development Combinations:

Claims Locked at 1st — Development 1st to x (1:x) -- Limited Incurred Losses

Options	Devel. Category	Injury Type Categories Included	Ind 1999 1:6	Ind 2000 1:5	Med 1999 1:6	Med 2000 1:5	I+M 1999 1:6	I+M 2000 1:5	I+M 1999 $M	% Total $ Move	I+M 2000 $M	% Total $ Move
Current	Likely	Fa + PT + PPL + TTL	1.443	1.444	1.221	1.229	1.337	1.341	4,977		5,128	
	Not Likely	All Other	1.459	1.454	1.105	1.106	1.242	1.241	5,594		5,771	
Opt 1	Likely	Fa + PT + PPLO + TTLO	1.500	1.504	1.242	1.253	1.377	1.385	4,127	-8%	4,264	-8%
	Not Likely	All Other	1.409	1.402	1.107	1.106	1.229	1.225	6,444		6,635	
Opt 2	Likely	Fa -Fa1 + PT + PPLO + TTLO	1.556	1.561	1.247	1.258	1.403	1.411	3,918	-10%	4,041	-10%
	Not Likely	All Other	1.375	1.369	1.105	1.105	1.218	1.216	6,654		6,859	
Opt 3	Likely	Fa -Fa1 + PT + PPLO + TTLO + MoLO	1.601	1.609	1.259	1.270	1.428	1.438	4,000	-9%	4,120	-9%
	Not Likely	All Other	1.343	1.335	1.096	1.095	1.201	1.197	6,572		6,780	
Opt 4	Likely	All Injury Types LO	1.554	1.560	1.258	1.271	1.410	1.420	4,130	-8%	4,263	-8%
	Not Likely	All Other	1.367	1.359	1.097	1.095	1.208	1.203	6,442		6,637	
Opt 5	Likely	All injury types LO, -Fa1	1.609	1.616	1.262	1.275	1.434	1.444	3,952	-10%	4,071	-10%
	Not Likely	All Other	1.340	1.332	1.095	1.094	1.199	1.195	6,619		6,829	

Claims Not Locked

-- Includes Crossover and Arisings on Subs — Development 1st to x (1:x) -- Limited Incurred Losses

Options	Devel. Category	Injury Type Categories Included	Ind 1999 1:6	Ind 2000 1:5	Med 1999 1:6	Med 2000 1:5	I+M 1999 1:6	I+M 2000 1:5	I+M 1999 $M	I+M 2000 $M
Current	Likely	Fa + PT + PPL + TTL	1.694	1.678	1.394	1.384	1.550	1.538	4,977	5,128
	Not Likely	All Other	1.411	1.426	1.096	1.106	1.218	1.230	5,594	5,771
Opt 1	Likely	Fa + PT + PPLO + TTLO	1.771	1.757	1.426	1.419	1.607	1.596	4,127	4,264
	Not Likely	All Other	1.394	1.402	1.113	1.118	1.226	1.233	6,444	6,635
Opt 2	Likely	Fa -Fa1 + PT + PPLO + TTLO	1.832	1.826	1.426	1.421	1.631	1.625	3,918	4,041
	Not Likely	All Other	1.375	1.377	1.114	1.119	1.223	1.227	6,654	6,859

Notes: Injury Type Category = Injury Type + Body Part category + Claim Status at 1st

Injury Types:
- Fa = Fatal
- PT = Permanent Total
- PP = Permanent Partial
- TT = Temporary Total
- Mo = Medical Only

Fa1 = Fatal at 1st
LO = Likely body part, open at 1st

Body Part Categories:
- N = Not likely body part
- L = Likely body part

Claim Status:
- C = Closed at 1st
- O = Open at 1st

Data: All NCCI ratemaking states
Excludes carriers not reporting in URE format
Applies the single claim loss limitation at $500K

Exhibit 12

ANALYSIS OF LOSS DEVELOPMENT
BY INJURY TYPE, PART OF BODY, AND OPEN/CLOSED (at 1st report)
STATISTICAL PLAN DATA - CLASS RATEMAKING

Summary - Fatal and PT Development

FATAL
PY 1999

Category at 1st	Category at 6th	Ind+Med at 1st	Ind+Med at 6th	Ind+Med Development	Ind+Med Injury Type Development
Stays in Injury Type					
FaLO	FaL	172,831,898	149,614,886	-23,217,012	-23,217,012
FaLC	FaL	18,522,409	19,393,256	870,847	870,847
FaNO	FaN	11,940,325	11,054,696	-885,629	-885,629
FaNC	FaN	1,101,646	1,140,701	39,055	39,055
Total Fa to Fa		204,396,278	181,203,539	-23,192,739	**-23,192,739**
Moves into Injury Type					
PTLO	FaL	5,948,628	5,110,187	-838,441	5,110,187
TTLO	FaL	12,678,675	16,950,679	4,272,004	16,950,679
MoLO	FaL	213,376	1,369,657	1,156,281	1,369,657
PPLO	FaL	13,519,287	15,965,816	2,446,529	15,965,816
----	FaL	0	12,583,421	12,583,421	12,583,421
----	FaN	0	1,366,094	1,366,094	1,366,094
TTLC	FaL	339,998	520,788	180,790	520,788
MoLC	FaL	23,952	979,881	955,929	979,881
PPLC	FaL	265,121	226,770	-38,351	226,770
TTNO	FaN	1,265,655	1,498,696	233,041	1,498,696
MoNO	FaN	30,028	938,698	908,670	938,698
PPNO	FaN	1,321,388	2,025,430	704,042	2,025,430
TTNC	FaN	37,411	55,284	17,873	55,284
MoNC	FaN	6,722	38,582	31,860	38,582
PPNC	FaN	53,961	71,656	17,695	71,656
Total Other to Fa		35,704,202	59,701,639	23,997,437	**59,701,639**
Other LO to Fa		32,359,966	39,396,339	7,036,373	39,396,339
Arising to Fa		0	13,949,515	13,949,515	13,949,515
All other to Fa		3,344,236	6,355,785	3,011,549	6,355,785
Moves out of Injury Type					
FaLO	PTL	597,761	954,391	356,630	-597,761
FaLO	TTL	3,373,971	3,034,733	-339,238	-3,373,971
FaLO	MoL	254,232	32,821	-221,411	-254,232
FaLO	PPL	208,664	205,713	-2,951	-208,664
FaLC	PTL	2,888	2,888	0	-2,888
FaLC	TTL	33,168	58,565	25,397	-33,168
FaLC	MoL	21,257	1,255	-20,002	-21,257
FaNO	TTN	383,884	403,289	19,405	-383,884
FaNO	MoN	6,500	0	-6,500	-6,500
FaNO	PPN	183,853	155,381	-28,472	-183,853
FaNC	TTN	18,617	22,089	3,472	-18,617
FaNC	PPN	5,650	8,364	2,714	-5,650
Total Fa to Other		5,090,445	4,879,489	-210,956	-5,090,445
Locked Injury Type Development			**209,486,723**	**186,083,028**	**-23,403,695**
					0.888
Cross Over Injury Type Development			**209,486,723**	**240,905,178**	**31,418,454**
					1.150

FATAL
PY 2000

Category at 1st	Category at 5th	Ind+Med at 1st	Ind+Med at 5th	Ind+Med Development	Ind+Med Injury Type Development
Stays in Injury Type					
FaLO	FaL	186,762,580	169,522,620	-17,239,960	-17,239,960
FaLC	FaL	15,910,070	17,079,627	1,169,557	1,169,557
FaNO	FaN	13,298,124	12,123,076	-1,175,048	-1,175,048
FaNC	FaN	1,058,062	1,060,164	2,102	2,102
Total Fa to Fa		217,028,836	199,785,487	-17,243,349	**-17,243,349**
Moves into Injury Type					
PTLO	FaL	3,966,358	3,819,262	-147,096	3,819,262
TTLO	FaL	6,169,446	7,229,697	1,060,251	7,229,697
MoLO	FaL	61,485	1,180,318	1,118,833	1,180,318
PPLO	FaL	8,128,178	7,374,389	-753,789	7,374,389
----	FaL	0	11,867,836	11,867,836	11,867,836
----	FaN	0	1,623,951	1,623,951	1,623,951
TTLC	FaL	583,054	826,786	243,732	826,786
MoLC	FaL	92,349	463,387	371,038	463,387
PPLC	FaL	5,000	5,000	0	5,000
PTNO	FaN	1,390,720	1,000,000	-390,720	1,000,000
TTNO	FaN	1,431,739	1,560,824	129,085	1,560,824
MoNO	FaN	45,319	961,661	916,342	961,661
PPNO	FaN	768,723	1,238,737	470,014	1,238,737
TTNC	FaN	54,585	235,528	180,943	235,528
MoNC	FaN	15,095	78,620	63,525	78,620
Total Other to Fa		22,712,051	39,465,996	16,753,945	**39,465,996**
Other LO to Fa		18,325,467	19,603,666	1,278,199	19,603,666
Arising to Fa		0	13,491,787	13,491,787	13,491,787
All other to Fa		4,386,584	6,370,543	1,983,959	6,370,543
Moves out of Injury Type					
FaLO	PTL	1,238,018	1,105,647	-132,371	-1,238,018
FaLO	TTL	1,500,046	1,697,990	197,944	-1,500,046
FaLO	MoL	579,712	25,285	-554,427	-579,712
FaLO	PPL	2,088,289	1,717,273	-371,016	-2,088,289
FaLC	TTL	5,536	11,236	5,700	-5,536
FaLC	MoL	2,591	2,553	-38	-2,591
FaLC	PPL	239,984	240,284	300	-239,984
FaNO	TTN	292,945	687,510	394,565	-292,945
FaNO	MoN	55,505	3,478	-52,027	-55,505
FaNO	PPN	306,629	334,433	27,804	-306,629
FaNC	TTN	23,176	25,341	2,165	-23,176
Total Fa to Other		6,332,431	5,851,030	-481,401	-6,332,431
Locked Injury Type Development			**223,361,267**	**205,636,517**	**-17,724,750**
					0.921
Cross Over Injury Type Development			**223,361,267**	**239,251,483**	**15,890,216**
					1.071

Notes: Injury Type Category = Injury Type + Body Part category + Claim Status at 1st

Injury Types:
- Fa = Fatal
- PT = Permanent Total
- PP = Permanent Partial
- TT = Temporary Total
- Mo = Medical Only

Body Part Categories:
- N = Not likely body part
- L = Likely body part

Claim Status:
- C = Closed at 1st
- O = Open at 1st

LO = Likely body part, open at 1st

Data: All NCCI ratemaking states
Excludes carriers not reporting in URE format
Applies the single claim loss limitation at $500K

Exhibit 13

ANALYSIS OF LOSS DEVELOPMENT
BY INJURY TYPE, PART OF BODY, AND OPEN/CLOSED (at 1st report)
STATISTICAL PLAN DATA - CLASS RATEMAKING

Summary - Fatal and PT Development

PERMANENT TOTAL
PY 1999

Category at 1st	Category at 6th	Ind+Med at 1st	Ind+Med at 6th	Ind+Med Development	Ind+Med Injury Type Development
Stays in Injury Type					
PTLO	PTL	83,291,688	81,330,910	-1,960,778	-1,960,778
PTLC	PTL	7,474,144	7,494,083	19,939	19,939
PTNO	PTN	24,646,111	24,954,711	308,600	308,600
PTNC	PTN	4,647,731	4,751,566	103,835	103,835
Total PT to PT		120,059,674	118,531,270	-1,528,404	**-1,528,404**
Moves into Injury Type					
FaLO	PTL	597,761	954,391	356,630	954,391
TTLO	PTL	58,296,074	180,949,875	122,653,801	180,949,875
MoLO	PTL	1,350,219	12,210,680	10,860,461	12,210,680
PPLO	PTL	90,115,408	271,054,396	180,938,988	271,054,396
----	PTL	0	38,971,217	38,971,217	38,971,217
----	PTN	0	17,518,210	17,518,210	17,518,210
FaLC	PTL	2,888	2,888	0	2,888
TTLC	PTL	779,756	4,115,315	3,335,559	4,115,315
MoLC	PTL	50,962	6,193,259	6,142,297	6,193,259
PPLC	PTL	503,709	3,619,431	3,115,722	3,619,431
TTNO	PTN	27,315,144	94,919,491	67,604,347	94,919,491
MoNO	PTN	218,603	4,241,846	4,023,243	4,241,846
PPNO	PTN	35,247,948	111,113,846	75,865,898	111,113,846
TTNC	PTN	452,656	2,778,277	2,325,621	2,778,277
MoNC	PTN	38,566	2,329,502	2,290,936	2,329,502
PPNC	PTN	679,326	3,250,047	2,570,721	3,250,047
Total Other to PT		215,649,020	754,222,671	538,573,651	**754,222,671**
Other LO to PT		150,359,462	465,169,342	314,809,880	465,169,342
Arising to PT		0	56,489,427	56,489,427	56,489,427
All other to PT		65,289,558	232,563,902	167,274,344	232,563,902
Moves out of Injury Type					
PTLO	FaL	5,948,628	5,110,187	-838,441	-5,948,628
PTLO	TTL	4,953,081	3,961,440	-991,641	-4,953,081
PTLO	MoL	1,363,527	27,013	-1,336,514	-1,363,527
PTLO	PPL	16,564,439	12,898,826	-3,665,613	-16,564,439
PTLC	TTL	336,156	193,243	-142,913	-336,156
PTLC	MoL	5,760	5,756	-4	-5,760
PTLC	PPL	237,237	278,250	41,013	-237,237
PTNO	TTN	2,660,188	2,452,291	-207,897	-2,660,188
PTNO	MoN	155,104	51,436	-103,668	-155,104
PTNO	PPN	7,046,099	5,241,309	-1,804,790	-7,046,099
PTNC	TTN	187,636	201,725	14,089	-187,636
PTNC	MoN	9,936	7,836	-2,100	-9,936
PTNC	PPN	19,788	44,490	24,702	-19,788
Total PT to Other		39,487,579	30,473,802	-9,013,777	-39,487,579
Locked Injury Type Development					
		159,547,253	**149,005,072**		**-10,542,181**
					0.934
Cross Over Injury Type Development					
		159,547,253	**872,753,941**		**713,206,688**
					5.470

PERMANENT TOTAL
PY2000

Category at 1st	Category at 5th	Ind+Med @1st	Ind+Med @5th	Ind+Med Development	Ind+Med Injury Type Development
Stays in Injury Type					
PTLO	PTL	76,210,396	80,732,133	4,521,737	4,521,737
PTLC	PTL	5,739,227	5,690,608	-48,619	-48,619
PTNO	PTN	25,918,704	25,534,009	-384,695	-384,695
PTNC	PTN	3,480,736	3,415,996	-64,740	-64,740
Total PT to PT		111,349,063	115,372,746	4,023,683	**4,023,683**
Moves into Injury Type					
FaLO	PTL	1,238,018	1,105,647	-132,371	1,105,647
TTLO	PTL	54,534,730	162,970,263	108,435,533	162,970,263
MoLO	PTL	271,881	9,962,765	9,690,884	9,962,765
PPLO	PTL	81,150,562	241,413,195	160,262,633	241,413,195
----	PTL	0	35,827,796	35,827,796	35,827,796
----	PTN	0	17,544,736	17,544,736	17,544,736
TTLC	PTL	679,688	3,055,005	2,375,317	3,055,005
MoLC	PTL	57,968	5,425,783	5,367,815	5,425,783
PPLC	PTL	1,045,229	1,387,697	342,468	1,387,697
TTNO	PTN	21,615,791	77,574,737	55,958,946	77,574,737
MoNO	PTN	65,919	3,759,852	3,693,933	3,759,852
PPNO	PTN	35,776,820	109,426,819	73,649,999	109,426,819
TTNC	PTN	919,653	2,442,629	1,522,976	2,442,629
MoNC	PTN	25,279	1,874,535	1,849,256	1,874,535
PPNC	PTN	162,571	1,232,692	1,070,121	1,232,692
Total Other to PT		197,544,109	675,004,151	477,460,042	**675,004,151**
Other LO to PT		137,195,191	415,451,870	278,256,679	415,451,870
Arising to PT		0	53,372,532	53,372,532	53,372,532
All other to PT		60,348,918	206,179,749	145,830,831	206,179,749
Moves out of Injury Type					
PTLO	FaL	3,966,358	3,819,262	-147,096	-3,966,358
PTLO	TTL	6,349,440	4,749,108	-1,600,332	-6,349,440
PTLO	MoL	1,892,978	1,092,058	-800,920	-1,892,978
PTLO	PPL	27,503,897	18,239,496	-9,264,401	-27,503,897
PTLC	TTL	210,089	243,128	33,039	-210,089
PTLC	PPL	151,118	148,666	-2,452	-151,118
PTNO	FaN	1,390,720	1,000,000	-390,720	-1,390,720
PTNO	TTN	3,649,969	2,458,285	-1,191,684	-3,649,969
PTNO	MoN	605,065	81,494	-523,571	-605,065
PTNO	PPN	7,684,122	6,825,909	-858,213	-7,684,122
PTNC	TTN	126,692	128,622	1,930	-126,692
PTNC	MoN	934	417	-517	-934
PTNC	PPN	65,145	64,953	-192	-65,145
Total PT to Other		53,596,527	38,851,398	-14,745,129	-53,596,527
Locked Injury Type Development					
		164,945,590	**154,224,144**		**-10,721,446**
					0.935
Cross Over Injury Type Development					
		164,945,590	**790,376,898**		**625,431,308**
					4.792

Notes: Injury Type Category = Injury Type + Body Part category + Claim Status at 1st

Injury Types:
- Fa = Fatal
- PT = Permanent Total
- PP = Permanent Partial
- TT = Temporary Total
- Mo = Medical Only

Body Part Categories:
- N = Not likely body part
- L = Likely body part

Claim Status:
- C = Closed at 1st
- O = Open at 1st

LO = Likely body part, open at 1st

Data: All NCCI ratemaking states
Excludes carriers not reporting in URE format
Applies the single claim loss limitation at $500K

Alternatives for Limiting Losses and Allocating Excess

Exhibit 14

Alt k =	Limit	Using Actual Excess
0	Unlimited	
1	$1M	Allocates Actual IG Excess Uniformly by Class Within the IG
2	$300k	Allocates Actual IG Excess Uniformly by Class Within the IG
3	$300k	Allocates Actual HG Excess Uniformly by Class Within the HG
4	$300k	Same as k=3 with factor to balance to IG Unlimited Losses
5	$300k	Allocates Actual IG Excess by Class Within IG Using Limited Losses x XS% / (1-XS%)
6	$300k	Allocates HG Actual Excess by Class Within HG Using Limited Losses x XS% / (1-XS%)
7	$300k	Allocates Actual State Excess by Class Using Limited Losses x XS% / (1-XS%)

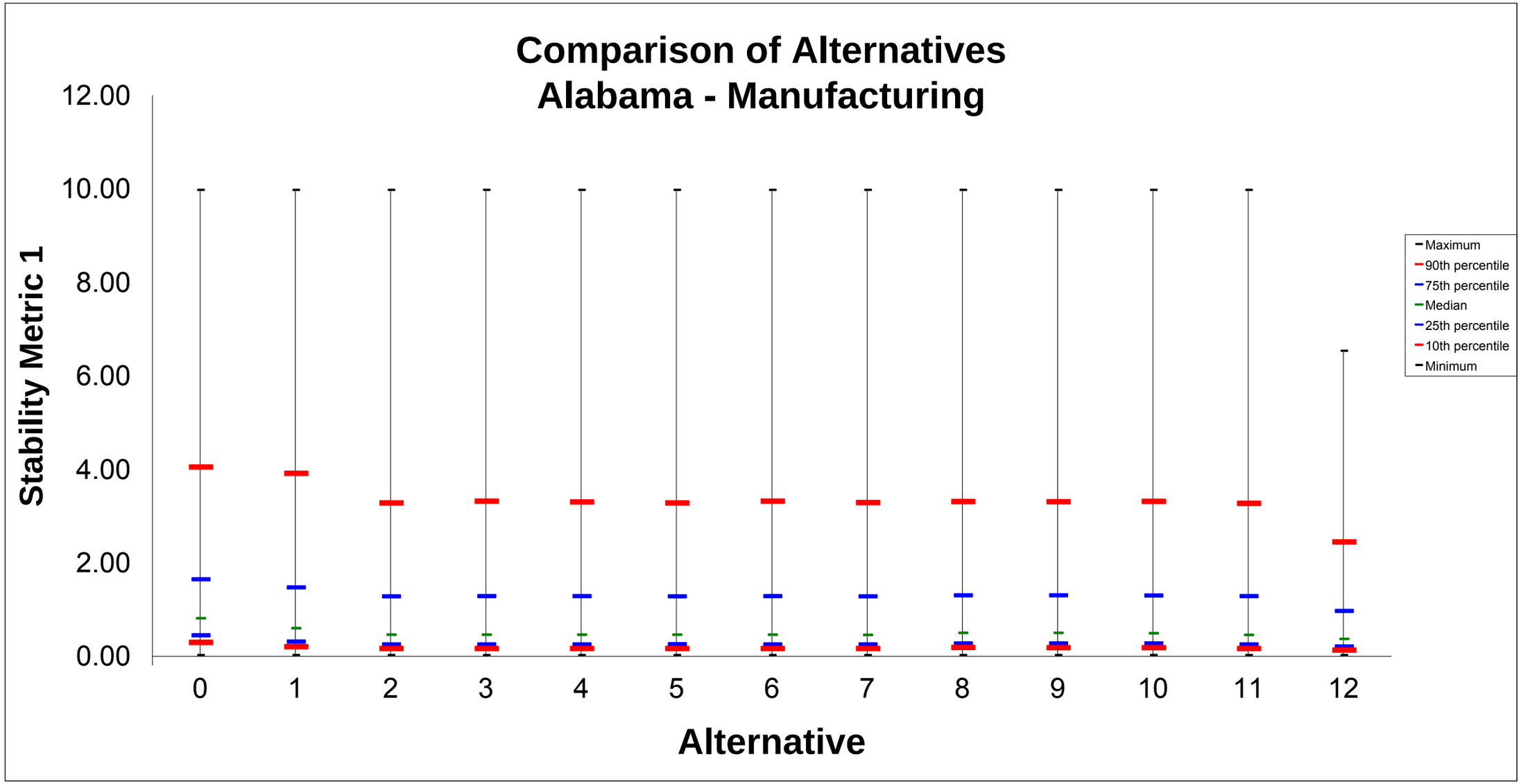
Alt k =	Limit	Using Actual Excess
8	$300k	Allocates Actual IG Excess by Class Within IG Using Unlimited Losses x XS%
9	$300k	Allocates Actual HG Excess by Class Within HG Using Unlimited Losses x XS%
10	$300k	Allocates Actual State Excess by Class Using Unlimited Losses x XS%
13	Vary by Class* $100k, $300k, $1M	Allocates Actual State Excess by Class Using Unlimited Losses x XS%

Alt k =	Limit	Using Expected Excess
11	$300k	Limited Actual Losses x 1 / (1- XS%)
12	$300k	Limited Losses + HG XS% x Unlimited Expected Losses (i.e. Mu)
14	Vary by Class* $100k, $300k, $1M	Limited Actual Losses x 1 / (1- XS%)
15	Vary by Class* $100k, $300k, $1M	Limited Losses + HG XS% x Unlimited Expected Losses (i.e. Mu)

Note: Alt 3 and Alt 6 are equivalent

Legend: IG - Industry Group
HG - Hazard Group
XS - per claim adjusted excess ratio

* Alts 13 - 15 proposed three loss limits: 100K for small classes, 300K for medium-size classes & $1M for large classes


Comparison of Alternatives
Alabama - Manufacturing
Stability Metric 1
12.00
10.00
8.00
6.00
4.00
2.00
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1
2
3
4
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7
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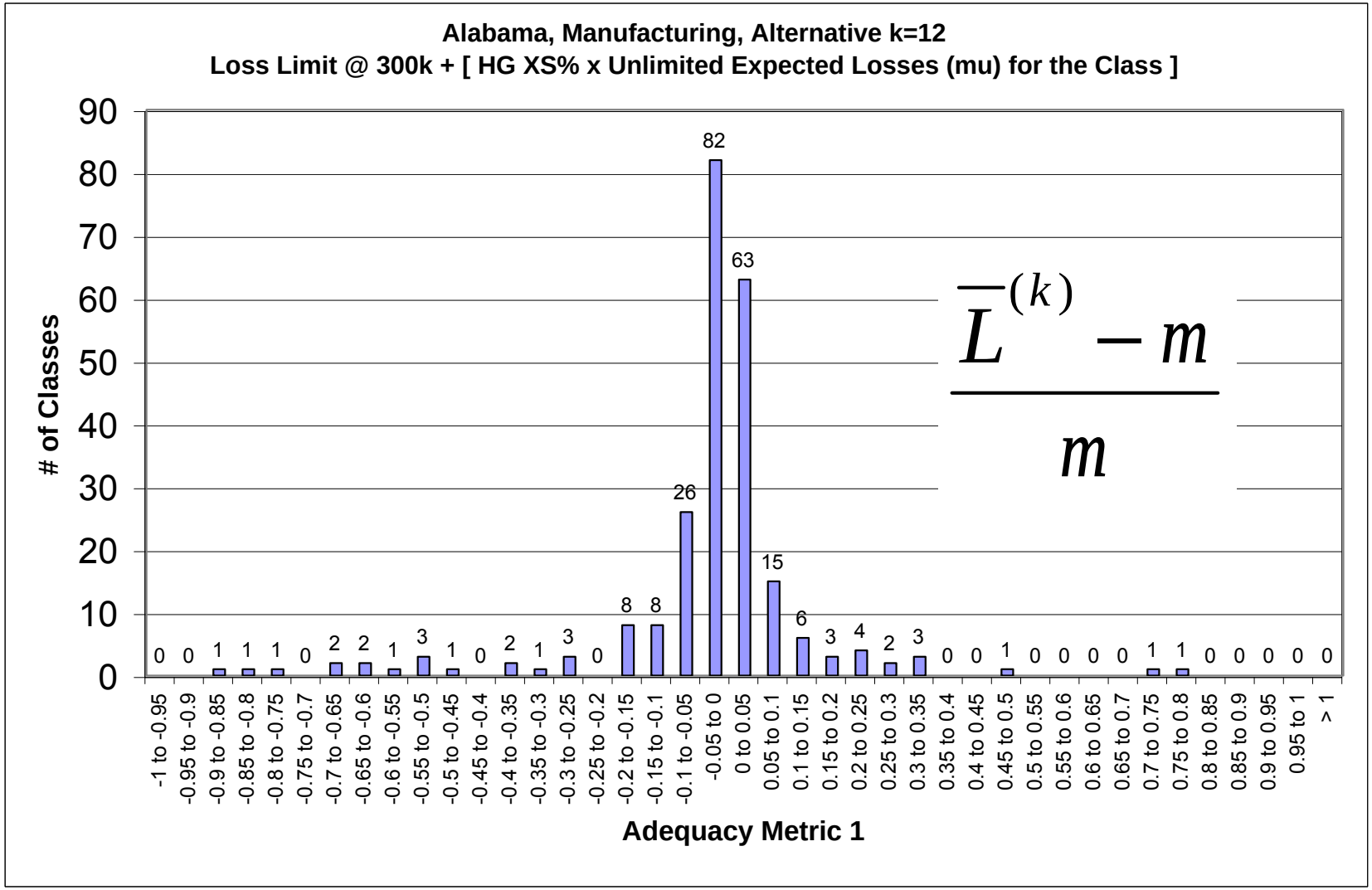
11
12
Alternative
Maximum
90th percentile
75th percentile
Median
25th percentile
10th percentile
Minimum



desired range (-.25, 0, .25)

min	-0.864
unweighted average	-0.031
weighted average	-0.007
max	0.766

Exhibit 16

Analysis of the Indemnity and Medical Excess (XS) Split
Call #31 Data as of 12-31-04 for all NCCI States

PY	Primary Ind.	Primary Med.	XS Ind.	XS Med.	XS Split Ind.	XS Split Med.	Claim Count
Prior	169,816,166	139,683,834	70,279,751	182,840,412	**27.8%**	**72.2%**	619
1982	13,995,376	14,004,624	8,619,005	13,163,124	**39.6%**	**60.4%**	56
1983	62,784,206	65,715,794	39,612,997	119,661,433	**24.9%**	**75.1%**	257
1984	174,613,643	172,386,357	124,779,440	258,040,159	**32.6%**	**67.4%**	694
1985	189,175,924	179,824,076	127,426,362	269,832,016	**32.1%**	**67.9%**	738
1986	231,461,635	228,538,365	139,680,186	284,920,944	**32.9%**	**67.1%**	920
1987	251,592,143	251,907,857	164,604,780	340,891,816	**32.6%**	**67.4%**	1,007
1988	266,459,073	290,040,927	183,851,067	409,875,986	**31.0%**	**69.0%**	1,113
1989	263,077,846	281,922,154	177,611,338	370,323,060	**32.4%**	**67.6%**	1,090
1990	250,790,173	284,709,827	155,166,315	386,803,697	**28.6%**	**71.4%**	1,071
1991	211,153,813	258,346,187	126,792,831	374,456,842	**25.3%**	**74.7%**	939
1992	213,866,898	244,633,102	120,914,845	331,330,704	**26.7%**	**73.3%**	917
1993	177,959,200	215,040,800	112,139,690	298,596,771	**27.3%**	**72.7%**	786
1994	178,857,458	212,142,542	108,183,294	324,031,769	**25.0%**	**75.0%**	782
1995	166,982,566	223,017,434	101,467,025	308,899,713	**24.7%**	**75.3%**	780
1996	211,737,505	248,762,495	128,285,636	313,703,083	**29.0%**	**71.0%**	921
1997	235,761,313	279,738,687	148,148,864	430,926,448	**25.6%**	**74.4%**	1,031
1998	270,545,487	311,954,513	174,634,718	435,518,901	**28.6%**	**71.4%**	1,165
1999	279,735,890	312,764,110	183,062,743	429,648,973	**29.9%**	**70.1%**	1,185
2000	282,319,912	306,680,088	181,576,108	365,938,213	**33.2%**	**66.8%**	1,178
2001	244,889,269	281,610,731	161,786,219	410,967,203	**28.2%**	**71.8%**	1,053
2002	177,579,023	249,920,977	129,992,203	404,432,908	**24.3%**	**75.7%**	855
2003	133,019,301	215,480,699	112,305,448	425,846,975	**20.9%**	**79.1%**	697
2004	56,015,676	79,484,324	44,337,439	111,049,945	**28.5%**	**71.5%**	271
Total	**4,714,189,497**	**5,348,310,503**	**3,025,258,303**	**7,601,701,096**	**28.5%**	**71.5%**	**20,125**

Note: Claims < $500,000 are excluded from the analysis.

Exhibit 17

Proposal for State Indicated Pure Premium Full Credibility Standards

	Current	Indicated[1]	Current/ Indicated
Serious	125	244	51%
Non-serious	350	491	71%
Combined Indemnity	--	1,397	--
Medical (non-serious severity)	750	1,341	56%
Medical (medical severity)	--	719	--

	Selection Proposal	Selection Proposal / Indication
Combined Indemnity	**850**	61%
Medical (non-serious severity)	750	56%
Medical (medical severity)	**400**	56%

Note: 1. From p=95%, k=25% regression results averaged across all 6 states.

Exhibit 18

Proposal for National Pure Premium Full Credibility Standards (actual lost-time claims)

	Current	Indicated[1]	Current/ Indicated
Serious	175	271	65%
Non-serious	500	1,132	44%
Combined Indemnity	--	2,127	--
Medical	1000	1,548	65%

	Selection Proposal	Selection Proposal / Indication
Combined Indemnity	**1,150**	54%
Medical	**1,000**	65%

Note: 1. From p=95%, k=25% regression results averaged across all 6 states.

Exhibit 19

Comparison Of Current And Proposed Indemnity Statewide Credibility

Comparison Of Current And Proposed Indemnity Statewide Credibility

	Statewide Credibility		Statewide Credibility (excluding 50 largest classes)	
	Current Average	Proposal Average[1]	Current Average	Proposal Average[1]
State				
IA	73%	78%	53%	51%
IL	90%	93%	75%	80%
NC	80%	81%	59%	56%
CO	77%	82%	58%	55%
MO	83%	85%	67%	62%
TN	82%	82%	60%	55%
National				
IA	13%	11%	23%	24%
IL	6%	4%	14%	10%
NC	10%	10%	21%	22%
CO	11%	9%	21%	22%
MO	9%	8%	17%	19%
TN	10%	10%	21%	23%

Note: 1. Assuming state Nf = 850 and national Nf = 1150.

Exhibit 20

Comparison Of Current And Proposed Medical Statewide Credibility

Comparison Of Current And Proposed Medical Statewide Credibility

	Statewide Credibility		Statewide Credibility (excluding 50 largest classes)	
	Current Average	Proposal Average[1]	Current Average	Proposal Average[1]
State				
IA	90%	88%	74%	68%
IL	96%	96%	89%	91%
NC	93%	89%	83%	73%
CO	90%	90%	72%	73%
MO	91%	92%	76%	80%
TN	91%	89%	76%	72%
National				
IA	5%	6%	13%	16%
IL	2%	2%	5%	5%
NC	4%	6%	9%	14%
CO	5%	5%	14%	14%
MO	5%	4%	12%	10%
TN	5%	6%	13%	15%

Note: 1. Assuming state Nf = 400 and national Nf = 1000.

Exhibit 21

Selection for IG Differential
FCS = 12,000

Industry Group Claim Counts		Updated Square Root								
	p	90%	90%	90%	98%	98%	98%	**95%**	95%	95%
	k	0.075	0.050	0.025	0.075	0.050	0.025	**0.075**	0.050	0.025
	Nf	8,417	18,939	75,755	16,837	37,883	151,533	**11,951**	26,890	107,561
1,000		34%	23%	11%	24%	16%	8%	29%	19%	10%
2,000		49%	32%	16%	34%	23%	11%	41%	27%	14%
4,000		69%	46%	23%	49%	32%	16%	58%	39%	19%
8,000		97%	65%	32%	69%	46%	23%	82%	55%	27%
16,000		100%	92%	46%	97%	65%	32%	100%	77%	39%
32,000		100%	100%	65%	100%	92%	46%	100%	100%	55%
64,000		100%	100%	92%	100%	100%	65%	100%	100%	77%
State		Using Typical Average Industry Group Claim Counts								
Maine		69%	46%	23%	49%	32%	16%	58%	39%	19%
Vermont		73%	49%	24%	52%	34%	17%	61%	41%	20%
Alabama		100%	92%	46%	97%	65%	32%	100%	77%	39%
Illinois		100%	100%	95%	100%	100%	67%	100%	100%	80%

Exhibit 22a

Large State

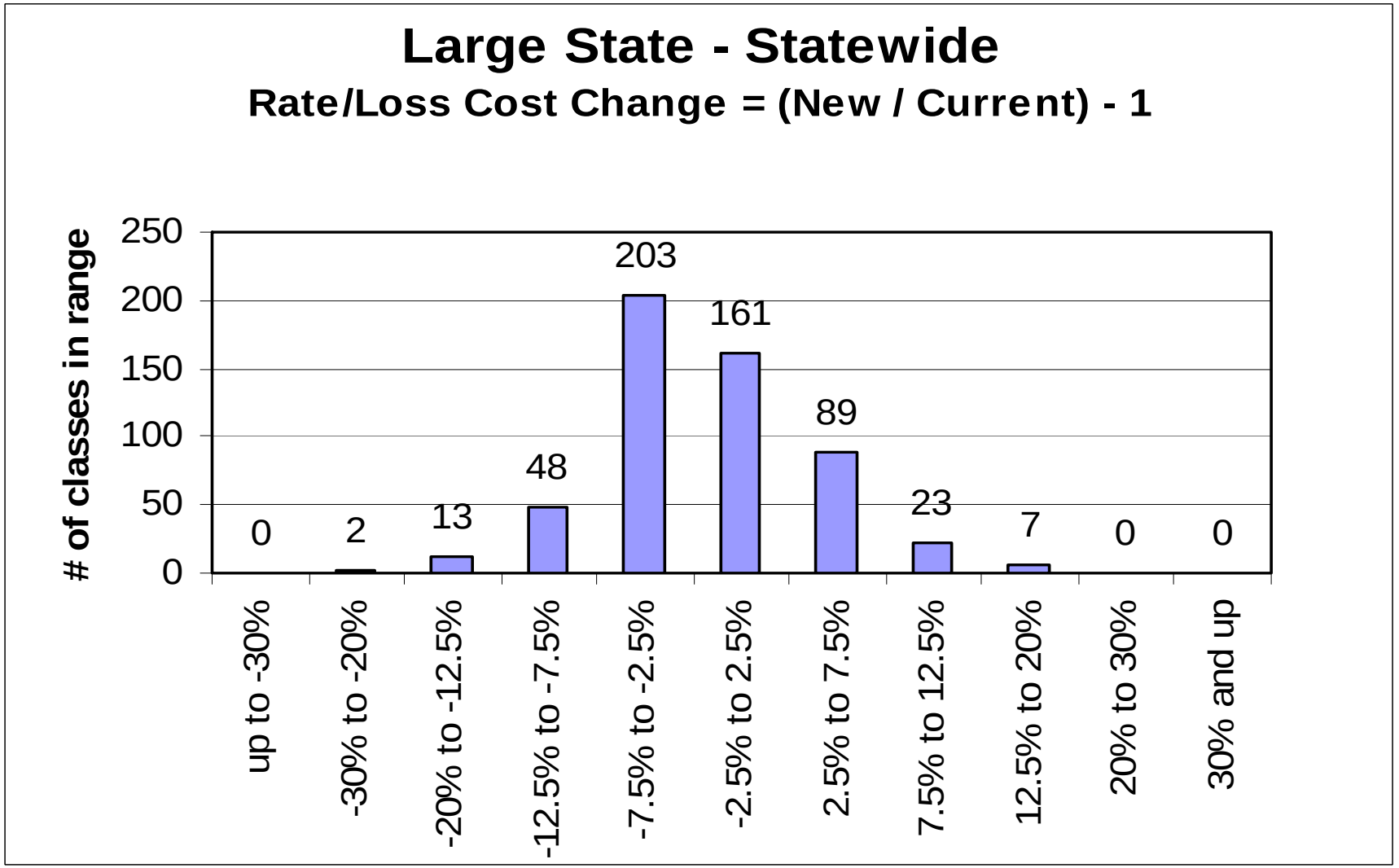
Impact of New Loss Development and Expected Excess by Industry Group

Industry Group	(1) Wtd Change in LDFs	(2) Wtd Change in Excess	(3) (1)x(2) Predicted Chg by IG	(4) (3) / Tot(3) Normalized Predicted Chg by IG	(5) (4)-1 Predicted %Chg by IG
Manufacturing	0.923	1.090	1.006	0.949	-5.1%
Contracting	0.892	1.170	1.043	0.984	-1.6%
Office & Clerical	0.975	1.101	1.073	1.012	1.2%
Goods & Services	0.988	1.096	1.083	1.021	2.1%
Miscellaneous	0.933	1.134	1.059	0.998	-0.2%
State Total	0.949	1.118	1.060	1.0000	0.0%

All five industry groups received IG credibility equal to 100% for Large state.

Exhibit 22b

All Classes – Final After Swing Limits



LIMITED INDEMNITY LOSS DEVELOPMENT Test State **04/01/08** Exhibit 23a

Likely

1st Report Start: 2/1/2004
1st Report End: 1/31/2005

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report	6th Report	7th Report	8th Report	9th Report	10th Report
2/91-1/92	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0
2/92-1/93	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0
2/93-1/94	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0	0
2/94-1/95	*0*	*0*	*0*	*0*	*0*	0	0	0	0	0
2/95-1/96	*0*	*0*	*0*	*0*	0	0	0	0	0	0
2/96-1/97	*0*	*0*	*0*	0	0	0	0	0	0	
2/97-1/98	*0*	*0*	0	0	0	0	0	0		
2/98-1/99	*0*	0	0	0	0	0	0			
2/99-1/00	60,996,530	92,218,325	117,039,686	132,422,739	140,802,919	144,380,191				
2/00-1/01	61,249,048	95,369,132	116,456,223	128,043,912	132,466,081					
2/01-1/02	63,330,710	101,332,628	120,907,703	131,065,662						
2/02-1/03	64,002,100	96,832,704	115,101,791							
2/03-1/04	62,441,089	97,204,707								
2/04-1/05	63,908,035									

Link Ratios	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2/91-1/92									
2/92-1/93									
2/93-1/94									
2/94-1/95									
2/95-1/96									
2/96-1/97									
2/97-1/98									
2/98-1/99									
2/99-1/00	1.512	1.269	1.131	1.063	1.025				
2/00-1/01	1.557	1.221	1.100	1.035					
2/01-1/02	1.600	1.193	1.084						
2/02-1/03	1.513	1.189							
2/03-1/04	1.557								

AVERAGE DEV.	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2 Year Averages	1.535	1.191	1.092	1.049					
3 Year Averages	1.557	1.201	1.105						
4 Year Averages	1.557	1.218							
5 Year Averages	1.548								
5 Yr Ex-Hi Lo Avgs	1.542								

AVG DEV. TO 5TH	1:5	2:5	3:5	4:5	5th:Ult
2 Year Averages	2.095	1.365	1.146	1.049	1.090
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

AVG DEV. TO ULT.	1:U	2:U	3:U	4:U	5:U
2 Year Averages	2.281	1.486	1.248	1.143	1.090
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

Averaging Method (Use '6' for 5 Yr Ex-HiLo)	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
	2	2	2	2	2	2	2	2	2

Selected Average Development	1:2	2:3	3:4	4:5	5th:Ult
	1.535	1.191	1.092	1.049	1.090

LIMITED INDEMNITY LOSS DEVELOPMENT Test State **04/01/08** Exhibit 23b

Not-Likely

1st Report Start: 2/1/2004
1st Report End: 1/31/2005

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report	6th Report	7th Report	8th Report	9th Report	10th Report
2/91-1/92	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0
2/92-1/93	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0
2/93-1/94	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0	0
2/94-1/95	*0*	*0*	*0*	*0*	*0*	0	0	0	0	0
2/95-1/96	*0*	*0*	*0*	*0*	0	0	0	0	0	0
2/96-1/97	*0*	*0*	*0*	0	0	0	0	0	0	
2/97-1/98	*0*	*0*	0	0	0	0	0	0		
2/98-1/99	*0*	0	0	0	0	0	0			
2/99-1/00	92,600,271	117,560,761	133,963,360	141,479,415	146,067,806	147,360,667				
2/00-1/01	95,374,095	116,001,514	131,138,809	138,472,791	141,250,877					
2/01-1/02	97,129,731	122,748,458	135,195,013	139,317,464						
2/02-1/03	95,563,495	115,415,827	126,594,218							
2/03-1/04	90,843,197	109,219,366								
2/04-1/05	96,958,872									

Link Ratios	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2/91-1/92									
2/92-1/93									
2/93-1/94									
2/94-1/95									
2/95-1/96									
2/96-1/97									
2/97-1/98									
2/98-1/99									
2/99-1/00	1.270	1.140	1.056	1.032	1.009				
2/00-1/01	1.216	1.130	1.056	1.020					
2/01-1/02	1.264	1.101	1.030						
2/02-1/03	1.208	1.097							
2/03-1/04	1.202								

AVERAGE DEV.	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2 Year Averages	1.205	1.099	1.043	1.026					
3 Year Averages	1.225	1.109	1.047						
4 Year Averages	1.223	1.117							
5 Year Averages	1.232								
5 Yr Ex-Hi Lo Avgs	1.229								

AVG DEV. TO 5TH	1:5	2:5	3:5	4:5	5th:Ult
2 Year Averages	1.417	1.176	1.070	1.026	1.030
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

AVG DEV. TO ULT.	1:U	2:U	3:U	4:U	5:U
2 Year Averages	1.459	1.211	1.102	1.057	1.030
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

Averaging Method (Use '6' for 5 Yr Ex-HiLo)										
	2	2	2	2	2	2	2	2	2	2

Selected Average Development	1:2	2:3	3:4	4:5	5th:Ult
	1.205	1.099	1.043	1.026	1.030

LIKELY DEVELOPMENT TO ULTIMATE

Test State

Exhibit 23c

04/01/08

Limited Indemnity - Combined

(using 2-year average development)

FIRST REPORT 2/04-1/05	(1) Limited Incurred Losses	(2) Development 1:5	(3) Amendment Factor	(4) Modified Losses (1)x((2)x(3))
Fatal-Likely	0	2.095	1.045	0
Fatal-Not Likely	10,269,396	1.417	1.045	15,208,975
Permanent Total	4,413,333	2.095	1.046	9,669,613
Perm. Partial-Likely	42,468,001	2.095	1.025	91,178,798
Perm. Partial-Not Likely	53,963,071	1.417	1.025	78,354,379
Temp. Total-Likely	17,026,701	2.095	1.046	37,305,502
Temp. Total-Not Likely	32,726,405	1.417	1.046	48,500,532

SECOND REPORT 2/03-1/04	(5) Limited Incurred Losses	(6) Development 2:5	(7) Amendment Factor	(8) Modified Losses (5)x((6)x(7))
Fatal-Likely	1,299,643	1.365	1.051	1,864,988
Fatal-Not Likely	8,017,542	1.176	1.051	9,909,682
Permanent Total	11,441,423	1.365	1.052	16,429,883
Perm. Partial-Likely	71,430,014	1.365	1.029	100,359,170
Perm. Partial-Not Likely	70,091,621	1.176	1.029	84,810,861
Temp. Total-Likely	13,033,627	1.365	1.052	18,716,288
Temp. Total-Not Likely	31,110,203	1.176	1.052	38,483,321

CALCULATION OF LIKELY 5TH-TO-ULTIMATE	
(9) Combined Likely Losses	275,524,242
(10) Combined Not-Likely Losses	275,267,750
(11) Combined Total Losses	550,791,992
(12) Financial Data 5th-to-Ultimate Development Factors	1.060
(13) 5th-to-Ultimate Loss Development (13) = {(12)-1}x(11)	33,047,520
(14) % of Loss Development attributable to Not-Likely Losses at 5th rpt	0.250
(15) 5th-to-Ultimate Likely Loss Development Factors (15) = {(9)+ [1-(14)]x(13)}/(9)	1.090
(16) 5th-to-Ultimate Not-Likely Loss Development Factors (16) = {(10)+ (14)x(13)}/(10)	1.030

LIMITED MEDICAL LOSS DEVELOPMENT Test State **04/01/08** Exhibit 23d

Likely

1st Report Start: 2/1/2004
1st Report End: 1/31/2005

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report	6th Report	7th Report	8th Report	9th Report	10th Report
2/91-1/92	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0
2/92-1/93	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0
2/93-1/94	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0	0
2/94-1/95	*0*	*0*	*0*	*0*	*0*	0	0	0	0	0
2/95-1/96	*0*	*0*	*0*	*0*	0	0	0	0	0	0
2/96-1/97	*0*	*0*	*0*	0	0	0	0	0	0	
2/97-1/98	*0*	*0*	0	0	0	0	0	0		
2/98-1/99	*0*	0	0	0	0	0	0			
2/99-1/00	75,200,873	90,059,436	100,912,427	109,486,363	115,848,096	120,187,414				
2/00-1/01	71,384,912	88,432,334	97,351,469	102,016,362	104,712,638					
2/01-1/02	82,626,918	100,990,563	107,850,140	114,019,998						
2/02-1/03	86,723,140	101,434,110	109,735,237							
2/03-1/04	88,194,204	104,765,903								
2/04-1/05	97,105,237									

Link Ratios	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2/91-1/92									
2/92-1/93									
2/93-1/94									
2/94-1/95									
2/95-1/96									
2/96-1/97									
2/97-1/98									
2/98-1/99									
2/99-1/00	1.198	1.121	1.085	1.058	1.037				
2/00-1/01	1.239	1.101	1.048	1.026					
2/01-1/02	1.222	1.068	1.057						
2/02-1/03	1.170	1.082							
2/03-1/04	1.188								

AVERAGE DEV.	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2 Year Averages	1.179	1.075	1.053	1.042					
3 Year Averages	1.193	1.084	1.063						
4 Year Averages	1.205	1.093							
5 Year Averages	1.203								
5 Yr Ex-Hi Lo Avgs	1.203								

AVG DEV. TO 5TH	1:5	2:5	3:5	4:5	5th:Ult
2 Year Averages	1.390	1.179	1.097	1.042	1.647
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

AVG DEV. TO ULT.	1:U	2:U	3:U	4:U	5:U
2 Year Averages	2.291	1.943	1.807	1.716	1.647
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

Averaging Method (Use '6' for 5 Yr Ex-HiLo)	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
	2	2	2	2	2	2	2	2	2

Selected Average Development	1:2	2:3	3:4	4:5	5th:Ult
	1.179	1.075	1.053	1.042	1.647

LIMITED MEDICAL LOSS DEVELOPMENT Test State **04/01/08** Exhibit 23e

Not-Likely

1st Report Start: 2/1/2004
1st Report End: 1/31/2005

PY Data	1st Report	2nd Report	3rd Report	4th Report	5th Report	6th Report	7th Report	8th Report	9th Report	10th Report
2/91-1/92	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0
2/92-1/93	*0*	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0
2/93-1/94	*0*	*0*	*0*	*0*	*0*	*0*	0	0	0	0
2/94-1/95	*0*	*0*	*0*	*0*	*0*	0	0	0	0	0
2/95-1/96	*0*	*0*	*0*	*0*	0	0	0	0	0	0
2/96-1/97	*0*	*0*	*0*	0	0	0	0	0	0	
2/97-1/98	*0*	*0*	0	0	0	0	0	0		
2/98-1/99	*0*	0	0	0	0	0	0			
2/99-1/00	153,833,071	168,754,862	175,377,809	179,794,298	181,687,652	185,095,079				
2/00-1/01	161,733,484	171,565,896	177,139,040	179,298,295	181,208,310					
2/01-1/02	172,959,433	185,061,442	188,700,978	189,239,144						
2/02-1/03	184,611,262	192,918,145	195,760,677							
2/03-1/04	181,237,908	188,403,055								
2/04-1/05	193,744,461									

Link Ratios	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2/91-1/92									
2/92-1/93									
2/93-1/94									
2/94-1/95									
2/95-1/96									
2/96-1/97									
2/97-1/98									
2/98-1/99									
2/99-1/00	1.097	1.039	1.025	1.011	1.019				
2/00-1/01	1.061	1.032	1.012	1.011					
2/01-1/02	1.070	1.020	1.003						
2/02-1/03	1.045	1.015							
2/03-1/04	1.040								

AVERAGE DEV.	1:2	2:3	3:4	4:5	5:6	6:7	7:8	8:9	9:10
2 Year Averages	1.043	1.018	1.008	1.011					
3 Year Averages	1.052	1.022	1.013						
4 Year Averages	1.054	1.027							
5 Year Averages	1.063								
5 Yr Ex-Hi Lo Avgs	1.059								

AVG DEV. TO 5TH	1:5	2:5	3:5	4:5	5th:Ult
2 Year Averages	1.082	1.037	1.019	1.011	1.138
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

AVG DEV. TO ULT.	1:U	2:U	3:U	4:U	5:U
2 Year Averages	1.232	1.181	1.160	1.151	1.138
3 Year Averages					
4 Year Averages					
5 Year Averages					
5 Yr Ex-Hi Lo Avgs					

Averaging Method (Use '6' for 5 Yr Ex-HiLo)										
	2	2	2	2	2	2	2	2	2	2

Selected Average Development	1:2	2:3	3:4	4:5	5th:Ult
	1.043	1.018	1.008	1.011	1.138

LIKELY DEVELOPMENT TO ULTIMATE

Test State

Exhibit 23f

04/01/08

Limited Medical - Combined

(using 2-year average development)

FIRST REPORT 2/04-1/05	(1) Limited Incurred Losses	(2) Development 1:5	(3) Amendment Factor	(4) Modified Losses (1)x((2)x(3))
Fatal-Likely	0	1.390	1.000	0
Fatal-Not Likely	1,434,476	1.082	1.000	1,552,103
Permanent Total	7,075,471	1.390	1.000	9,834,905
Perm. Partial-Likely	53,804,199	1.390	1.000	74,787,837
Perm. Partial-Not Likely	66,844,773	1.082	1.000	72,326,044
Temp. Total-Likely	36,225,567	1.390	1.000	50,353,538
Temp. Total-Not Likely	68,052,815	1.082	1.000	73,633,146
Medical Only	57,388,896	1.082	1.000	62,094,785
Contract Medical	23,501	1.082	1.000	25,428

SECOND REPORT 2/03-1/04	(5) Limited Incurred Losses	(6) Development 2:5	(7) Amendment Factor	(8) Modified Losses (5)x((6)x(7))
Fatal-Likely	225,002	1.179	1.000	265,277
Fatal-Not Likely	660,108	1.037	1.000	684,532
Permanent Total	10,473,697	1.179	1.000	12,348,489
Perm. Partial-Likely	66,975,353	1.179	1.000	78,963,941
Perm. Partial-Not Likely	67,728,416	1.037	1.000	70,234,367
Temp. Total-Likely	27,091,851	1.179	1.000	31,941,292
Temp. Total-Not Likely	62,029,074	1.037	1.000	64,324,150
Medical Only	57,984,300	1.037	1.000	60,129,719
Contract Medical	1,157	1.037	1.000	1,200

CALCULATION OF LIKELY 5TH-TO-ULTIMATE	
(9) Combined Likely Losses	258,495,279
(10) Combined Not-Likely Losses	405,005,474
(11) Combined Total Losses	663,500,753
(12) Financial Data 5th-to-Ultimate Development Factors	1.336
(13) 5th-to-Ultimate Loss Development (13) = {(12)-1}x(11)	222,936,253
(14) % of Loss Development attributable to Not-Likely Losses at 5th rpt	0.250
(15) 5th-to-Ultimate Likely Loss Development Factors (15) = {(9)+ [1-(14)]x(13)}/(9)	1.647
(16) 5th-to-Ultimate Not-Likely Loss Development Factors (16) = {(10)+ (14)x(13)}/(10)	1.138

Appendix B

Exhibit 1

New Class Ratemaking: Indicated Pure Premiums
NCCI State

Step 1: Start with 5 policy periods of Limited Losses and Payroll (00's)

Class Code 1234 Hazard Group C IG: Goods & Services

Current Loss Cost = 4.00

PY	Report	Payroll	Actual Limited Losses
1/00 thru 12/00	5	50,000,000	800,000
1/01 thru 12/01	4	53,200,000	690,000
1/02 thru 12/02	3	57,700,000	750,000
1/03 thru 12/03	2	61,000,000	730,000
1/04 thru 12/04	1	64,995,000	700,000

Notes:

a) The losses for each policy period are comprised of finer subcategories (see Step 2)

b) Individual claims are limited at $500,000.

c) The loss cost in this NCCI state includes loss adjustment expense (LAE).

Appendix B

Exhibit 2

New Class Ratemaking: Indicated Pure Premiums

NCCI State

Step 2: Adjust Limited Losses to Midpoint of Proposed Effective Date

Use Primary Conversion Factors (PCF varies by report)

Class	HG	Report	Actual Limited Losses	Dev't Group	LDF	Other PCF	Adjusted Limited Losses
1234	C	5	75,000	Fatal-L	1.400	0.95	99,750
1234	C	5	45,000	Fatal-N	1.100	0.95	47,025
1234	C	5	200,000	Permanent Total	1.400	0.99	277,200
1234	C	5	40,000	Permanent Partial-L	1.400	1.01	56,560
1234	C	5	20,000	Permanent Partial-N	1.100	1.01	22,220
1234	C	5	10,000	Temporary Total-L	1.400	0.94	13,160
1234	C	5	9,000	Temporary Total-N	1.100	0.94	9,306
1234	C	5	360,000	Medical-L	1.750	1.15	724,500
1234	C	5	41,000	Medical-N	1.250	1.15	58,938
			800,000				
1234	C	4	40,000	Fatal-L	1.480	0.96	56,832
1234	C	4	30,000	Fatal-N	1.125	0.96	32,400
1234	C	4	170,000	Permanent Total	1.480	0.98	246,568
1234	C	4	40,000	Permanent Partial-L	1.125	1.02	45,900
1234	C	4	45,000	Permanent Partial-N	1.125	1.02	51,638
1234	C	4	40,000	Temporary Total-L	1.480	0.94	55,648
1234	C	4	27,000	Temporary Total-N	1.125	0.94	28,553
1234	C	4	222,000	Medical-L	1.900	1.15	485,070
1234	C	4	76,000	Medical-N	1.300	1.15	113,620
			690,000				
1234	C	3	5,000	Fatal-L	1.550	0.97	7,518
.	.	.	.	.	.		
.	.	.	.	.	.		
.	.	.	.	.	.		

Notes:

a) The LDF is shown separately from the PCF for illustrative purposes only, and will be included in the PCF.

b) The Other PCF includes the LR trend to proposed level midpoint and benefit on-level factors.

c) Adjusted Limited Losses = Actual Limited Losses * LDF * Other PCF

d) The medical has similar injury type components plus medical only and contract medical, and is condensed simply for illustrative purposes.

Appendix B
New Class Ratemaking: Indicated Pure Premiums
NCCI State

Exhibit 3

Step 3: Compute Expected Excess Losses @$500,000
Use State Adjusted Per Claim Excess Ratios (vary by hazard group)

Class	HG	Report	Dev't Group	Adjusted Limited Losses	XS Ratio	XS Factor	Unadjusted XS Losses
1234	C	5	Fatal-L	99,750	0.194	1.241	24,009
1234	C	5	Fatal-N	47,025	0.194	1.241	11,319
1234	C	5	Permanent Total	277,200	0.194	1.241	66,721
1234	C	5	Permanent Partial-L	56,560	0.194	1.241	13,614
1234	C	5	Permanent Partial-N	22,220	0.194	1.241	5,348
1234	C	5	Temporary Total-L	13,160	0.194	1.241	3,168
1234	C	5	Temporary Total-N	9,306	0.194	1.241	2,240
1234	C	5	Medical-L	724,500	0.194	1.241	174,383
1234	C	5	Medical-N	58,938	0.194	1.241	14,186
1234	C	4	Fatal-L	56,832	0.194	1.241	13,679
1234	C	4	Fatal-N	32,400	0.194	1.241	7,799
1234	C	4	Permanent Total	246,568	0.194	1.241	59,348
1234	C	4	Permanent Partial-L	45,900	0.194	1.241	11,048
1234	C	4	Permanent Partial-N	51,638	0.194	1.241	12,429
1234	C	4	Temporary Total-L	55,648	0.194	1.241	13,394
1234	C	4	Temporary Total-N	28,553	0.194	1.241	6,872
1234	C	4	Medical-L	485,070	0.194	1.241	116,754
1234	C	4	Medical-N	113,620	0.194	1.241	27,348
1234	C	3	Fatal-L	7,518	0.194	1.241	1,809
.	.	.	.	.	.	.	
.	.	.	.	.	.	.	
.	.	.	.	.	.	.	

Notes:

a) The adjusted per claim excess ratio (XS ratio) is indemnity and medical combined.

b) The XS Factor = [1.0 / (1.0 - XS Ratio)]

c) Unadjusted XS Losses = (XS factor -1.0) * Adjusted Limited Losses

d) The medical has similar injury type components plus medical only and contract medical, and is

Appendix B

Exhibit 4

New Class Ratemaking: Indicated Pure Premiums

NCCI State

Step 4: Transfer 40% of Expected Excess Losses from Indemnity to Medical

Class	HG	Report	Unadjusted XS Losses	Dev't Group	Adjusted XS Losses
			Indemnity	Indemnity	Indemnity
1234	C	5	107,511	Likely	64,507
1234	C	5	18,907	Not Likely	11,344
Total	C	5	126,418	Total	75,851
			Medical	Medical	Medical
1234	C	5	174,383	Likely	217,388
1234	C	5	14,186	Not Likely	21,749
Total	C	5	188,569	Total	239,137
			314,987		314,987
			Indemnity	Indemnity	Indemnity
1234	C	4	97,469	Likely	58,481
1234	C	4	27,100	Not Likely	16,260
Total	C	4	124,569	Total	74,741
			Medical	Medical	Medical
1234	C	4	116,754	Likely	155,741
1234	C	4	27,348	Not Likely	38,188
Total	C	4	144,102	Total	193,929
			268,670		268,670
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.

Notes:

a) The indemnity adjusted XS losses = .60 * unadjusted XS losses for indemnity (see exception in (c)).

b) The medical adjusted XS losses = unadjusted med. XS loss + 40% unadjusted indemnity XS loss (exception in (c)

c) If the unadjusted medical XS losses = $0 (for L or NL), transfer $0 excess to medical (L or NL).

d) At each report for each class code, adjusted XS loss = unadjusted XS loss for indemnity and medical combined.

e) Adjusted XS loss is allocated to all remaining non-zero injury type/dev't group combinations based on its share of adjusted losses at each report.

Appendix B

Exhibit 5

New Class Ratemaking: Indicated Pure Premiums

NCCI State

Step 5: Combine Adjusted Limited Losses with Adjusted XS Losses

Then Apply Secondary Conversion Factors (SCF vary by report)

Class	Report	Dev't Group	Adjusted Limited Losses	Adjusted XS Losses	SCF	Expected Unlimited Losses
1234	5	Fatal-L	99,750	14,406	1.220	139,270
1234	5	Fatal-N	47,025	6,791	1.220	65,656
1234	5	Permanent Total	277,200	40,032	1.220	387,023
1234	5	Permanent Partial-L	56,560	8,168	1.220	78,968
1234	5	Permanent Partial-N	22,220	3,209	1.220	31,023
1234	5	Temporary Total-L	13,160	1,901	1.220	18,374
1234	5	Temporary Total-N	9,306	1,344	1.220	12,993
1234	5	Medical-L	724,500	217,388	1.220	1,149,103
1234	5	Medical-N	58,938	21,749	1.220	98,437
				314,987		
1234	4	Fatal-L	56,832	8,207	1.180	76,747
1234	4	Fatal-N	32,400	4,679	1.180	43,753
1234	4	Permanent Total	246,568	35,609	1.180	332,968
1234	4	Permanent Partial-L	45,900	6,629	1.180	61,984
1234	4	Permanent Partial-N	51,638	7,457	1.180	69,732
1234	4	Temporary Total-L	55,648	8,037	1.180	75,148
1234	4	Temporary Total-N	28,553	4,123	1.180	38,558
1234	4	Medical-L	485,070	155,741	1.180	756,157
1234	4	Medical-N	113,620	38,188	1.180	179,133
				268,670		
.	.	.	.	.	.	
.	.	.	.	.	.	
.	.	.	.	.	.	

Notes:

a) The medical is condensed for illustrative purposes, but has similar injury type components plus medical only and contract medical.

b) The SCF includes: the aggregate statewide loss cost change, the factor to adjust for proposed IG differential, proposed loss-based expense the balancing of indicated to expected losses, and misc. premium adjustments (a few states).

c) Secondary conversion factors vary by report and industry group.

d) Expected Unlimited Losses = (Adjusted Limited Losses + Adjusted XS Losses) * SCF

Appendix B

Exhibit 6

New Class Ratemaking: Indicated Pure Premiums

NCCI State

Step 6: Organize Expected Unlimited Losses (a.k.a. Converted Losses) into Indemnity and Medical Components

Compute Indicated Pure Premiums

CLASS 1234	**Class Code Description**								
Industry Group: Goods and Services Hazard Group C		CONVERTED LOSSES							
		INDEMNITY LIKELY		INDEMNITY NOT-LIKELY		MED LIKELY	MED NOT-LIKELY	TOTAL	TOTAL
POLICY PERIOD	PAYROLL	CASES	AMOUNT	CASES	AMOUNT	AMOUNT	AMOUNT	AMOUNT	PURE PREM.
1/00 thru 12/00	50,000,000	19	623,636	40	109,672	1,149,103	98,437	1,980,848	3.96
1/01 thru 12/01	53,200,000	17	546,847	50	152,043	756,157	179,133	1,634,180	3.07
1/02 thru 12/02	57,700,000	20	500,000	65	400,000	800,000	700,000	2,400,000	4.16
1/03 thru 12/03	61,000,000	18	310,000	57	300,000	1,150,000	850,000	2,610,000	4.28
1/04 thru 12/04	64,995,000	12	300,000	60	450,000	720,000	1,100,000	2,570,000	3.95
5 YR. TOTAL	286,895,000	86	2,280,482	272	1,411,715	4,575,261	2,927,570	11,195,028	3.90
		INDEMNITY			MEDICAL				
		CRED.	PURE PREM.*		CRED.	PURE PREM.*			PURE PREM.*
Indicated Pure Premium		66%	1.287		77%	2.615			3.90

Notes:

a) The indemnity and medical components replace the former serious, non-serious, and medical partial pure premiums.

b) Indemnity and Medical credibilities are derived in Step 7.

Appendix B — Exhibit 7

New Class Ratemaking: Indicated Pure Premiums

NCCI State

Step 7: Derive Expected Losses for Class 1234 for the Indemnity and Medical Components

Compute Credibility for each Component

Background:

Credibility Formula used for all classes

$Z = [N/ N_f]^{0.4}$

Full Credibility Standards (all classes)

N_f : 850 Indemnity

N_f : 400 Medical

*Pure premium underlying current loss cost for 1234 = 1.70 Indemnity

*Pure premium underlying current loss cost for 1234 = 2.10 Medical

* Adjusted to proposed level via changes in trend, benefits, and experience.

Average Cost per Case for NCCI state: SACC = $16,000 Indemnity

SACC = $28,500 Medical

Expected Losses for class code 1234= (5 years payroll in '00s) x Underlying PP

c) Full Credibility Standard (all classes) expected losses = N_f x SACC

Calculations:

Indemnity

N= Expected Losses for class code 1234= 2,868,950 X 1.70

N= Expected Losses for class code 1234= 4,877,215

Medical

N=Expected Losses for class code 1234= 2,868,950 X 2.10

N=Expected Losses for class code 1234= 6,024,795

c) Indemnity N_f = 16,000 X 850 = 13,600,000

c) Medical N_f = 28,500 X 400 = 11,400,000

Indemnity Z = 66.35%

Medical Z = 77.48%

Notes:

a) Credibility is rounded to nearest whole number percentage.
b) The SACC for medical includes all medical loss dollars (i.e. incl. med.-only dollars) divided by lost-time claims.
c) The Full Credibility Standard is also adjusted by a statewide balancing factor of 5 years of indicated-to-expected losses. This calculation assumes that the statewide balancing factor is unity for this state.

Appendix B

Exhibit 8

New Class Ratemaking: National Pure Premiums

NCCI State

Step 8: Derive National Pure Premiums for Class 1234 *

1. Compute a payroll-weighted average of the new revision indicated pure premiums across all classes in the reviewed state using reviewed states' payroll (5 years).

2. Compute Step 1 for indemnity and medical separately.

3. For all other NCCI states, compute a payroll-weighted average of derived-by-formula pure premiums (3 years) for each state using all classes in common with the reviewed state.

4. Compute Step 3 using the reviewed state payroll (5 years) for indemnity and medical separately.

5. Compute adjustment factor k for each state for indemnity and medical: k = (step 2 / step 4).

6. Adjust each state's losses by class code (3 years) to reviewed state level by multiplying by k.

7. Compute national pure premiums n_c (for indemnity and medical separately) for each class code c.

$$n_c = \frac{\text{3 years other states' losses (adjusted to reviewed state level)}}{\text{3 years other states' payroll (in 00's) for class c}}$$

Final adjustment: balance the national pure premiums to the indicated pure premiums in the reviewed state.

8. For each industry group (IG), compute the total indicated pure premium. Do this by extending 5 years of reviewed state payroll by the reviewed state indicated pure premiums.

9. For each industry group (IG), compute the total adjusted unbalanced national pure premium. Do this by extending 5 years of reviewed state payroll by the adjusted unbalanced national pure premiums.

10. Compute balancing factor B_{IG} for each IG, where B_{IG} = (step 8 / step 9).

11. Compute final balanced national pure premiums for reviewed state for each class c: $N_c = B_{IG} \times n_c$

* For a numerical illustration of the national pure premium calculation, refer to:

Boor, J.A. , "The Complement of Credibility," PCAS LXXXIII, 1996, pp 14-18

Appendix B Exhibit 9

New Class Ratemaking: Present-On-Rate-Level Pure Premiums

NCCI State

Step 9: Derive Present-On-Rate-Level (PORL) Pure Premium for Class 1234

Pure premium underlying current loss cost for 1234 = $1.70 Indemnity

Pure premium underlying current loss cost for 1234 = $2.10 Medical

Apply separate adjustment factors for the indemnity and medical components to adjust to the proposed level of the loss cost filing.

	Indemnity	Medical	Total
1. PP underlying current loss cost:	$1.70	$2.10	
Adjustments:			
2. Change in Proposed LR Trend:	0.990	1.010	
3. Proposed Change in Benefits:	1.005	0.980	
4. Proposed Change in LBE:	1.000	1.000	
5. Proposed Change in Off-Balance:	0.990	0.990	
6. Proposed SW Experience Change	1.010	1.010	
7. Adjusted IG Differential:	1.021	1.021	
8. Miscellaneous factors	1.000	1.000	
9. Product of Step 2. through Step 8.	1.016	1.010	
10. Present On-Rate-Level Pure Premium: (The Product of Step 1 and Step 9)	1.727	2.122	3.849

Notes:

a) The PP underlying the current loss cost includes LAE (if any), the test correction factor, and applied swing limits

b) The PP underlying the current loss cost excludes the manual to standard premium ratio.

c) No loss development adjustment is necessary as the value is already at an ultimate level.

d) All adjustments are for a one-year timespan

e) Change in loss-based expenses (LBE) is change in LAE and change in any other Loss based assessments.

f) Proposed change in off-balance is current M/E / proposed M/E for the IG where class 1234 resides.

Appendix B Exhibit 10
New Class Ratemaking: Remaining Credibility Steps
NCCI State

Step 10: Compute Credibility for National and PORL Pure Premiums for Class 1234

Background: National Pure Premium

Credibility Formula used for all classes

$Z = \min \{ 0.5*(1- \text{State Z}), [N/ N_f]^{0.4} \}$

Full Credibility Standards (all classes)

N_f : 1,150 Indemnity

N_f : 1,000 Medical

N_f and N for the national pure premiums are based on actual number of lost-time claims based upon the latest three years of national data for the class code.

Calculations: National Pure Premium

Indemnity and Medical

N= Actual # of lost-time claims (all states) for class code 1234 = 1,025

National Z for Indemnity = $Z = \min \{ 0.5*(1- \text{State Z}), [N/ N_f]^{0.4} \}$

National Z for Indemnity = min { 17% or 96% } = 17%

National Z for Medical = $Z = \min \{ 0.5*(1- \text{State Z}), [N/ N_f]^{0.4} \}$

National Z for Medical = min { 11% or 100% } = 11%

Background: Present On-Rate Level Pure Premium

$Z = (1- \text{State Z} - \text{National Z})$

Calculations: Present On-Rate Level Pure Premium

PORL Z for Indemnity = (1 - 66% - 17%) = 17%

PORL Z for Medical = (1 - 77% - 11%) = 12%

Notes:

a) Credibility is rounded to nearest whole number percentage.

Appendix B
New Class Ratemaking: Derived By Formula Pure Premiums
NCCI State

Exhibit 11

Step 11: Apply Three-way Credibility Formula to the Indemnity and Medical Components
Compute the Derived By Formula Pure Premium

CLASS 1234	**Class Code Description**								
Industry Group: Goods and Services		CONVERTED LOSSES							
Hazard Group C		INDEMNITY LIKELY		INDEMNITY NOT-LIKELY		MED LIKELY	MED NOT-LIKELY	TOTAL	TOTAL
POLICY PERIOD	PAYROLL	CASES	AMOUNT	CASES	AMOUNT	AMOUNT	AMOUNT	AMOUNT	PURE PREM.
5	50,000,000	19	623,636	40	109,672	1,149,103	98,437	1,980,848	3.96
4	53,200,000	17	546,847	50	152,043	756,157	179,133	1,634,180	3.07
3	57,700,000	20	500,000	65	400,000	800,000	700,000	2,400,000	4.16
2	61,000,000	18	310,000	57	300,000	1,150,000	850,000	2,610,000	4.28
1	64,995,000	12	300,000	60	450,000	720,000	1,100,000	2,570,000	3.95
5 YR. TOTAL	286,895,000	86	2,280,482	272	1,411,715	4,575,261	2,927,570	11,195,028	3.90

		INDEMNITY		MEDICAL		TOTAL
	CRED.	PURE PREM.*	CRED.	PURE PREM.*	PURE PREM.*
Indicated Pure Premium	66%	1.287	77%	2.615	3.90
Pure Premium Indicated by National	17%	1.200	11%	2.800	4.00
Pure Premium Present on Rate Level	17%	1.727	12%	2.122	3.85
Pure Premium Derived by Formula		1.345		2.579	3.92

Appendix B Exhibit 12

New Class Ratemaking: Final Loss Cost / Rate Calculation

NCCI State

Step 12: Compute the final proposed loss cost by adjusting pure premium derived by formula

Current Loss Cost for Class 1234 = 4.00

		Indemnity	Medical	Total
1	Indicated Pure Premium	1.287	2.615	3.90
2	Pure Premium Indicated by National Relativity	1.200	2.800	4.00
3	Pure Premium Present on Rate Level	1.727	2.122	3.85
4	State Credibilities	66%	77%	xxx
5	National Credibilities	17%	11%	xxx
6	Residual Credibilities = 100% - (4) - (5)	17%	12%	xxx
7	Derived by Formula Pure Premiums = (1) x (4) + (2) x (5) + (3) x (6)	1.345	2.579	3.92
8	Test Correction Factor	0.9963	0.9963	xxx
9	Underlying Pure Premiums = (7) x (8) *	1.341	2.569	3.91
10	Ratio of Manual to Standard Premium			1.063
11	Target Cost Ratio (TCR)			1.00
12	Loss Cost = (9) x (10) / (11)			4.16
13	Loss Cost Within Swing Limits			4.16
	Current Loss Cost x Swing Limits a) Lower bound = .75 x 4.00 b) Upper bound = 1.25 x 4.00			
14	Pure Premiums Underlying Proposed Loss Cost* ((14TOT) / (9TOT)) x (9) ; (14TOT) = (13) x (11) / (10))	1.341	2.569	3.91
15	Disease, PAP, and/or Miscellaneous Loadings			0.00
16	Final Proposed Loss Cost			4.16

* Indemnity pure premium is adjusted for the rounded total pure premium:

Notes:

a) The swing limits are applied as +/- 25% change around the IG change in most states.
b) The test correction factor is computed by IG to redistribute premium for classes exceeding swing limits.
c) The TCR is the fraction of the adequate premium dollar accounting for losses and loss-based expenses.

Appendix B
New Class Ratemaking: Derivation of Industry Group Differentials
NCCI State

Exhibit 13

II. Derivation Of Industry Group Differentials

a) INDUSTRY GROUP WAGE TREND ADJUSTMENT

Industry Group	(1) Converted Indicated Indemnity Losses*	(2) Converted Indicated Medical Losses*	(3) Converted Indicated Total Losses*	(4) CPS Average Weekly Wage Trends**	(5) Wage Trend Differential	(6) Medical Loss Wage Trend Adjustments	(7) Normalized Medical Loss Wage Trend Adjustments
I	321,604,662	247,834,851	569,439,513	1.130	0.979	0.991	0.990
II	542,740,889	488,814,443	1,031,555,332	1.100	1.005	1.002	1.001
III	242,098,488	248,912,602	491,011,090	1.099	1.006	1.003	1.002
IV	488,290,147	467,545,456	955,835,603	1.091	1.014	1.007	1.006
V	361,406,704	241,602,904	603,009,608	1.123	0.985	0.994	0.993
VI	0	0	0	0.000	1.000	1.000	0.999
ALL	1,956,140,889	1,694,710,257	3,650,851,146	1.106		1.001	1.000

***** These expected unlimited losses are at ultimate, on-level, include the proposed experience and loss based expense changes and any miscellaneous premium adjustments (excludes trend).
****** These CPS average weekly wage trends were fit to CPS average weekly wages based on the $150k payroll cap.

b) EXPECTED LOSSES

Industry Group	(8) Latest Year CURRENT Manual Pure Premium*	(9) Five Year CURRENT Manual Pure Premium*	(10) Five Year PROPOSED Manual Pure Premium*	(11) Current Ratio of Manual to Standard Premium	(12) Proposed Ratio of Manual to Standard Premium	(13) Latest Year CURRENT Expected Losses** (8) x (11) / (12)	(14) Five Year CURRENT Expected Losses** (9) x (11) / (12)	(15) Five Year PROPOSED Expected Losses** (10) x (11) / (12)	(16) Current / Proposed (9) / (10)	(17) Adjustment to Proposed for Current Relativities (16) / 0.975
I	119,092,461	559,793,421	574,558,035	1.088	1.072	120,869,960	568,148,546	583,133,528	0.974	0.999
II	240,949,465	1,051,366,791	1,076,899,697	1.096	1.077	245,200,198	1,069,914,580	1,095,897,928	0.976	1.001
III	104,805,551	464,202,966	476,975,093	1.109	1.086	107,025,190	474,034,153	487,076,776	0.973	0.998
IV	240,216,710	1,035,955,411	1,065,551,933	1.052	1.063	237,730,930	1,025,235,271	1,054,525,525	0.972	0.997
V	145,206,659	614,567,457	627,887,892	1.092	1.089	145,606,677	616,260,480	629,617,611	0.979	1.004
VI	0	0	0	1.000	1.000	0	0	0	0.000	0.000
ALL	850,270,846	3,725,886,046	3,821,872,651			856,432,955	3,753,593,030	3,850,251,368	0.975	1.000

* The CURRENT pure premiums are payroll extended underlying pure premiums. The PROPOSED pure premiums are adjusted to include the proposed experience, trend, benefit and loss based expense changes as well as any miscellaneous premium adjustments.
** The CURRENT expected losses are payroll extended underlying pure premium adjusted by the change in off-balance by industry group. The PROPOSED pure premiums are further adjusted to include the proposed experience, trend, benefit and loss based expense changes as well as any miscellaneous premium adjustments.

c) INDUSTRY GROUP DIFFERENTIALS

Industry Group	(18) Converted Indicated Balanced Losses*	(19) Five Year Ind to Exp Ratios (w/o Wage Trend) (18) / [(15) x (17)]	(20) Indicated Differentials (w/o Wage Trend) (19) / 0.818	(21) Five Year Ind to Exp Ratios (w/ Wage Trend) (19) x (7)	(22) Lost-Time Cases	(23) Full Standard for Credibility Lost-Time Cases	(24) Credibility Minimum of 1.00 and [(23) / (24)] ^ 0.50	(25) Credibility Weighted Ind to Exp Ratios (25) x (21) + [1 - (25)] x (21) Total	(26) Normalized Credibility Weighted Ind to Exp Ratios (aka IG Differentials)	(27) Final Industry Group Differentials
I	478,573,006	0.822	1.005	0.814	12,088	12,000	1.00	0.814	0.996	0.996
II	877,674,956	0.800	0.978	0.801	15,366	12,000	1.00	0.801	0.980	0.980
III	424,625,861	0.874	1.068	0.876	9,648	12,000	0.90	0.870	1.065	1.065
IV	869,514,555	0.827	1.011	0.832	27,209	12,000	1.00	0.832	1.018	1.018
V	497,494,959	0.787	0.962	0.781	10,494	12,000	0.94	0.783	0.958	0.958
VI	0	1.000	1.000	1.000	0	12,000	0.00	1.000	1.000	1.000
ALL	3,147,883,337	0.818		0.817				0.817		1.000

***** These expected unlimited losses are at ultimate, on-level, trended, and include the proposed experience and loss based expense changes as well as any miscellaneous premium adjustments. These losses have also been balanced to the proposed level via the balancing factors.