A CURRENT LOOK AT WORKERS' COMPENSATION RATEMAKING

ROY H. KALLOP

INTRODUCTION

The purpose of this paper is to provide a current look at workers' compensation ratemaking procedures employed by the National Council on Compensation Insurance. The paper has been long delayed since notable changes were anticipated both in determining rate level and classification rates. In 1974 the use of policy year aggregates in rate level calculations was introduced. The National Council is also close to completing a new approach in developing rates for classes with small credibility. This paper will describe in detail the rate level calculations and provide the reader with changes made to date in classification relativity since Ralph Marshall's paper was revised in 1961. An additional paper would be appropriate detailing the new classification relativity program when it is implemented.

The workers' compensation pricing program is briefly described in Section A, which covers the pricing of small size insureds including minimum premiums, loss and expense constants, and three year fixed rate policies as well as the pricing of large size insureds including premium discounts and individual risk rating plans.

Section B is a description of manual ratemaking and is divided into the following five parts:

1. Statistical data employed in computing workers' compensation manual rates.
2. Calculation of industry group and overall rate levels.
3. Calculation of manual rates.
4. Ratemaking procedures for classifications having unique conditions.
5. Appendix providing detailed calculations of a rate revision for a typical state.

   The Appendix will include detailed technical steps applicable to each stage of the ratemaking process described in Section B. The

paper itself, however, primarily is a narrative description of the techniques employed which, hopefully, will be of interest to those desiring some insight into workers' compensation ratemaking procedures without becoming bogged down in a maze of figures, and it introduces no new concepts in ratemaking. The intention of this paper is to describe current workers' compensation ratemaking procedures.

SECTION A. WORKERS' COMPENSATION PRICING PROGRAM

Overall Pricing in Workers' Compensation Insurance

The first consideration is to determine the classification rate or rates that apply to the particular insured. In workers' compensation there are approximately 700 classifications of various operations for which a separate rate is established. This represents a very refined program to ensure that the price will have a direct tie-in with the occupational hazards involved.

Basis of Determining Premium

The manual rate for each insured is determined according to the business in which the employer is engaged. While workers' compensation insurance basically assigns a single classification descriptive of each employer's business, certain types of employees are generally separately classified and described as standard exceptions. These are clerical office workers, draftsmen, outside salesmen, and drivers, unless specifically included in the scope of the classification. The basic classification approach also contains specific provisions for division of payroll for mercantile operations, construction or erection work, and those businesses which qualify for two or more classifications under the multiple enterprise rule. If two or more classifications, exclusive of standard exceptions, apply to an employer, then the governing classification is the code that carries the largest amount of payroll. The governing classification determines the assignment of the loss constant and the General Inclusion payrolls.

The fundamental concept underlying workers' compensation ratemaking and pricing is that the exposure to risk of each employer is in part a function of the business in which he is engaged. Because it is expected that each employer engaged in the same type of business would have a similar distribution of employees performing comparable functions, it follows that a single all-inclusive classification is the most practical method of determin-

ing premium. In this manner, all industries producing the same product or utilizing the same manufacturing process are grouped for rating purposes and pay the same basic premium charge. Consequently, each industry is responsible for its own job-related injuries.

Payroll is the basis of exposure for determining premium. It is readily available and reflects exposure to injury. Manual premium is determined by multiplying the manual rate by the payroll in $100 units. For example, a payroll of $50,000 at a $1.00 manual rate will produce $500 of manual premium. When an employee works overtime, the payroll in excess of straight time pay is excluded. For the last fifteen years or so, payroll used for premium computation purposes had been limited to an average of $300 per week in most states. However, a growing number of workers are earning over $300 per week during the current inflationary period. As a result, these workers were being priced on a head-count basis, with no reflection of hours worked. For example, an employee in the contracting business earning $8 an hour working 40 hours a week is charged the same amount of premium as another worker in the same business earning the same hourly rate working 60 hours a week. There is a greater likelihood that the second employee will suffer an injury than the first since he is on the job for a longer period of time. Hence, it became desirable to utilize the free flow of payroll in order to best reflect exposure to injury. During the past year, the National Council on Compensation Insurance has been filing for the use of total payroll to determine premium, except for executive officers and employees in certain classifications having a relatively high manual rate and wide range of wage-paying practices, such as professional athletes. In these instances, payroll is limited to $500 per week for circuses and athletic teams, and $300 per week for executive officers.

Manual rates apply to all insureds both large and small. The manual rates, however, are only one part of the overall pricing program which also includes various costing programs that bear on the size of the insured's operations.

All members of the National Council including stock carriers, mutual carriers, reciprocals, and competitive state funds use the manual rates published by the Council. There are provisions, however, in many states where a carrier may deviate, such deviation generally falling into the category of a uniform percentage increase or decrease for a period of at least one year.

Pricing of Insureds with Small Premium Volume

For small size insureds where the cost of handling the account and the expectancy of loss represents a much higher percentage of premium than for the large size insureds, programs have been developed toward achieving price equity. This includes minimum premiums, expense constants, and loss constants. In addition, a three year fixed rate policy program is available as a means of writing small businesses for less cost. A description of these programs follows.

Expense Constants

A $15 expense constant is charged per policy to insureds whose annual premium is under $200, and a $10 expense constant is charged per policy for insureds whose annual premium is between $200 and $500. These charges are made because small insureds have a much higher percentage of expense related to manual premium than the large insureds. This comes about since certain fixed costs represent a much greater proportion of a small annual premium than a large annual premium. The expense constant program is a means of distributing expense costs according to need. The expense allowance underlying the manual rates anticipates the collection of expense constant dollars. Hence, manual rates are lower than they would be if no expense constant program were in existence. In other words, the overall premium is the same but more expense dollars are collected from the small insured.

Loss Constants

Another feature of price equity between large and small size insureds is the loss constant program. Loss constants are flat charges which vary by state and by industry group and apply to insureds whose annual premium is less than $500. Normally, there are three industry groups consisting of manufacturing, contracting, and all other classifications. The principle of loss constants is to improve the loss ratios of small insureds. Experience shows that small insureds normally have a loss cost per exposure unit which is greater than the corresponding loss cost for large insureds. Loss constants endeavor to bring the loss ratios of large and small size insureds into closer alignment. Again, as with expense constants, rates are offset in anticipation of collecting loss constant dollars, and consequently the overall premium is unaffected.

Minimum Premiums

The minimum premium is the minimum price for writing a workers' compensation policy. Originally, it was designed to provide premium for one full-time worker. However, the formula was not revised over the years to maintain this level. The concept of a minimum premium is that the carrier must receive a minimum amount to defray the cost of issuing a policy and to provide premium for assuming the hazards being insured.

The minimum premium formula during the past several years assumed an annual wage of $2,500. Today, of course, the average annual wage is over $5,000, and the $2,500 figure is not a true reflection of current conditions.

Small premium policies have always been a problem area in workers' compensation insurance because they do not provide sufficient dollars to cover the cost of policy handling. Also, even a small loss may wipe out premiums of many years. A classification with a $.10 rate in a state with a $15.00 expense constant and a $10.00 loss constant produces a minimum premium of only $28.00 based on an annual wage of $2,500. This would be used almost entirely for the expense of issuing and handling the policy with little or no premium left over for assuming the liability to pay losses.

In order to maintain a market for small size insureds, the following minimum premium program is now being filed in each state:

1. In lieu of an assumed payroll of $2,500, a payroll of $3,500 is used. This means that the minimum premium is calculated by taking 35 times the class rate, plus loss and expense constants.

In addition, it is intended that in future years the minimum premium should be related to the state average annual wage (rounded to the nearest $500) as reported to the National Council semi-annually by the carriers. Thus, instead of 35 times the rate, future revisions would utilize the annual wage rounded to the nearest $500 and establish a multiplier based upon such wage. For instance, if the annual wage should be $5,245, the multiplier would be 50 and the minimum premium would be 50 times the rate, plus loss and expense constants.

Recognizing that utilizing the state average annual wage cannot be accomplished in one step, there will be no proposal to change the minimum premium formula greater than a ten point multiplier in one year. Annually

thereafter, the multiplier would change in accordance with any changes that might occur in the state average annual wage.

2. A minimum charge of $35 was established for any insured.

3. A maximum charge of not more than $500 was established for any insured. It was recognized that in those instances of high rated classifications, the minimum premium formula can produce a fairly substantial minimum premium. It was felt that limiting premiums to $500 would be consistent with the principle underlying the establishment of loss and expense constants.

Three Year Fixed Rate Program

The three year fixed rate policy program was established to permit the underwriting of small size insureds at less cost. This is a plan whereby an insured whose annual premium is less than $300 may be written for a period of three years, at the manual rate in effect at the inception date of the policy. This rate will not be changed unless there is an adjustment of outstanding policies in excess of 10% as a result of a law amendment. Law amendments will be described later in this paper.

There is an inducement for the insured to pay his premium in advance. In such instances he would only pay one expense constant for the three year period. If he pays his premium in annual installments, he is charged two expense constants for the three year period.

Pricing of Insureds with Large Premium Volume
Premium Discounts

For insureds whose total annual standard earned premium is in excess of $1,000, premium discounts apply on a mandatory basis. In other words, the amount of discount given to an insured operating in more than one state is based on his total premium for all states where he has operations, not just the premium for one state. Standard earned premium is premium after the application of experience rating which is described in the next section. Premium discounts are afforded since there is a reduction in expenses (as a percentage of premium) incurred by the carrier as the size of the insured increases. There are two schedules of discounts, one for stock carriers and the other for non-stock carriers. The discounts given by non-stock carriers are less than the discounts given by stock carriers because non-stock carriers anticipate granting dividends to policyholders.

Stock carriers may use the non-stock discount table and non-stock carriers may use the stock discount table if they desire. However, in the state or states where they have opted to transfer, they must use the table for a period of at least one year on all of their compensation business in that state. The incidence of companies transferring to the other table is quite low.

For stock carriers, the current discounts are based on the following gradation of expenses:

Standard Premium		(1) Production Expenses	(2) General Expenses	(3) Total of Graduated Items	(4) Amount of Gradation
First	$ 1,000	17.5%	8.4%	25.9%	0.0%
Next	4,000	12.5	4.6	17.1	8.8
Next	95,000	7.5	4.6	12.1	13.8
Over	100,000	6.0	4.6	10.6	15.3

The amount of gradation in expense provisions adjusted for profit and taxes determines the percentage of discount allowed. For example, the premium discount for the "Next $4,000" premium interval is derived by dividing 8.8% by the complement of the 2.5% profit allowance and the average countrywide tax allowance of 3.8%. [0.088 ÷ (1.000 — 0.025 — 0.038) = 0.094]. The current premium discount allowances are as follows:

Standard Premium		Premium Discounts
First	$ 1,000	0.0%
Next	4,000	9.4
Next	95,000	14.7
Over	100,000	16.3

The expense gradation for non-stock carriers is only available in the aggregate, with the following premium discounts currently in effect:

Standard Premium		Premium Discounts
First	$ 1,000	0.0%
Next	4,000	3.0
Next	95,000	6.0
Over	100,000	8.5

Individual Insured Rating Plans

(a) Experience Rating Plan (Prospective)

For those insureds whose annual premium is $750 or more, the manual premium is modified either upward or downward according to the insured's own experience over the past three year period. If the insured develops favorable experience, he receives a reduction (credit) in his manual premium; if the insured develops unfavorable experience, a debit (surcharge) will apply. The experience rating modification will apply to the forthcoming year; hence, the application of the plan is prospective in nature. Since the large size insureds normally have a loss cost per exposure unit which is less than the corresponding loss cost for small insureds, more credits are granted in experience rating than debits.

The experience rating modification is prepared by the rating bureau having jurisdiction and is mandatory regardless of the carrier currently writing the policy.

(b) Experience Rating Plan (Retrospective)

In addition to the mandatory prospective rating plans, there are optional retrospective rating plans available which may be agreed to by the insured and his carrier at the inception of the policy. These plans set forth conditions whereby the premium actually paid depends on the loss experience generated by the insured during the time the policy is in force, subject to a specified maximum and minimum premium. Appropriate net insurance charges offset the effect of the maximum and minimum limitations. The insured and the carrier select the maximum and minimum limitation which best suits the needs of the insured. This can be done from a series of tables (Plans A, B, C, and J) or can be developed from a formula (Plan D). Three year agreements are also available under retrospective rating.

The eligibility requirement for retrospective rating is an annual premium as low as $1,500 for certain plans.

The same expense graduations underlying the Premium Discount Plan are an integral part of all retrospective rating agreements. Hence, if an insured is under a retrospective rating plan, the agreement is in lieu of the Premium Discount Program, not in addition to premium discounts.

SECTION B. DESCRIPTION OF MANUAL RATEMAKING

1. Statistical Data Employed in Computing Workers' Compensation Rates

At the time Ralph Marshall's paper was written, the formula to determine overall rate level was to give equal weight to policy year data and calendar year data. This formula is still in effect today. The only change made is in the source of the policy year data. Until recently, policy year totals from unit statistical reports were used. Now, policy year aggregates from financial data are employed. Unit statistical plan data continues to be used to calculate individual classification rates. The statistical data used is data solely from the state under review. Only the distribution tables used in valuing law amendments which are described later in this paper are developed from countrywide data.

Unit Plan Data (See Appendix, Exhibit II)

Unit plan data is composed of statistical reports which are submitted to the National Council by its members in accordance with the Unit Statistical Plan which has been filed and approved by state regulatory bodies. The Plan provides for the reporting of payroll, manual premium, and incurred loss data by classification code by state for each policyholder. Incurred losses include amounts paid, plus amounts still to be paid. Losses used for ratemaking must represent the total liability of the carrier in discharging its obligation. Losses are valued 18 months after the inception date of the policy, and reports are due to be reported to the National Council two months later. At the time of valuation, there are cases for which the total benefit cost is not yet known. In these instances an estimate is made based upon the facts known at that time. If any losses are still open as of a first valuation date, or are subsequently reopened or reported, a second report is required a year later. A claim is considered to be open if all benefits have not been fully paid. The second valuation could be greater or less than the original estimate depending upon whether the condition of the injured worker has worsened or improved. If any losses are still open as of the loss valuation date of the second report, a third report is required the following year. Similarly, fourth and fifth reports are required if any loss or losses remain open.

Data is submitted by carriers in batches at monthly intervals. The data is keypunched and grouped into 12 month policy periods separately for each state. There is no necessity for such periods to begin on January 1. In order

to utilize the most recent experience, policy periods are staggered throughout the year. The policy period is keyed to the anticipated effective date of the proposed rates in the state, allowing sufficient time for preparing the filing.

Losses are identified by type of injury; i.e., fatal, permanent total, permanent partial, and temporary total. Indemnity and medical losses are shown separately. The National Council classifies permanent partial cases into two categories, a major or minor case, according to a critical value which varies by state. These values are adjusted periodically to keep pace with law amendment changes. Losses reported at or in excess of such critical values are classified as major permanent partial claims, and losses reported below such critical values are called minor permanent partial claims. In general, major permanent partial claims involve loss of major members of the body such as a hand, a foot, or a leg, while minor permanent partial claims involve minor members of the body such as a finger, a thumb, or a toe.

Losses reported under the Unit Statistical Plan are limited for use in ratemaking, in order to prevent any one big single claim or multiple claim from having an unduly strong influence on the indicated pure premium. The limitations are as follows:

1. Single claims are limited to 10% of the self-rating point used in experience rating.
2. Multiple claims (an accident where more than one worker is injured) are limited to 20% of the self-rating point used in experience rating.
3. The amount of disease loss that can enter any one class in any one policy year is limited to 25% of the self-rating point used in experience rating.
4. Employers' liability claims are limited to $100,000 exclusive of loss adjustment expense.

The carriers have an option in reporting three year fixed rate policies under the unit statistical plan. They can either submit unit reports for each insured or they may submit data on a Schedule Z basis; i.e., a summary by class by effective year.

For reporting purposes, the experience on three year fixed rate policies is assigned to the year in which the policy became effective, regardless of expiration date. Losses are valued not earlier than March 31 and filed not later than September 1 of the fourth year after the year in which the policy became effective. For example, the experience on three year fixed rate policies becoming effective in 1971 was filed not later than September 1, 1975, with losses valued not later than March 31, 1975. No subsequent reports are made.

Policy Year Aggregates (See Appendix, Exhibit I, Section A)

Over the years, elements in the ratemaking formula have changed as the need required. The workers' compensation ratemaking system has always been under study so that it could keep pace with current conditions. Several years ago it was noted that loss development, that is, the changes in the estimates of the cost of cases over a period of years, were no longer adequately being measured by the use of three consecutive unit statistical reports. It was evident that the character of workers' compensation administrative and benefits programs had changed over the years and the final determination of incurred losses could no longer be considered as available with the use of three subsequent reports. Consequently, the calculation of development factors was changed to use four reports and, later, five reports. Further study indicated that there could be significant development beyond a fifth report. At this point in order to measure such development, it was decided to make use of policy year aggregates valued at calendar year end in lieu of unit statistical reports. This improvement in the process of measuring incurred losses to an ultimate value was made approximately three years ago.

Policy year aggregate data are compilations of loss payments, loss reserve changes, written premium transactions, and unearned premium reserve changes associated with the particular policy year involved. Thus, policy year 1971 would involve all such transactions arising out of policies issued between January 1 and December 31, 1971. Policy year aggregate data would also include the insurance company's judgment as to the amount of incurred but not yet reported claims and the estimated additional cost on closed claims which will be reopened in the future.

In the course of further study of the development problem, it became apparent that the ability to make an adequate determination of losses in the first instance would be improved by use of policy year aggregate data.

Tests showed this to be true. Further, with the dynamic environment in which workers' compensation insurance operates today, it was important to do so to preserve the ability to make rates which are a more current reflection of loss costs. It is expected that the use of policy year aggregates will improve the workers' compensation ratemaking system and make it more responsive to forces affecting costs, both upward and downward. In 1974, the National Council began making filings in which policy year rate levels were based on financial data records for first and subsequent reports.

Calendar Year Data (See Appendix, Exhibit I, Section C)

Calendar year experience also is used to determine rate level. The reason for using calendar year experience is to recognize the very latest experience available. These data are obtained from semi-annual calls issued by the National Council to its membership. Standard earned premium and incurred losses are obtained by state. Net earned premium also is obtained in the call requesting data for the full year. Calendar year premiums are determined by adding to the premiums written during the year the unearned premium reserves at the beginning of the year and subtracting the unearned premium reserves at the end of the year. Calendar year losses are determined by adding to the losses paid during the year the loss reserves at the end of the year and subtracting the loss reserves at the beginning of the year.

Calendar year experience is more recent data than policy year experience. Calendar year 1974, for example, includes the incomplete policy year 1974 consisting of all premium and loss transactions on policies effective in 1974 which were recorded in 1974. The complete policy year 1974 aggregates will not be available until the following year. Calendar year experience includes all premiums earned and losses incurred during the calendar year period regardless of the effective date of the policies producing the data. These data reflect all cost factors which affect compensation underwriting results, including not only the most recent changes in wages but also the most recent changes in the frequency and severity of claims.

Financial data is not available on a classification basis. It is statewide data exclusive of excess policies, U.S. Defense Projects Rating Plan risks, and coal mine experience. Carriers are now beginning to exclude experience under the United States Longshoremen's & Harbor Workers' Compensation Act since a separate ratemaking procedure has been established for the classifications falling under this Act—the so-called "F" Classifications. This

procedure is described later in the paper. The changes from one year to the next in the policy year aggregates previously mentioned can be summed to reconcile with calendar year data. Since insurers also report calendar year experience to regulatory officials in their Insurance Expense Exhibits annually, such data can be further reconciled to this source. Specifically, the calendar year premiums and losses shown in Part IV of the Insurance Expense Exhibit should agree with the net earned premiums and incurred losses reported to the National Council for calendar year data taking into consideration the aforementioned exclusions. These exclusions are included in the Insurance Expense Exhibit data.

In determining rate level, the amount of loss for a single or multiple accident is limited to 5% of the standard earned premium for the preceding calendar year. The rationale here is that both single claim and multiple claim losses should be included in rate level, except an unusually large catastrophe such as a Texas City disaster. At one time, a much lower limit was applicable for excluding losses from catastrophes. However, there was a one cent loading in the rates for catastrophes. There is no catastrophe charge applicable today.

Distribution Tables—Valuation of Law Amendments (See Appendix, Exhibit II-B)

The benefits payable to injured workers are adjusted periodically by state legislatures. In these instances it is necessary to determine the percentage increase in cost of the new law to the old law in order to determine what past losses will cost at the new law level. Each state has its own compensation act which prescribes a schedule of benefits for each type of injury. A typical compensation act establishes weekly payments as a percentage of the injured worker's average weekly wage subject to a maximum and a minimum weekly benefit. For example, the injured worker receives a specified percentage, say 66⅔% of his wages earned at the time of injury. A common provision is to set the maximum and minimum benefits as a percentage of the state average weekly wage. If the maximum weekly benefit is established at 100% of the state average weekly wage, and the state average weekly wage is $150, the maximum weekly benefit is $150. A worker earning $300 per week would receive a weekly benefit of two-thirds of $300, limited however to the maximum of $150. Payments usually are made during the entire period of total disability. Most permanent partial disability payments are limited according to a specified schedule. For example, the duration of payments for a dismemberment of an arm might

be payable for 200 weeks, a dismemberment of a leg payable for 250 weeks, a loss of a hand payable for 125 weeks, etc. In death cases, benefits generally vary by type of dependency, with widows in many states receiving life pensions providing they do not remarry. In temporary total cases, benefits are payable during disability following a waiting period—usually three days—but payable from day of disability if disability lasts more than a specified duration—usually, one, two, or three weeks.

Whenever benefits change, say the maximum benefits increase, the effect of the law change is determined for each type of injury. This is accomplished by developing monetary costs under the old law, and under the new law, based on (1) the old and new benefit provisions using an accident distribution table in the case of permanent partial cases, (2) a dependency distribution table for fatal cases, (3) a disability table in the case of temporary total cases and (4) a standard wage distribution table to measure the effect of the maximum and minimum weekly limitations in computing the average weekly benefit for each type of injury.[1] The overall cost of the new law is determined by weighting the individual cost effects by type of injury with the latest statewide distribution of losses by type of injury.

Increases in benefits require an adjustment of outstanding policies if the overall increase in benefits results in an adjustment of 1% or more of premium. Such adjustments are made since the carriers are liable for the payment of the higher benefits the day the law goes into effect, and the rates applicable to the policy do not contemplate the higher benefit level.

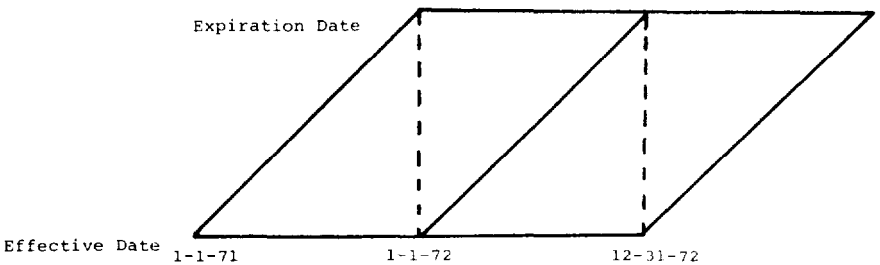
2. *Calculation of Industry Group and Overall Rate Levels (See Appendix, Exhibit I)*

The approach to workers' compensation ratemaking is similar to that used in many lines of insurance whereby premiums and losses of the past are brought up to current conditions, and the resulting loss ratio is compared to an expected loss ratio. If past data is better than expected, a rate level decrease is indicated; and if past data is worse than expected, a rate level increase is indicated. Rates are set prospectively based on past experience at current levels. The rates are designed to produce premium which is adequate to pay for (1) losses which are expected to be incurred, (2)

[1] See Fratello, Barney, 'The "Workmen's Compensation Injury Table" and "Standard Wage Distribution Table"—Their Development and Use in Workmen's Compensation Insurance Ratemaking,' *PCAS* XLII, pp. 110-202.

expenses, and (3) a margin of 2.5% for contingencies and underwriting profit.

The basic data underlying the policy year experience are from financial data records. The two latest complete policy periods are used in the determination of rate level. For example, for policy year aggregates valued as of 12/31/73, policy years 1971 and 1972 would be used. This is illustrated by the following diagram:



Policy year 1971 covers all policies effective in 1971, the last policy expiring as late as 12/31/72; policy year 1972 covers all policies effective in 1972, the last policy expiring as late as 12/31/73.

Policy year data is homogenous data in that the premiums and losses all come from the same set of policies. It is that part of the rate level formula which represents "stability" and is given 50% weight in determining rate level.

Policy year premiums used at the present time are net earned premiums from the Supplementary Call for Policy Year Aggregates, adjusted to a standard earned basis. This adjustment is accomplished by applying the same ratio of standard to net as existed in the two calendar years in which the policy occurred. Carriers now are requested to provide standard earned premiums as well as net earned premiums when submitting policy year aggregates. It is expected that standard earned premiums will be available in the near future.

The standard earned premium thus derived is then brought up to current rate level. This is accomplished through the use of index numbers. When making this adjustment it is assumed that an even distribution of exposure applies throughout the policy period. All rate levels which became effective during or subsequent to the policy period are indexed to a common base. The average rate level for the policy period is determined by depicting rate levels which occur during the policy period according to proportionate areas. This adjustment is computed separately for each of the two policy

years used in determining rate level. The indicated premium adjustment for each policy year is the ratio of the current index to the average rate level of the policy year. A further adjustment is made to exclude expense constant premiums. This adjustment is necessary since the premium derived from rates excludes expense constant premium. The permissible loss and loss adjustment ratio referred to later in this section has been adjusted to anticipate this other source of income. Loss constant premium, on the other hand, has not been excluded. Instead, a separate rate reducing factor called the Loss Constant Offset (described later in this paper) is applied to rates to recognize this additional source of income.

Incurred losses also must be brought up to the current benefit levels. This is done in a manner similar to adjusting premium to current rate level; i.e., law amendments which have occurred during or subsequent to the policy period are indexed to a common base. In this instance an even distribution of loss occurrence is assumed throughout the policy period. The average benefit level for the policy period is developed by weighting each benefit level that cuts through the policy period by its proportionate area. The adjustment to apply to each policy year aggregate loss is the ratio of the current index and the average benefit level of the particular policy year.

Tracking losses to their ultimate cost level is necessary if rates are to reflect ultimate liability. The losses used in ratemaking are converted to an ultimate reporting basis through the use of development factors. These factors are determined by tracking the movement of losses for older policy periods to their ultimate level. By applying these factors to the most recent policy periods, it is assumed that the new experience will develop from year to year in the same manner as the older policy year data.

The latest of the two policy years used in rate level is on a first reporting basis; i.e., it represents the first time the complete policy year is available. For example, policy year 1972 valued as of 12/31/73 is considered a first report. The earlier of the two years, policy year 1971 valued as of 12/31/73, is on a second report basis. The development factors are designed to adjust the earlier year from a second to an ultimate reporting basis, and the latest year from a first to an ultimate reporting basis.

The use of the three most recent calls for policy year experience valued at calendar year end provides the movement of premiums and losses by policy year for two consecutive years. Hence, it is possible to get development from a first to a second report basis for the two most recent periods

where a second report is available. Similarly, it is possible to determine the movement of premiums and losses from a second to a third reporting basis for the two most recent policy periods where a third report is available. In like manner, the movement from third to fourth reports, fourth to fifth reports, etc., to ultimate can be determined.

The development factors are obtained by multiplying the average development from first to second report (for the two latest policy periods where a second report is available) times the average development from second to third report (for the two most recent years where a third report is available), etc., to an ultmate level. The supplementary call for this information requests carriers to provide policy year aggregates for all prior years. The call for policy year aggregates was a major undertaking and internal recordkeeping procedures in many companies had to be revised. Some companies could not supply such data separately for older policy years. However, they were able to provide this information on a prospective basis. Hence, it is necessary to "match" like companies in each layer of development since all carriers could not provide data for older policy years.

The final adjustment applied to losses is to include loss adjustment expense as a function of losses. Loss adjustment expense includes the cost of investigating cases, representing the employer before claims adjudicating bodies, defending law suits, etc. The allowance includes both allocated and unallocated expense since workers' compensation losses exclude all loss adjustment expenses except allocated loss adjustment expenses for Coverage B claims which are reported as losses. Currently, loss adjustment expense is expressed as 12.5% of expected losses, it having recently been reduced from 13.0% of expected losses. Loss adjustment expense traditionally tracks losses more closely than premiums and, therefore, is more appropriately expressed as a function of loss. The same results can be obtained by setting loss adjustment expense to an equivalent percentage of premium.

To summarize, policy year premiums are adjusted to current rate levels and policy year losses are adjusted to current law levels, converted to an ultimate liability level and further adjusted to include loss adjustment expense. The resulting modified loss and loss adjustment ratio then is divided by the expected loss and loss adjustment ratio to determine policy year overall rate level. The expected loss and loss adjustment ratio, more commonly referred to as the permissible loss and loss adjustment ratio, is the complement of the expense allowance included in manual rates.

Each year expenses are reviewed to determine the expense needs of the carriers for the forthcoming period. This entails a review of past expenses based on data reported in the Insurance Expense Exhibit to observe if any expense item is trending upward or downward. If a trend is apparent, a change in the allowance for such item is made. This could result in either a change in the expense allowance included in the manual rates or a change in the premium discount percentages.

The present allowance for expenses applicable to the first $1,000 of premium is:

1.	Acquisition and Field Supervision	17.5%
2.	General Expenses	8.4
3.	Profit and Contingencies	2.5
	Total for Company Expense and Profit	28.4%
4.	Taxes	Vary by state

The amount of taxes includes state taxes plus a 0.7% allowance for miscellaneous taxes, licenses, and fees. The state taxes include all taxes that are levied as a percentage of premium. Taxes which are levied in the form of assessments based on losses are accounted for in the modification of policy year and calendar year losses to current level. Such assessments become part of the loss modifier in the same manner as development factors and law amendment factors. Assessments based on losses that are limited to certain types of injury such as a sum payable to a Second Injury Fund in a no-dependent death case are included in the experience reported to the National Council and, therefore, no factor is required.

The permissible loss and loss adjustment expense ratio is the complement of the sum of 28.4% and the tax allowance.

A common provision in rate regulatory laws is that due consideration shall be given to a reasonable margin for underwriting profit and contingencies. In workers' compensation insurance, a profit and contingency allowance of 2.5% has been in use for at least 25 years. The 2.5% underwriting profit contemplates additional profits from other sources to realize an adequate rate level.

Earlier in this paper it was mentioned that large size insureds normally have a loss cost per unit of exposure which is less than the corresponding loss cost for small insureds. Hence, in the experience rating plan more

credits are given than debits. As a result, the total premium collected after experience rating (i.e., standard earned premium) is less than that premium produced by manual rates. In rate level, since both policy year and calendar year premium are on a standard basis (i.e., after the application of experience rating) and the permissible loss and loss adjustment ratio is a function of standard earned premium, it is not necessary to correct for the off-balance. Under the old rate level method, however, policy year premium generated by extending payrolls times current rates was at manual level (i.e., before the application of experience rating). Therefore, it was necessary to convert this premium to a standard earned basis in order that a proper comparison could be made when the policy year loss ratio was related to the permissible loss ratio. No correction was necessary on the calendar year premium entering rate level because this premium was on a standard earned basis.

The next step is to bring in the effect of the most recent calendar year experience. As mentioned earlier, the rate level formula gives equal weight to policy year and calendar year indications.

The calendar year data used in the rate revision covers all premium and loss transactions during the latest 12 calendar months available. As indicated earlier, calendar year data is obtained from semi-annual calls for experience. Geometrically, calendar year experience can be represented by a square covering 12 months ending June 30, or 12 months ending December 31.

The same procedure for adjusting experience to current level applies to calendar year premium and loss data as was employed with policy year aggregates; i.e., through the use of index numbers, premiums are adjusted from the average rate level of the calendar year to the latest rate level, and the losses are adjusted from the average law level of the calendar year to the latest law level. The same assumption of an even distribution of exposure and loss occurrence are made as were used in adjusting policy year data. It is realized, however, that calendar year incurred losses include changes in reserves of old claims. A new method using policy year contributions to calendar year experience will be implemented shortly in order to more accurately adjust old claims to current level.

The recognition of calendar year experience in rate level is accomplished by the inclusion of a rate level adjustment factor. The rate level adjustment factor expresses the effect of the calendar year data as a multi-

plier to the policy year indications. The effect of calendar year data expressed as a multiplier is most convenient when developing classification rates described in the next subsection. The calendar year loss ratio at current level and the policy year loss ratio at current level are given equal weight when calculating the rate level adjustment factor. The product of the policy year rate level change and the rate level adjustment factor produces the indicated overall change in rate level.

Rate levels are then determined for three broad industry groups, namely Manufacturing, Contracting, and All Other. This is accomplished by distributing the overall effect according to the relativity indicated by unit statistical plan aggregates. Experience is available by classification under the Unit Statistical Plan and, therefore, can be assembled into Manufacturing, Contracting, and All Other industry groups for this purpose.

Committees of the National Council are constantly reviewing the rate level formula in order to ensure that the existing program responds effectively to current conditions. The recent adverse experience indicates that additional steps may be forthcoming. Several possible areas are being explored, such as the assignment of greater weight to calendar year experience and trend factors.

The use of policy year aggregates from financial data records, in lieu of Unit Statistical Plan data, is felt to be a step forward but not necessarily the final answer.

3. Calculation of Manual Rates

After determining the required changes in premium level, the next step in the ratemaking procedure is to distribute these changes among the various industry classifications. The first step is to develop pure premiums for each classification. A pure premium is the amount of loss per $100 of payroll. For example, if the total loss for a classification was $500, and the classification payroll was $50,000, the pure premium would be $500 ÷ [50,000 ÷ 100] = $1.00.

Reviewed Classifications—Pure Premiums (See Appendix, Exhibit II)

The reviewed classifications consist of those classifications whose experience is of sufficient volume to warrant the assignment of some "credibility" or weight to the latest experience for the individual classifications.

Pure premium exhibits are developed which show in detail the experience for each reviewed classification. The data shown in these exhibits

are from second reports under the unit statistical plan for the earlier policy year, from first reports under the unit statistical plan for the latest policy year, and from the experience of the three year fixed rate policies for the two latest years. The three year policies are equivalent to a third report for the first 12 months of experience, a second report for the second 12 months of experience, and a first report for the latest 12 months of experience. Losses are at current benefit level and include development factors and loss adjustment expense of 12.5%.

In order to adjust losses to current level, amendment factors are calculated for each type of injury. This is done in the same way that the overall amendment factor was calculated by adjusting the policy year aggregate loss data whereby benefit changes occurring during and subsequent to the policy period are indexed to a common base, and the amendment factor determined by dividing the current index by the average benefit level for the policy period. Again, the average policy year loss level is computed by using proportionate areas of the policy period which is represented geometrically by a parallelogram.

Development factors also are computed in the same manner as development factors for policy year aggregates, by averaging the movement of the premium, indemnity losses, and medical losses for the two latest periods for each reporting from the respective amounts compiled for the preceding report. As indicated earlier in this paper, unit report data is available up to a fifth report. In order to convert policy year unit plan data to an ultimate basis, it is necessary to use the indications of development from fifth report to ultimate from financial data records. A further adjustment is required to develop losses to levels indicated by policy year aggregates used in determining rate level. This is obtained by adjusting losses by the ratio of the policy year earned loss ratio at current level from policy year aggregates and the policy year earned loss ratio at current level from unit plan data.

Losses are combined into serious, non-serious, and medical components. Serious losses consist of death, permanent total, and major permanent partial claims. Non-serious losses consist of minor permanent partial and temporary total claims. Medical losses consist of all medical claims including both compensable and noncompensable cases.

The pure premiums included in these classification exhibits are as follows:

a. *Indicated:* These are the pure premiums indicated by the experience for the classification adjusted to current levels as described above. When a new law amendment develops, and it is known at the time a rate revision is to be prepared, it is included in the amendment factors in both rate level and classification relativity. There are occasions, however, when a law change is not known until the pure premiums have already been prepared. In these instances, the law amendment is applied in the final calculation of rates by parts: serious, nonserious, and medical.

b. *Underlying Present Rates*: These are the pure premiums underlying the rates currently in force. The procedure used to produce these underlying pure premiums involves the following values which are obtained from the previous rate revision:

Proposed Pure Premiums

Rate Level Adjustment Factor

Test Correction Factors (explained later in this section)

Ratio of Manual Premium to Earned Premium

The calculation is as follows:

The proposed pure premiums from the preceding rate revision for serious, non-serious, and medical are adjusted by applying the Rate Level Adjustment Factor from the preceding rate revision, the corresponding industry group test correction factors from the preceding rate revision, and the present ratio of manual premium to standard earned premium divided by the proposed ratio of manual premium to standard earned premium to each pure premium.

The rationale here is that last year's test correction factor and the rate level adjustment factor were applied after the proposed pure premiums were calculated and must be included as part of this year's underlying pure premiums. Secondly, the pure premium present on the rate level described below includes the policy year rate level change. The rate level change includes any change in the off-balance of the experience rating plan. These changes are reflected in the calculation of rates after the pure premiums are determined and should not affect the pure premiums. The above

formula effectively cancels out these changes in the pure premium present on rate level.

The resulting partial pure premiums then are adjusted in instances where there is a law amendment that is included in this year's amendment factors but was not included in last year's rates by applying to them the benefit level change by parts. This adjustment is made in order that this year's proposed pure premiums will include the effect of the law amendment in every instance. As explained later in this paper, in some instances the underlying pure premium is selected as the proposed pure premium. This produces the Partial Pure Premium "Underlying Present Rates".

The total pure premium is obtained by adding the partial pure premiums and rounding the sum to two decimal places.

c. *Present on Rate Level:* These are the pure premiums underlying present rates (see paragraph "b" above) brought to the proposed premium level by the application to the partial pure premiums of factors representing the effect of any proposed changes in policy year premium level. The overall effect of the benefit level change is removed from the policy year premium change before application to the underlying pure premium. The change, exclusive of law, then is applied to the partial pure premiums. The law change has been excluded since it already has been included in the underlying pure premiums.

Whenever there is a change in expenses, such change is reflected in the proposed policy year premium level indication. Therefore, this change must be removed from the pure premium present on rate level because expense changes will be recognized later in the calculation of rates and should not be duplicated in the pure premium exhibits.

d. *Derived by Formula:* The formula pure premium is derived by a mathematical weighting between the indicated and the present on rate level pure premiums. The weight given to the policy year partial indicated pure premium varies from zero percent to 100 percent depending upon the volume of expected losses for serious, non-serious, and medical, respectively, for the classification. Expected losses are derived by multiplying the payroll, in $100 units,

by the partial pure premium underlying the present rates. Expected losses are used in assigning credibility because expected losses represent the normal probability of occurrence. Actual losses, on the other hand, are a matter of chance whereby very favorable experience would produce less credibility than that assigned on the basis of expected losses, and unfavorable experience would produce more credibility than that assigned on the basis of expected losses. The complement of the weight given the indicated pure premium is applied to the present on rate level pure premium. Thus, if 80% credibility is assigned to the indicated, 20% is applied to the present on rate level pure premium. A table of credibilities is used to assign weights to the indications for each of the three industry groups. To the extent a classification grows in volume and attains credibility, the classification makes its own rate. The requirement for full credibility for serious losses is an expected loss amount equal to 25 times the average serious indemnity claim cost; the requirement for full credibility for non-serious losses is an expected loss amount equal to 300 times the average non-serious case. Full credibility for medical is reached if the medical expected losses are equal to or greater than 80% of the expected loss amount to qualify for full credibility for non-serious losses. Partial credibility which is implemented in 10 percentage intervals, is expressed as: Required Expected Losses = (Expected losses required for 100% credibility) x (% credibility)$^{3/2}$. In other words, the percentage of the amount required for full credibility to receive, say, 70% credibility, is determined by the expression $(.70)^{3/2}$ or 58.6%. The exponential expression is used in lieu of a straight line formula in order to produce higher credibilities for partial credibilty.

The rationale behind the development of the formula pure premium is to base such premiums on the indicated pure premiums to the fullest extent that credibility will permit. To the extent that a classification is not credible, the underlying present pure premium is assigned with the assumption that the experience for the classification would change by the same percentage change as the industry group to which the classification belongs; i.e., pure premium present on rate levels.

e. *Proposed:* The proposed pure premiums are the middle ones of the indicated, the formula, and the underlying present rate. Normally, this would be the formula pure premium. However, this selection acts as a stabilizer in those instances where the experience of a class with relatively small credibility moves significantly in one direction while the experience of the industry group under which this class belongs moves significantly in the opposite direction. When the selected pure premium is other than the formula pure premium, the proposed total pure premium is distributed by parts in the same manner as the proposed pure premium.

Non-Reviewed Classifications—Pure Premiums (See Appendix, Exhibit II)

Those classifications whose expected losses are so small that no credibility can be attached to any one of the partial pure premiums (i.e., serious, non-serious, or medical) are called non-reviewed classifications. The expression "non-reviewed" is somewhat of a misnomer in the sense that these classifications are reviewed and have been assigned zero credibility for each partial pure premium. The rate for a non-reviewed classification is determined by modifying the current rate by the change in the industry group rate level into which the classification belongs. Partial pure premiums are maintained for each non-reviewed classification. These partial pure premiums are needed whenever the classification attains sufficient volume to be reviewed. Also, as explained later in this section, whenever a law change occurs, the law amendment is applied by parts to non-reviewed classifications. Further details are provided later in the paper.

Factors to Apply to Proposed Pure Premium to Derive Manual Rates — Reviewed Classes (See Appendix, Exhibit II)

The following items are combined with the proposed pure premium to obtain the final manual rate for a reviewed classification:

a. *Rate Level Adjustment Factor*

The classification experience is compiled excluding the Rate Level Adjustment Factor. It is necessary to bring in this factor when calculating rates as a multiplier to the proposed pure premiums in order to recognize the effect of calendar year experience.

b. *Effect of Legislation*

The partial pure premiums are multiplied by the three part effect of

serious, non-serious and medical changes in benefit level that have not already been included in the pure premium exhibits. This may occur, for example, when an experience review is combined with legislation, and the law change is not known until after the pure premium exhibits have been prepared.

c. *Ratio of Manual Premium to Earned Premium*

The ratios of the industry group manual premiums to standard earned premiums are applied to the total pure premium to produce the required level of standard earned premium.

d. *Loss Constant Offsetting Reductions (See Appendix, Exhibit II-E)*

The manual rates include an offsetting reduction for the loss constants so that the premium from such loss constants will not produce premium in excess of the required level. Calculations are made based upon a distribution of size of risk of state experience for the policy year premium level period to produce indicated loss constant offsets each year.

e. *Expense Allowance (See Appendix, Exhibit I-D)*

The expense allowance is introduced into the rate by dividing the product of the proposed pure premiums and the appropriate factors above by the permissible loss and loss adjustment ratio. This operation produces the proposed rate prior to addition of a disease element, if any.

f. *Disease Elements*

The proposed manual rates include specific disease elements for those classes where they apply. The purpose here is to allow the normal occurrence of disease losses to be included in the rate calculations. Abnormally high disease losses are to be excluded. The specific disease elements applicable to those classifications with a high susceptibility to disease exposure provide the carrier with premium for the potential liability which could develop if many diseased workers filed claims at one time. The possibility of an outbreak of claims occurring at one time exists because many workers afflicted with a disease continue working and can at any time file a workers' compensation claim. When workers are reassigned, or long layoffs develop, an emergence of claims might be expected.

Normal disease emergence is an integral part of ratemaking. Typical disease losses include dermatitis, various lung afflictions, lead poisoning,

etc. Many diseases have emerged in recent years resulting from the use of new chemical compounds which may involve very high loss potential. Also, the adjudication of disease claims today is much more liberal than was the case years ago. Hence, many cases formerly held non-compensable are now receiving awards.

Those classifications which have a high susceptibility to disease hazard involve exposure to silica dust, rock excavation and quarries, foundries, etc. In these instances, a schedule of specific disease elements which vary by classification applies. The specific disease elements are added to the rates as otherwise calculated to obtain the total manual rate. The elements were established by considering the relative number of employees exposed to the disease hazard, the rate of infection among those employed, and the severity of the resulting disease. If an employer, however, does engage in operations under one or more classifications where a specific disease element applies, and the hazard is not present, manual rules provide that the specific disease element may be removed.

g. *Maximum Departure*

A test is made to make certain that the proposed rates fall within the specified departure from the present rates. Classification rates may not change from one revision to the next by more than the effect of legislation and one-half of the industry group experience change, plus or minus 25%. To illustrate, if a state had an experience change of 1.060 for Manufacturing, with a law change of 10%, the upper swing limit for manufacturing classes would be 38% (i.e., 10% plus 1/2 of 6% = 13%, and 13% plus 25% = 38%). The lower swing limit would be −12% (i.e., 13% −25% = −12%).

h. *Rates — Test Correction Factor*

The payrolls now are extended by the rates presently in effect and by the indicated proposed rates to determine if the required change in manual premium level has been achieved. Since at first this calculation may not yield the required results, an iterative process is initiated which continuously tests the proposed rates including tentative test correction factors until the required change in manual premium level is obtained for each industry group.

Iteratives are necessary because individual class changes are limited. The test correction factors are applied as multipliers to the proposed pure premium.

It is not necessary from a mechanical viewpoint to isolate every factor shown above since there is a balancing out to the indicated rate level. However, it is more meaningful that each item be separately identified.

Factors to Derive Manual Rate — Non-Reviewed Classifications

If the rate revision is a review of experience only, the proposed non-reviewed classification rates are determined by multiplying the present rate excluding the specific disease element by the industry group rate level change and then adding back the specific disease element.

If the rate revision is a review of experience and law amendment combined, the law amendment is applied by parts, serious, non-serious, and medical, to the pure premiums underlying the present rates to derive the current rate modified for law amendments. Then, the industry group rate level change based on experience is applied to the current rate adjusted for the law change to derive the proposed rate.

4. Ratemaking Procedures for Classifications having Unique Conditions

There are certain classifications with characteristics which do not lend themselves readily to the standard ratemaking techniques. In these instances, special procedures are utilized in order to calculate rates.

A. *Per-Capita Classifications*

Per-capita classifications are those classifications comprised of in-servants and out-servants. Payroll is not the ideal basis of exposure for these classifications because in many instances a significant part of the remuneration is in the form of free room and board. Hence, rates for in-servants and out-servants are developed in the same way as any other class, except the number of servants is used in lieu of payroll.

B. *"F" Classifications (See Appendix, Section B-4)*

Prior to November of 1972, employees under the so-called "F" classifications (i.e., stevedores, shipbuilders, tallymen, etc.) received state benefits if they were injured on the dock and were paid benefits under the

United States Longshoremen's & Harbor Workers' Act (USL&HW Act) if they were injured on board ship.

Public Law 92-576, expanded coverage of the USL&HW Act to include dock workers' losses incurred subsequent to November 26, 1972 for the "F" classifications. Hence, stevedores, shipbuilders, tallymen, etc. are, for all practical purposes, completely under the federal act. Also, benefit adjustments under the USL&HW Act will be made annually on October 1. These conditions led to establishing a separate ratemaking program applicable to "F" classifications.

The ratemaking system for "F" classifications is described in detail in the Appendix. Highlights of this program include:

(1) Substituting national "F" classification pure premiums at up to 50% of the credibility that would previously have been assigned to state underlying pure premiums, in instances where the state indicated pure premium is not credible. The rationale here is to give the fullest credibility possible to the actual experience reported for the jurisdiction where rates are being revised. Then, to the extent credibility is not generated, the rate will be based on the national pure premium for the particular classification. However, to avoid any severe swings, the underlying state pure premium is given at least equal weight with the national pure premium.

(2) Since almost all injuries in the "F" classifications are now incurred under one Act, it is expected that rates among the various states would move closer together. Therefore, a range of rates based upon national pure premiums is established. Although not every rate in every state will fall within this range, only movement of rates towards this range is permitted. This technique also recognizes that the experience now available includes some data which is prior to the enactment of Public Law 92-576.

(3) No rate is permitted to increase or decrease by more than 50% from the present rate. This swing limit is more liberal than the limit applicable to other classes because greater fluctuations are anticipated for the next year as a result of the expansion under the Act.

C. *Chemical Classes*

The Chemical and Dyestuff Rating Plan has been established to provide a means of classifying and rating operations for (1) insureds which manufacture chemicals or dyestuffs or (2) insureds where the hazards are of a chemical nature although chemical and dyestuffs are not manufactured by the concern.

The measurement of hazard in terms of basic rates considers first the flammable or explosive nature of substances used or manufactured and second, the hazard created by or during the processes of accomplishing the transformation from raw material to finished product.

The flammable hazard is measured by the flash point. The chemical rates for each state are a grid whereby the abscissae includes four groups with various flash-point ranges and the ordinates indicate the degree of flammability in the processing.

The rates are calculated in the usual manner except that the rates are not permitted to reverse themselves either according to flash point or the degree of processing. When reversals are indicated they are combined with other points on the grid, and a common rate is computed for the group being combined.

D. *Underground Coal Mines*

The rates for underground coal mines are filed under a separate program. The hazards of an underground coal mine are unique because of the high catastrophe hazard present in underground operations. The rates for surface coal mines, auger coal mines, and types of mining other than coal, are developed in the same way as in other classifications except that there is a provision in the rate to cover state and federal black lung claims.

The calculation of the traumatic rate generally is the same as the approach used for calculating non-coal mine rates. However, there are some differences. In most instances, law evaluations have been computed on the basis that the wages received by coal miners will qualify them for maximum benefits. Carriers report calendar year experience and unit plan data for coal mine operations separately. To ensure stability in determining rates, two-thirds weight is given to policy year experience and one-third weight is given to calendar year experience. Expenses included in the manual rate for deep mines are lower than non-coal mine risks, but there are no pre-

mium discounts available. There is a catastrophe loading which is a flat charge added to the rate.

The disease rate is a comprehensive rate designed to produce premium to pay for disease claims, primarily black lung, reported under the state act or the federal act. There is an immense loss potential with regard to black lung cases.

The Federal Coal Mine Health and Safety Act of 1969 (FCMHSA), enacted in 1969 and amended in May of 1972, made current coal mine operators and employers who were formerly operators of coal mines liable for the payment of benefits for death or total disability due to pneumoconiosis (black lung) arising out of coal mine employment. The Act also established certain presumptions in the claimant's favor, applicable to black lung determinations:

1. Where a miner with pneumoconiosis has been employed in underground coal mines for 10 years or more, there is a rebuttable presumption that his pneumoconiosis arose out of such employment.
2. Where a deceased miner with 10 years or more of underground coal mine employment died of a respiratory disease, there is a rebuttable presumption that his death was due to pneumoconiosis; and
3. If a miner is suffering from complicated pneumoconiosis, there is an irrebuttable presumption that he is totally disabled due to pneumoconiosis.

As of July 1, 1973 a claimant has the option to file either under the state or federal laws. Black lung benefits payable to a miner or widow are reduced by the amount received under a state program of workers' compensation. This means that those claimants eligible for benefits under the state workers' compensation law will receive the larger of state benefits or federal benefits.

The worker normally would be expected to file under the state act in those jurisdictions where the state benefits exceed the federal benefits and vice versa. Also, there are additional claimants who may file under the state act first, but not qualify for benefits under the state act, and will then file and be eligible for benefits under the federal act.

Although a great many claims have been established and are being compensated under the federal program administered by the Department of Health, Education & Welfare (Part B of the FCMHSA), there is a considerable potential liability remaining to emerge. Some of the features of such liability should be outlined. In the first place, each case of black lung is for all practical purposes a life pension case with an extremely high average cost, currently in the area of $65,000. Thus, the emergence of a number of such cases would be serious indeed. Such an emergence could result from mine shutdowns or from claims by inactive miners or dependents of deceased miners who have not filed claims prior to July 1, 1973. In addition, claims originally filed under the Social Security Administration can be refiled with the Department of Labor to obtain medical benefits which have not previously been available to them. At an estimated amount of $12,000 per claim, application for medical benefits on any significant percentage of the hundreds of thousands of cases filed prior to July 1, 1973 would cost hundreds of millions of dollars.

The rate filed is a complete disease rate anticipating certain claims to be filed under the state law and other claims to be filed under the federal law. With respect to claims filed under the state law, the rate calculations reflect additional amounts that may be payable to the beneficiaries as a result of the federal law. This recognizes that the claimant will receive the federal law's escalated benefits which exceeds state law benefits.

The first step in the derivation of the proposed rate is the estimation of the frequency of successful claims. In this respect various data from reliable sources are interrelated to recognize two principal types of claims: (a) those miners with advanced stages of pneumoconiosis who are disabled, and (b) those miners with mild stages of pneumoconiosis who qualify for benefits under the previously cited presumptions but who refrain from filing a claim until it becomes economically advantageous for them to do so. Coal miners age 62 and over who have filed successful black lung claims receive tax-free income in the form of black lung benefits, social security benefits, and union pensions. The rate computation therefore assumes that the active coal miner age 62 and over will have a successful claim frequency of 25% from July 1, 1973 through June 30, 1974. This frequency is deemed to include those miners age 62 and over with advanced stages of coal miners' pneumoconiosis (progressive massive fibrosis or PMF) and is not in addition to the PMF component of claim frequency.

With respect to those miners under age 62 with progressive massive fibrosis, use is made of a study of 62,876 miners by the National Institute of Occupational Safety & Health (NIOSH) under the provisions of the Federal Coal Mine Health & Safety Act. The study obtained data on active miners who volunteered to be x-rayed. The results of the x-rays then were employed to arrange the miners in distributions according to age, years of service, and stage of pneumoconiosis. Thus, for the age intervals used in the distributions, the ratio of miners with PMF to the total number of miners in the interval can be readily determined. The rate computation assumes that this ratio approximates the true frequency of claims from July 1, 1973 to June 30, 1974 for the age interval. The frequencies for each age interval were applied to an age distribution of coal mine workers to obtain the estimated number of claimants in each age interval. The total number of claimants in all age intervals was then ratioed to the total number of miners to produce the estimated frequency of successful claims. The average age of a claimant was determined by utilizing the estimated numbers of claimants in each age interval as weights against the midpoints of the various intervals.

The average age thus obtained determines the average present value of a claim. There are no temporary total or permanent partial cases eligible for black lung disease benefits under the federal law. Therefore, the evaluation is based upon the present value of life pensions for a miner and his wife. Since most claims are filed by miners of advanced age, the annuity calculations assume there will be a negligible number of cases involving dependents other than wife or widow and relatively few involving a miner alone. It is assumed that when a worker files a claim, his wife, who is approximately two years younger than the miner, will survive him. This assumption is based on the following argument: (1) the mortality rate for miners is expected to be much higher than for non-diseased workers, (2) the mortality rate for men is generally higher than the mortality rate for women, and (3) a miner's wife, on the average, is at least two years younger than the miner.

Benefits payable under the U.S. law are increased automatically whenever the federal pay schedule is revised. When state benefits are initially higher than the corresponding federal benefits, it is assumed that some miners will file successful claims under the state act along with claims under the federal law to protect their interests in receiving supplementary benefits under the federal law in subsequent years when (1) federal benefits have

escalated to a level above state benefits or (2) limitations on state benefits apply.

Recognition must also be given to the present value of medical benefits. The rate derivation assumes that average medical costs for black lung disease cases will not differ significantly from the average medical costs for traumatic cases.

The addition of the present value of medical benefits to the average present value of indemnity benefits results in the total average present value of benefits.

The next step toward the proposed rate is to recognize insurance company expenses. An expense allowance of 12.3% plus taxes is included to apply to the disease rate. The traumatic rate will continue to have the full standard expense allowance. A breakdown of the expense allowance is as follows:

Item	Proposed Allowance Applicable to Disease
Taxes	vary by state
Commissions	1.0%
Bureaus	1.0
Profit & Contingencies	2.5
Home Office & Claims	7.8

The present cost (benefits and expenses) per claim is multiplied by the frequency of successful claims to obtain the amount of premium that must be collected per miner to provide the new occupational disease coverage. Division of this per capita charge by the estimated average annual salary in hundreds provides the indicated basic rate.

The basic rate in all states then is increased by 40% to recognize the unknown elements that are not considered in the basic rate. Specifically this includes (1) the so-called junior catastrophes (i.e., closing down of single mines or local layoffs of workers resulting in an acceleration of claims filed), (2) claims filed by inactive miners engaged in other occupations or retired who did not file claims prior to July 1, 1973, and (3) workers who were not eligible for medical payments under the Social Security Administration who would be expected to refile under Part C of the FCMHSA to obtain medical payments on or after January 1, 1974. The loss potential

in these areas can be enormous if any significant number of claims occur. For example, 100 claims resulting from a mine closing could easily produce a liability in excess of 65 million dollars.

The above procedure currenty is being reviewed. At the present time only limited data is available on the total liability of claims under policies effective on or after July 1, 1973. However, it is expected that the above procedure will be replaced by a new method using actual data as soon as it becomes available.

E. *Ex-Medical Rates*

Policies may be endorsed to exclude medical coverage. Further, it is necessary that the Board or Bureau having jurisdiction authorizes the writing of this type of policy except where the insured is a hospital. The manual rate for this type of coverage is the manual or authorized rate less 70% of the medical rate. The medical rate is expressed as the medical pure premium divided by the permissible loss ratio. The entire medical rate is not deducted from the full rate to determine the ex-medical rate because (1) the insurance carrier is still liable for the medical loss in case of insolvency by the insured, and (2) the insurance carrier may desire to assume payment of certain medical costs to hasten recovery and enable the injured worker to return to his job as soon as possible. The ex-medical rate is determined by subtracting from the manual rate the product of the manual rate and the ex-medical ratio for the classification involved.

Ex-medical ratios (i.e., 70% times the ratio of the medical pure premiums to the total pure premiums) for the hospital classifications (Codes 8833 and 9040) are printed as footnotes on the state rate pages. Ex-medical ratios for other classes are not printed on the state rate pages but are shown on the exhibits of approved rates and rating values which are distributed to the insurance carriers when an approval notice is released.

CONCLUSION

There exists today some minor variations within National Council states with respect to the procedures described above. This also is true with respect to the ratemaking procedure used by Independent Bureaus. For example, five years of class relativity is used in a few small volume states, and three years are used in a few others. As of this writing, two states are still at the old $100 payroll limitation rule, one state at $200, and some

states at $300. Some states have never accepted loss constants. However, despite these variations the same general principles described above underlie the rates in each state.

With the dynamic changes occurring in workers' compensation in recent years, it is a certainty that the workers' compensation ratemaking procedure will be under constant scrutiny to ensure that such procedures effectively respond to these changes.

A few descriptive passages have been taken directly from the filings of the National Council on Compensation Insurance.

Appreciation is hereby extended to the Staff of the National Council for their helpful suggestions.

PREFACE TO APPENDIX

The following exhibits show the step-by-step procedure used to calculate manual rates.

At the time these exhibits were being prepared, loss adjustment expense was included at 13.0% of losses. Subsequently, this allowance was reduced to 12.5% of losses.

Also, the policy year data from unit statistical reports normally consists of two twelve month periods plus two years of data from three year fixed rate policies. However, there are instances when a policy period may be extended or abbreviated to adjust for changes in the normal rate revision effective date. In the attached illustration the earlier of the two policy periods covers ten months of experience, and the most recent period covers twelve months of experience.

EXHIBIT I

Determination of Change in Manual Premium Level

A. *Policy Year Experience—Financial Data*

The data for each policy year are valued as of the year end. Net earned premiums are compiled from the "Supplementary Call for Policy Year Experience Valued at Calendar Year End" and are adjusted to a standard earned premium basis; the calculations underlying such adjustments are found in Exhibit I-A. Premium derived from expense constants is eliminated and all data placed on a current basis (i.e., premiums are on present rate level and losses are on current law level); the calculations of factors to reflect this adjustment are found in Exhibit I-B. Development of both premiums and losses beyond the indicated valuation date is included through factors determined in Exhibit I-C.

	(1)	(2)	(3)	(4)	(5)	(6)
		FACTORS				
	Valued As of 12-31-73	To Current Level	Develop-ment	Loss Ad-justment Expense	Composite (2)x[(3)x(4)]	Modified Data (1)x(5)
Premiums and Losses of Policies which became effective 1-1-72 through 12-31-72						
Std. Earned Prem.	86,014,777	1.053	1.003	—	1.056	90,831,605
Incurred Losses	48,360,811	1.133	1.118	1.130	1.431	69,204,321
Loss and Loss Adjustment Ratio						.762
Premiums and Losses of Policies which became effective 1-1-71 through 12-31-71						
Std. Earned Prem.	76,583,952	1.022	1.009	—	1.031	78,958,055
Incurred Losses	41,035,648	1.209	1.089	1.130	1.488	61,061,044
Loss and Loss Adjustment Ratio						.773
Total for Policies which became effective 1-1-71 through 12-31-72						
Std. Earned Prem.	xxx	xxx	xxx	xxx	xxx	169,789,660
Incurred Losses	xxx	xxx	xxx	xxx	xxx	130,265,365
Loss and Loss Adjustment Ratio						.767

Exhibit I (Cont.)

B. *Policy Year Indicated Change in Premium Level*

1.	Policy Year Incurred Losses	130,265,365
2.	Policy Year Standard Earned Premium	169,789,660
3.	Policy Year Loss and Loss Adjustment Ratio (1) ÷ (2)	.767
4.	Permissible Loss and Loss Adjustment Ratio (See Exhibit I-D)	.689
5.	Policy Year Change in Premium Level (3) ÷ (4)	1.113

This means that, prior to modification by calendar year results, an average overall increase of 11.3% in premium level is indicated by the policy year experience.

C. *Rate Level Adjustment Factor*

Calendar year premiums are adjusted to present rate level and calendar year losses are adjusted to current law level. The premium derived from the expense constant is eliminated so that the resulting calendar year loss and loss adjustment ratio will be comparable with the policy year loss and loss adjustment ratio. The losses are adjusted to include loss adjustment expense.

The calculation of the Rate Level Adjustment Factor follows:

		Experience of 12 Cal. Mos. End. 6-30-74		
		(a) Actual Basis	(b) Factors to Adj. to Present Law & 10-1-74 Rate Level†	(c) Adjusted Basis (a) × (b)
1.	Standard Earned Premium	106,851,486	1.003	107,172,040
2.	Incurred Losses and Loss Adj. Exp.	80,292,329	1.017	81,657,299
3.	Loss and Loss Adjustment Ratio			.762
4.	Policy Year Loss and Loss Adj. Ratio Based on Earned Prems. (from A)			.767
5.	Mean of (3) and (4)			.7645
6.	Rate Level Adjustment Factor (5) ÷ (4)			.997

†See Exhibit I-B for derivation of these factors.

Exhibit I (Cont.)

D. *Proposed Overall Change in Premium Level*

The product of the policy year indicated change in premium level from B above and the Rate Level Adjustment Factor from C above will produce the required change in premium level. This has the effect of giving equal 50% weightings to the policy year and the calendar year results.

1.	Policy Year Indicated Premium Level Change (from B)	1.113
2.	Rate Level Adjustment Factor (from C)	.997
3.	Overall Change in Premium Level (1) × (2)	1.110

E. *Distribution of Overall Change in Premium by Industry Group*

Since policy year aggregates are not available by industry group, (i.e., Manufacturing, Contracting and All Other), the summaries of Unit Statistical Plan data are used to obtain the distribution by industry group of the overall change in premium level. Exhibit I-E contains such information and, on the basis of the earned premium volume for each industry group the differentials are:

Industry Group	Differential
Manufacturing	.913
Contracting	1.023
All Other	1.036
Overall	1.000

F. *Change in Premium Level by Industry Group*

Applying the industry group differentials from E above produces the following changes in premium level by industry group:

		Industry Groups			
		Mfg.	Cont.	All Other	Total
1.	Overall Change in Premium Level (From D)	—	—	—	1.110
2.	Industry Group Differentials (From E)	.913	1.023	1.036	1.000
3.	Final Change in Premium Level by Industry Group (2) × 1.110	1.013	1.136	1.150	1.110

Exhibit 1 (Cont.)

G. *Effect of the 1-1-75 Benefit Changes*

The calculations up to this point have been carried through on the July 1, 1974 law level. A benefit change was enacted 1-1-75 and is applied as a final step as shown below.

The change in manual premium level by industry group determined in Section F must be further modified by the effect of the benefit change as follows:

	Change in Manual Premium Level (From Sect. F)	Effect of 1-1-75 Benefit Change	Final Change in Manual Premium Level
Manufacturing	1.013	1.014	1.027
Contracting	1.136	1.014	1.152
All Other	1.150	1.014	1.166
Total	1.110	1.014	1.126

The final change in premium level, therefore, is a 12.6% overall increase.

Manufacturing	2.7% increase
Contracting	15.2% increase
All Other	16.6% increase
Overall	12.6% increase

EXHIBIT I-A

Conversion of Net Earned Premium to Standard Earned Premium

A. *Conversion of 1971 Policy Year Net Earned Premium to Standard Earned Premium*

Assuming an even distribution of business, one-half of Policy Year 1971 falls in Calendar Year 1971, and one-half falls in Calendar Year 1972. Therefore, to derive standard earned premium for Policy Year 1971, equal weight is given to the ratio of standard to net premium for Calendar Years 1971 and 1972 to derive Policy Year 1971 net earned premium.

(1) Calendar Period	(2) Standard Earned Premium	(3) Net Earned Premium	(4) Conversion Factor (2) ÷ (3)
1-1-71/12-31-71	77,246,171	72,221,796	1.070
1-1-72/12-31-72	84,370,151	77,238,092	1.092
			1.081

	(5) Net Earned Premium	(6) Conversion Factor	(7) Standard Earned Premium (5) × (6)
Policy Year 1971 as of 12-31-73	70,845,469	1.081	76,583,952

B. *Conversion of 1972 Policy Year Net Earned Premium to Standard Earned Premium*

(1) Calendar Period	(2) Standard Earned Premium	(3) Net Earned Premium	(4) Conversion Factor (2) ÷ (3)
1-1-72/12-31-72	84,370,151	77,238,092	1.092
1-1-73/12-31-73	96,734,165	88,410,138	1.094
			1.093

	(5) Net Earned Premium	(6) Conversion Factor	(7) Standard Earned Premium (5) × (6)
Policy Year 1972 as of 12-31-73	78,696,045	1.093	86,014,777

EXHIBIT I-B

Factor Adjusting 1972 Policy Year Premium to Level of Present Rates

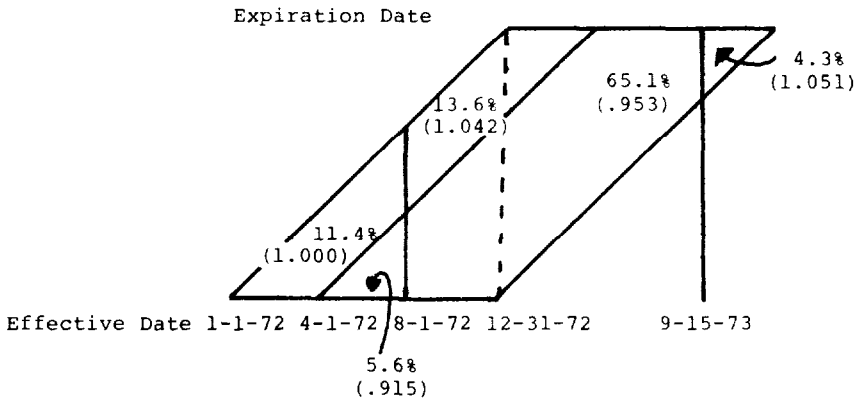
There are two types of rate adjustments. One is applicable to new and renewal business. This type of change can be represented geometrically by a diagonal line. For example, the new and renewal rate level change effective 4-1-72 is shown in the diagram below as a diagonal line. It indicates an average reduction in rate level of 8.5% applicable to all new and renewal policies effective on and after 4-1-72. The other type of change occurs when there is a law amendment or a medical fee change which requires an adjustment to outstanding policies. The 8-1-72 change shown below increased new, renewal, and outstanding policies by 4.2%. This type of change can be represented geometrically as a vertical line since it affects all policies in force on and after a specified date.

The 8-1-72 outstanding adjustment affected policies written under the 2-1-71 rates as well as policies written under the 4-1-72 rates. The new and renewal change effective 9-15-73 consisted of a review of experience and a benefit increase. The experience indications were somewhat favorable and, combined with the benefit adjustment, produced a net change of 7%. The outstanding policies were adjusted by a flat 10.3% for the unexpired portion of the policies to recognize the law change. The benefit increase was actually 10.6% but was reduced because of restrictions imposed by the Economic Stabilization Program. The outstanding adjustment cut across the tail end of Policy Year 1972 as shown below.

The rate level changes are indexed to a common base as shown in column (2) below. By computing proportionate areas to each rate level appearing in Policy Year 1972, the weights in column (3) are determined. These weights are then applied to the rate level indices in column (2) to determine the average policy year rate level index of .972 in column (4). The factor to bring the policy year data to current rate level is the ratio of the current index (1.044) in column (2) divided by the average policy year rate level (.972) to produce a factor of 1.074 in column (5). Following the removal of expense constant premium, the factor is reduced to 1.053 in column (7).

Exhibit I-B (Cont.)

Date	(1) Premium Level Changes: Manual Change	(2) Premium Level Changes: Cumulative Index	(3) Weight (See diagram)	(4) Product (2) × (3)	(5) Adj. Factor: Pres. Index ÷ Sum. Col. (4)	(6) Adj. For Exp. Const. Removal	(7) Prem. Adj. Factor (5) × (6)
2-1-71	Base	1.000	.114	.114	1.074	.980	1.053
4-1-72	.915	.915	.056	.051			
8-1-72(AO)	1.042	1.042	.136	.142			
8-1-72(NR)	1.042	.953	.651	.620			
9-15-73(AO)	1.103	1.051	.043	.045			
9-15-73(NR)	1.070	1.020	—	—			
10-1-74	1.024*	1.044	—	—			
				.972			



* Applicable to "all outstanding" as well as new and renewal.
AO = All Outstanding.
NR = New and Renewal Business Only.

Factor Adjusting 1972 Pol. Year Losses to Level of Present Law

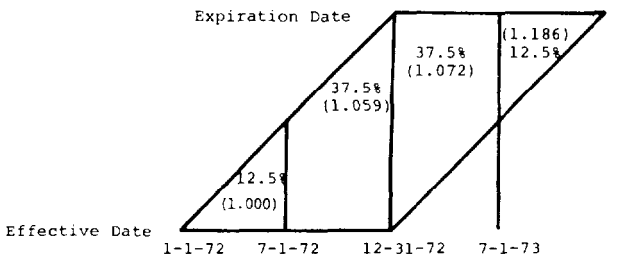
Benefit changes resulting from legislative enactments, medical fees, and hospital changes are represented geometrically by a vertical line since they are applicable to all new claims regardless of policy effective dates.

Set forth below are the benefit changes which have occurred during or subsequent to the policy period and indexed to the level of benefits applicable on 1-1-72. Using proportionate areas 12.5% of losses are at the 1-1-72 level; 37.5% are at the 7-1-72 level; 37.5% are at the 1-1-73 level; and 12.5% are at the 7-1-73 level. The weighted average law level for the policy year (using index numbers shown in column (9) is 1.072 in column (11)). The current index of 1.215 divided by 1.072 is the factor to ad-

Exhibit I-B (Cont.)

just the policy year losses to current law level, namely 1.133 as shown in column (12).

Date	(8) Benefit Change	(9) Cumulative Index	(10) Weight (See Diagram)	(11) Product (9) × (10)	(12) Adj. Factor Pres. Index ÷ Sum. Col. (11)
1-1-72	Base	1.000	.125	.125	1.133
7-1-72	1.059	1.059	.375	.397	
1-1-73	1.012	1.072	.375	.402	
7-1-73	1.106	1.186	.125	.148	
1-1-74	1.014	1.203	—	—	
7-1-74	1.010	1.215	—	—	
				1.072	



The procedures to adjust policy year 1971 premiums and losses to current levels are performed in a similar manner as shown below.

Factor Adjusting 1971 Pol. Year Premium to Level of Present Rates

Date	(1) Premium Level Changes Manual Change	(2) Cumulative Index	(3) Weight (See diagram)	(4) Product (2) × (3)	(5) Adj. Factor Pres. Index ÷ Sum. Col. (4)	(6) Adj. For Exp. Const. Removal	(7) Prem. Adj. Factor (5) × (6)
8-15-70	Base	1.000	.003	.003	1.043	.980	1.022
2-1-71	1.041*	1.041	.910	.947			
4-1-72	.915*	.953	—	—			
8-1-72 (AO)	1.042	1.085	.087	.094			
8-1-72 (NR)	1.042	.993	—	—			
9-15-73 (AO)	1.103	1.095	—	—			
9-15-73 (NR)	1.070	1.063	—	—			
10-1-74	1.024*	1.089	—	—			
				1.044			

* Applicable to "all outstanding" as well as new and renewal.
AO = All Outstanding. NR = New and Renewal Business Only.

Exhibit I-B (Cont.)

Factor Adjusting 1971 Pol. Year Losses to Level of Present Law

Date	(8) Benefit Change	(9) Cumulative Index	(10) Weight (See Diagram)	(11) Product (9) × (10)	(12) Adj. Factor Pres. Index ÷ Sum. Col. (11)
1-1-71	Base	1.000	.125	.125	1.209
7-1-71	1.001	1.001	.375	.375	
1-1-72	1.006	1.007	.375	.378	
7-1-72	1.059	1.066	.125	.133	
1-1-73	1.012	1.079	—	—	
7-1-73	1.106	1.193	—	—	
1-1-74	1.014	1.210	—	—	
7-1-74	1.010	1.222	—	—	
				1.011	

DIAGRAM FOR PREMIUM ADJUSTMENT

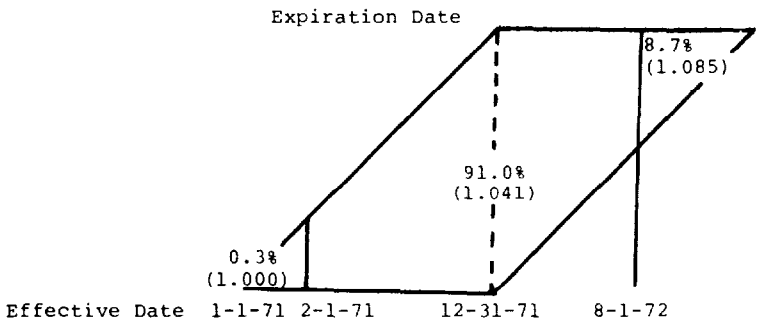


DIAGRAM FOR LOSS ADJUSTMENT

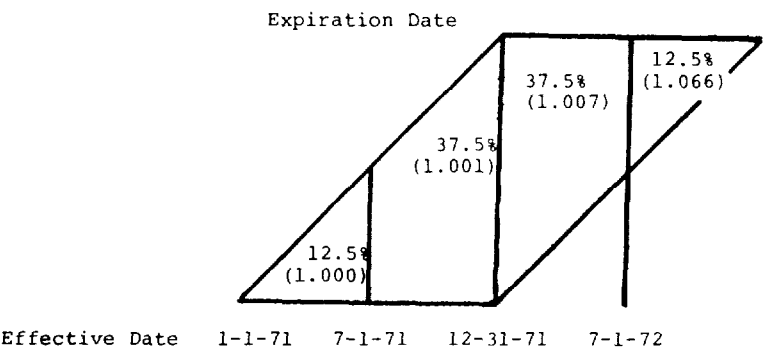


Exhibit I-B (Cont.)

Factor Adjusting Calendar Year Premium to Level of Present Rates

The same procedure is used to adjust calendar year premiums and losses to current levels as was used to adjust policy year premiums and losses to current levels.

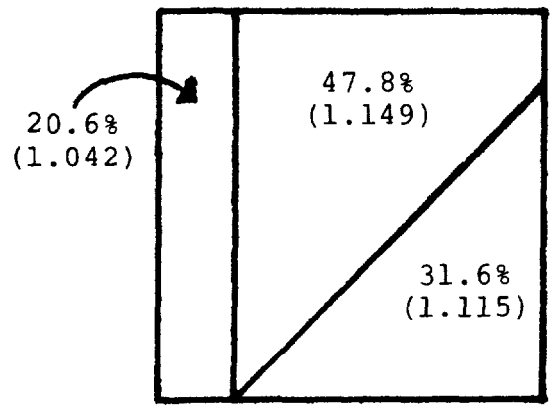
	(1) Premium Level Changes	(2)	(3)	(4)	(5) Adj. Factor	(6)	(7)
Date	Manual Change	Cumulative Index	Weight (See diagram)	Product (2) × (3)	Pres. Index ÷ Sum. Col. (4)	Adj. For Exp. Const. Removal	Prem. Adj. Factor (5) × (6)
4-1-72	Base	1.000	—	—	1.023	.980	1.003
8-1-72	1.042*	1.042	.206	.215			
9-15-73 (AO)	1.103	1.149	.478	.549			
9-15-73 (MR)	1.070	1.115	.316	.352			
10-1-74	1.024*	1.142	—	—			
				1.116			

Factor Adjusting Calendar Year Losses to Law Level Underlying Present Manual Rates

	(1) Benefit Changes	(2)	(3)	(4)	(5) Adj. Factor
Date	Change	Cumulative Index	Weight (See Diagram)	Product (2) × (3)	Pres. Index ÷ Sum. Col. (4)
7-1-73	Base	1.000	.500	.500	1.017
1-1-74	1.014	1.014	.500	.507	
7-1-74	1.010	1.024	—	—	
				1.007	

Exhibit I-B (Cont.)

DIAGRAM FOR PREMIUM ADJUSTMENT

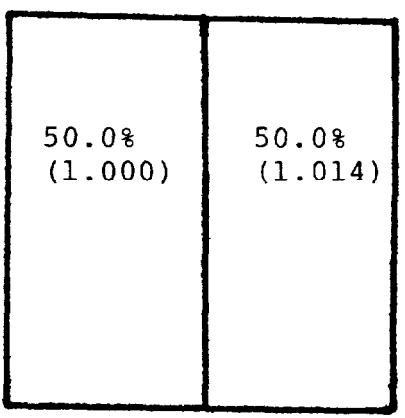


Effective Date 7-1-73 9-15-73 6-30-74

BASIC DATA

1.	Standard Earned Premium	106,851,486
2.	Incurred Losses Ex. Loss Adj.	71,055,158
3.	Incurred losses, (2) × 1.130	80,292,329

DIAGRAM FOR LOSS ADJUSTMENT



Effective Date 7-1-73 1-1-74 6-30-74

* Applicable to "all outstanding" as well as new and renewal.

EXHIBIT I-C

CALCULATION OF DEVELOPMENT FACTORS (1st to 5th)

The calculation of development factors from second report to ultimate and from first report to ultimate follows. In computing development from a first report to a second report the aggregate figures of all carriers that submitted reports from first report to second report are used; in computing development from a second report to third report the aggregate figures of all carriers that submitted reports from a second to a third report are used etc. In other words, in computing development from one report to the next the aggregates must represent the same carriers.

Premium development is not carried beyond a fifth report since no significant development is expected beyond that point.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		NET EARNED PREMIUM AND TOTAL INCURRED LOSSES FOR MATCHING COS.								
		1st Report	2nd Report	3rd Report	4th Report	5th Report	1st/2nd	2nd/3rd	3rd/4th	4th/5th
1967	Prem.	xxx	xxx	xxx	43,085,575	43,101,142	xxx	xxx	xxx	1.000
	Losses	xxx	xxx	xxx	25,468,539	25,517,526	xxx	xxx	xxx	1.002
1968	Prem.	xxx	xxx	xxx	44,457,862	44,344,785	xxx	xxx	xxx	.997
	Losses	xxx	xxx	xxx	27,048,083	27,731,066	xxx	xxx	xxx	1.025
1968	Prem.	xxx	xxx	44,030,869	44,158,317	xxx	xxx	xxx	1.003	xxx
	Losses	xxx	xxx	26,593,494	26,947,988	xxx	xxx	xxx	1.013	xxx
1969	Prem.	xxx	xxx	53,075,479	53,283,244	xxx	xxx	xxx	1.004	xxx
	Losses	xxx	xxx	30,938,657	31,701,046	xxx	xxx	xxx	1.025	xxx
1969	Prem.	xxx	52,982,736	52,695,898	xxx	xxx	xxx	.995	xxx	xxx
	Losses	xxx	29,938,634	30,755,330	xxx	xxx	xxx	1.027	xxx	xxx
1970	Prem.	xxx	58,706,720	59,675,421	xxx	xxx	xxx	1.017	xxx	xxx
	Losses	xxx	35,681,348	36,602,354	xxx	xxx	xxx	1.026	xxx	xxx
1970	Prem.	57,769,741	58,141,229	xxx	xxx	xxx	1.006	xxx	xxx	xxx
	Losses	34,186,877	35,061,430	xxx	xxx	xxx	1.026	xxx	xxx	xxx
1971	Prem.	67,140,830	65,837,749	xxx	xxx	xxx	.981	xxx	xxx	xxx
	Losses	37,588,806	38,630,481	xxx	xxx	xxx	1.028	xxx	xxx	xxx
	Unweighted Average									
	Prem.						.994	1.006	1.004	.999
	Losses						1.027	1.027	1.019	1.014
	Dev. Factors: 2nd to 5th Report (7)x(8)x(9)									
1971	Prem.	1.009								
	Losses	1.062								
	Dev. Factors: 1st to 5th Report (6)x(7)x(8)x(9)									
	Prem.	1.003								
	Losses	1.091								

Exhibit I-C (Cont.)

CALCULATION OF DEVELOPMENT FACTORS (5th to ultimate)

Policies Becoming Effective During Period	(1) TOTAL INCURRED LOSSES FOR CORRESPONDING COMPANIES AS PER 5th Report	(2) 6th Report	(3) 7th Report	(4) 8th Report	(5) DEVELOPMENT FACTORS 5th to 6th (2) ÷ (1)	(6) 6th to 7th (3) ÷ (2)	(7) 7th to 8th (4) ÷ (3)	(8) 5th to 7th (5) × (6)	(9) 5th to 8th (8) × (7)
1964	xxx	xxx	19,800,947	19,782,024	xxx	xxx	.999	xxx	xxx
1965	xxx	xxx	21,430,394	21,671,573	xxx	xxx	1.011	xxx	xxx
1965	xxx	21,239,964	21,350,885	xxx	xxx	1.005	xxx	xxx	xxx
1966	xxx	24,029,594	24,166,650	xxx	xxx	1.006	xxx	xxx	xxx
1966	23,562,465	23,783,049	xxx	xxx	1.009	xxx	xxx	xxx	xxx
1967	25,611,420	25,608,236	xxx	xxx	1.000	xxx	xxx	xxx	xxx
			Unweighted Average:		1.005	1.006	1.005	1.011	1.016

(10) Change in losses from 12-31-71 to 12-31-72 for All Policy Years Prior to 1964 68,575
(11) Total incurred losses for corresponding companies for Policy Year 1963 valued as of 12-31-71 18,504,166
(12) Development Factors from 8th Report to Ultimate Development for All Policy Years Prior to 1964 [(10)+(11)]÷(11) 1.004
(13) Change in losses from 12-31-72 to 12-31-73 for All Policy Years Prior to 1965 251,029
(14) Total incurred losses for corresponding companies for Policy Year 1964 valued as of 12-31-72 19,822,402
(15) Development Factors from 8th Report to Ultimate Development for All Policy Years Prior to 1965 [(13)+(14)] : (14) 1.013
(16) Unweighted Average of 8th to Ultimate Development Factors [(12)+(15)]+2 1.009
(17) Development Factors from 5th Report to Ultimate Development (9)×(16) 1.025

	2nd to 5th	1st to 5th	5th to Ultimate	2nd to Ultimate	1st to Ultimate
2nd	1.062	xxx	1.025	1.089	xxx
1st	xxx	1.091	1.025	xxx	1.118

Note: The development of losses beyond an eighth report are lumped together and related to the policy period on an eighth reporting basis to obtain development from eighth to ultimate. The two latest developments from eighth to ultimate determines the development factor from eighth to ultimate.

EXHIBIT I-D

Allowances for Expenses, Taxes, Profit and Contingencies

Underlying the proposed rates are allowances of 25.9% of standard premium for company expenses, 2.5% of standard premium for profit and contingencies, 2.7% of standard premium for taxes, coupled with 13.0% of expected losses for loss adjustment expenses, plus an expense constant on premiums under $500.

The items comprising the expense allowance are as follows:

	Item	
(1)	Acquisition and Field Supervision	17.5%
(2)	General Expenses	8.4
(3)	Total for Company Expenses (1) + (2)	25.9%
(4)	Taxes, Licenses and Fees other than Federal Income Tax	2.7
(5)	Profit and Contingencies	2.5
(6)	Total for Company Expenses, Taxes and Profit and Contingencies (3) + (4) + (5)	31.1%
(7)	Permissible Loss and Loss Adjustment Ratio	68.9
	Loss Adjustment Expense:	
(8)	Related to Premium	7.9
(9)	Related to Losses	13.0
(10)	Total Expense Allowance Related to Premium (6) + (8)	39.0%
(11)	Expense Constant	
	Risks Under $200 Premium	$15.00
	Risks Between $200 and $500 Premium	$10.00

As a matter of information, the following paragraphs develop the allowance of the net rate; i.e., the manual rate after premium discounts have been applied.

It should be borne in mind that the allowances shown above apply only to the first $1,000 of premium. For risks with premium over $1,000 which in this state represent about 27.6% of the total number of risks and about 90.4% of the total premium, manual rules provide for a reduction of rates through application of premium discounts (or their equivalents included in the Retrospective Rating Plan Values). Premium discounts result from the reduction of expense requirements for Acquisition and General

Exhibit I-D (Cont.)

Administration with increasing premium size. The premium discounts are as follows:

Division of Standard Premium	Stock Co. Discount*	Non-Stock Co. Discount
First $ 1,000	—	—
Next 4,000	9.4%	3.0%
Next 95,000	14.7	6.0
Over 100,000	16.3	8.5

*To be used by all carriers for policies issued under an assigned risk plan.

A tabulation of the state experience by risk size for the latest available policy period shows that for stock carriers the proposed discounts would produce a net discount of 10.3%. This figure undoubtedly is on the conservative side because in actual practice the discounts, which increase by risk size, are based on the total risk premium, including premium developed by operations in all states.

The tables below indicate for the stock carriers, the proposed expense, taxes, and profit and contingencies allowances on two bases. Column (1) lists the net allowances after reduction for the proposed premium discounts, such allowances being expressed as a percentage of standard premium. Column (2) expresses these allowances as a percentage of the net premium resulting from premium discounts.

Item	(1) Net Allowance (% of Standard Premium)	(2) Net Allowance (% of Net Prem.) (Col. (1) ÷ .897)
Acquisition and Field Supervision	10.8%	12.0%
General Expenses	5.4	6.0
Total for Company Expenses	16.2%	18.0%
Taxes, Licenses, and Fees other than Federal Income Taxes	2.4	2.7
Profit and Contingencies	2.2	2.5
Loss Adjustment Expense—Related Premium	7.9	8.8
Losses	61.0	68.0
Total	89.7%	100.0%
Premium Discounts	10.3	xxx
Total	100.0%	100.0%

EXHIBIT 1-E

CALCULATION OF INDUSTRY GROUP DIFFERENTIALS

Industry group totals compiled under the Unit Statistical Plan are used to establish industry group relativities. These relativities are adjusted to unity on an overall basis and then applied to the proposed overall rate level.

Policies Becoming Effective During Period	(1) Premiums At 10-1-74 Manual Rates**	(2) Losses and Loss Adjustment Expense On 7-1-74 Law Level***
Manufacturing Group—Schedules 5-25 Inclusive††		
7-1-70 to 4-30-71	19,289,641	10,797,825
5-1-71 to 4-30-72*	20,707,220	11,937,564
1968†	61,959	14,932
1969†	35,250	7,773
TOTAL	40,094,070	22,758,094
Contracting Group—Schedules 26 and 27††		
7-1-70 to 4-30-71	21,732,247	12,574,145
5-1-71 to 4-30-72*	26,303,258	15,976,434
1968†	62,556	120,741
1969†	54,379	6,164
TOTAL	48,152,440	28,677,484
All Other Group—Other Schedules Except Schedule 29††		
7-1-70 to 4-30-71	30,663,550	19,536,945
5-1-71 to 4-30-72*	39,166,320	23,833,808
1968†	601,007	477,552
1969†	455,039	359,499
TOTAL	70,885,916	44,207,804
All Industry Groups		
7-1-70 to 4-30-71	71,685,438	42,908,915
5-1-71 to 4-30-72*	86,176,798	51,747,806
1968†	725,522	613,225
1969†	544,668	373,436
TOTAL	159,132,426	95,643,382

* Last policy expired April 30, 1973.

† Three Year Fixed Rate Policies, last policy expired December 31, 1972.

†† Schedules are those set forth in Classifications Code Book issued by National Council.

** Derived by extending policy year payrolls by current rates exclusive of off-balance factor (manual to earned) and the loss constant offset.

*** Losses developed to an ultimate reporting level, adjusted to current benefit level, and further adjusted to include loss adjustment expense.

Exhibit I-E (Cont.)

In order to obtain the rate level by industry group the overall rate level change must be distributed by industry group using policy year differentials.

The Expected Losses—column (2)—are calculated by multiplying the premium at current manual rates by the ratio of earned premium to manual premium to recognize the Experience Rating Plan and by the permissible loss and loss adjustment ratio. The indicated losses are the losses and loss adjustment expense on the current law level brought up to the proposed rate level.

(1)	(2)	(3)	(4)	(5)
Industry	Expected Losses	Indicated Losses	Ratio (3) ÷ (2)	Group Differentials (4) ÷ 1.112
Manufacturing	26,464,572	26,854,551	1.015	.913
Contracting	29,726,620	33,839,431	1.138	1.023
All Other	45,275,047	52,165,209	1.152	1.036
Overall	101,466,239	112,859,191	1.112	1.000

EXHIBIT II

Calculation of Rates for Reviewed Classifications

Indicated Pure Premium

Losses for each classification must be adjusted to current levels in the same manner as the policy year aggregates which were used to determine rate level. The factors are different, however, because the time period is different. Unit statistical report compilations are submitted monthly and, therefore, it is not necessary that the latest twelve month policy period commence on January 1.

The step by step development of the proposed pure premium for Classification Code 2003—"Bakeries" is as follows:

The indicated pure premium for Code 2003 is determined by first taking the losses as reported under the unit statistical plan and modifying them as indicated above (see Exhibit II-A). The losses (including loss adjustment expenses) on current level are related to payrolls in $100 units to determine the indicated pure premium.

	(1) Losses and Loss Adjustment Expense†	(2) Payroll	(3) Payroll In Units of $100 (2) ÷ (100)	(4) Indicated Pure Prem. (1) ÷ (3)
Serious	130,652	xx	xx	.207
Non-Ser.	461,337	xx	xx	.730
Medical	265,010	xx	xx	.419
TOTAL	856,999	63,231,980	632,319.80	1.36

† See Exhibit II-A.

Exhibit II (Cont.)

Pure Premium Underlying Present Rates

	Ser.	Non-Ser.	Med.	Total
1. Proposed Pure Premiums (Previous Revision)	.300	.524	.311	1.14
2. Product of RLAF and Test Correction Factor (Previous Revision)	1.067	1.067	1.067	xx
3. Adjusted Pure Premiums (Previous Revision) (1) × (2)	.320	.559	.332	1.21
4. Effect of Legislation 7-1-74	1.036	1.033	1.000	xx
5. Adjusted Pure Premium Including Law Change (Previous Revision) (3) × (4)	.332	.577	.332	1.24
6. Ratio of Manual To Earned (Mfg. Grp.) (Prev. Rev.)	1.062	1.062	1.062	xx
7. Ratio of Manual To Earned (Mfg Grp.) (Current Rev.)	1.044	1.044	1.044	xx
8. Factor to Adjust Underlying Pure Premium from Previous Revision (6) ÷ (7)	1.017	1.017	1.017	xx
9. Pure Premiums Underlying Present Rates (Current Revision) (5) × (8)	.338	.587	.338	1.26

Note: If there was a law amendment which was included in this year's pure premium exhibits which is not included in the present rates, the effect of the law amendment is applied by parts to the pure premiums shown in line (9).

Present on Rate Level Pure Premium

These are the pure premiums underlying present rates brought to the proposed premium level by the application to the partial pure premiums of factors representing the effect of the changes in policy year premium level. The overall effect of the benefit level change is removed from the policy year premium change before application to the underlying pure premium. The derivation of the policy year change in premium level for the Manufacturing Group, exclusive of benefit change, and of the present on rate level pure premium for Code 2003 follows:

1. Proposed Change in Prem. Level—Mfg. Group	1.027
2. Rate Level Adjustment Factor	.997
3. Policy Year Change in Premium Level (1) ÷ (2)	1.030
4. Effect of 1-1-75 Benefit Change	1.014
5. Policy Year Change Excl. 1-1-75 law—Mfg. Group (3) ÷ (4)	1.016

	Ser.	Non-Ser.	Med.	Total
6. Underlying Pure Premiums	.338	.587	338	1.26
7. Present on Rate Level Pure Prems. (5) × (6)	.343	.596	.343	1.28

Determination of Credibility

The expected loss credibility criteria for assigning 100% credibility to an indicated partial pure premium are determined as follows:

		Serious	Non-Ser.	Medical	Total
1.	No. of Cases—All Classes	1,375	30,388	xx	xx
2.	Modified Losses—All Classes	29,730,836	37,763,181	28,139,265	95,643,382
3.	Average Cost per Case (2) ÷ (1)	21,630	1,243	xx	xx
4.	Basis for 100% Credibility—No. of Cases	25	300	*	xx
5.	100% Cred. Criteria on Actual Losses (3) × (4)	540,750	372,900	298,320*	xx
6.	Expected Losses Based on Underlying Pure Premium—All Classes**	34,069,966	38,599,777	28,857,479	101,527,222
7.	Factor to Adjust from Actual to Underlying (6) ÷ (2)	xx	xx	xx	1.062
8.	Expected Losses Required for 100% Credibility (5) × (7)	574,277	396,020	316,816	xx

* 100% Credibility Criterion for Medical equals 80% of Non-Serious Criterion.

** Expected losses in line (6) are the sum of the product of the total payroll in $100 units times the underlying pure premiums for all classes. The expected losses for Code 2003 are as follows:

		Serious	Non-Ser.	Medical	Total
1.	Payroll in Units of $100 (Code 2003)	xx	xx	xx	632,319.80
2.	Underlying Pure Premiums (Prev. Rev.)	.332	.577	.332	xx
3.	Expected Losses (1) × (2)	209,930	364,849	209,930	xx

The formula to determine partial credibility, which is implemented in 10 percentage point intervals is:

(100% criteria) × (% credibility) = Required expected losses

The credibility table for "State X" is shown in Exhibit II-D.

Exhibit II (Cont.)

The serious, non-serious, and medical expected losses of $209,930, $364,849, and $209,930 derived above, when compared to the credibility table (Exh. II-D), results in serious, non-serious, and medical credibility assignments of 50%, 90%, and 70%, respectively.

Formula Pure Premium

These pure premiums are determined by adding the product of the indicated pure premium times its credibility and the product of the present on rate level pure premium times the unassigned credibility. Shown below is this calculation for Code 2003:

	Serious	Non-Serious	Medical	Total
1. Indicated Pure Premium	.207	.730	.419	1.36
2. Credibility	50%	90%	70%	xx
3. Present on Rate Level Pure Premium	.343	.596	.343	1.28
4. Unassigned Credibility [100% − (2)]	50%	10%	30%	xx
5. Formula Pure Premium [(1) × (2)] + [(3)× (4)]	.275	.717	.396	1.39

Proposed Pure Premium

The proposed pure premiums are derived based on selection of the middle of the total pure premiums for indicated, underlying, and formula. The total pure premiums for Code 2003 are:

Indicated	1.36
Formula	1.39
Underlying	1.26

Since for 2003 the indicated total pure premium is the middle of the three, the indicated pure premium is selected as the proposed pure premium (serious, non-serious, and medical). If either the indicated or the underlying total pure premium is selected as the middle pure premium, the partial pure premiums for the selected are adjusted so as to be in the same relativity

Exhibit II (Cont.)

as the formula partial pure premiums, while still summing to the selected total pure premium. Redistributing the partial indicated pure premiums produces the partial proposed pure premiums as follows:

	Serious	Non-Serious	Medical	Total
Proposed Pure Premium	.269	.702	.387	1.36

Computation of Manual Rate

The purpose of selecting the middle of the three pure premiums to be the proposed pure premium is to prevent the rates for classes which are not fully credible from moving significantly away from the industry group indications and to add an additional force for maintaininng the stability of rates from year to year.

The following items are combined with the proposed pure premium to obtain the final manual rate for a reviewed classification:

(1) Rate Level Adjustment Factor

See Exhibit I for Derivation of this Factor

(2) Effect of Legisation

The partial pure premiums are multiplied by the three part effect of the January 1, 1975 legislation change in benefit level, namely:

Serious	1.017
Non-Ser.	1.023
Medical	1.000

(3) Ratios of Manual Premiums to Earned Premiums

The ratios of manual premiums to earned premiums by industry group have also been excluded from the classification experience, and it is necessary to apply these factors to the proposed pure premiums. These factors

Exhibit II (Cont.)

Computation of Manual Rate

are determined by dividing the manual premium by the earned premium for the two policy periods combined. These premiums are the actual reported earned and manual premiums at policy year level. The factors for "State X" were as follows:

Industry Group	Rates of Manual Premium to Earned Premium
Manufacturing	1.044
Contracting	1.116
All Other	1.079

(4) Loss Constant Offsetting Reductions

The present manual rates include an offsetting reduction for the loss constants so that the premium from such loss constants will not produce premium in excess of requirements. This proposal contemplates the continuance of existing loss constants. Calculations based upon a distribution of size of risk of the state experience for the policy year premium level period used in this filing indicate revised offsetting reductions as follows:

Industry Group	Loss Constants	Offsetting Reduction in Manual Rate	
		Present	Proposed*
Manufacturing	$15.00	.999	.999
Contracting	8.00	.999	.999
All Other	5.00	.997	.998

The product of these factors referred to in (3) and (4) above are as follows:

Industry Group	(1) Ratio Of Man. Prem. To Earned Prem.	(2) Loss Const.	(3) Product (1) × (2)
Manufacturing	1.044	.999	1.0430
Contracting	1.116	.999	1.1149
All Other	1.079	.998	1.0768

* For Derivation of these factors see attached Exhibit II-E.

Computation of Manual Rate

(5) Expense Allowance

The expense allowance is introduced into the rate by dividing the product of the proposed pure premium and the appropriate factors above by the permissible loss and loss adjustment expense ratio.

(6) Disease Elements

The proposed manual rates include specific disease elements for those classifications where they apply. There is no specific disease element for Code 2003.

(7) Rates—Test Correction Factor

The payrolls are now extended by the rates presently in effect and by the indicated proposed rates to determine if the required change in manual premium level has been achieved. Since at first this calculation may not yield the required results, an iterative process is initiated which continuously tests the proposed rates including tentative test correction factors until the required change in manual premium level is obtained. The iterative process also adjusts for the effect of limited classes indicated in the next paragraph.

In the computer program the factors are then rearranged in the order indicated in the illustration that follows. In this way, next year's underlying pure premium can be identified and stored.

The factors referred to in (1) and (5) above as as follows:

Industry Group	(1) Test Correction Factor	(2) Rate Level Adjust. Factor	(3) Product (1) × (2)
Manufacturing	.993	.997	.990
Contracting	.989	.997	.986
All Other	1.027	.997	1.024

A test is made to make certain that the proposed rates fall within the following departures from the present rates:

Manufacturing	from 27% above to 23% below
Contracting	from 33% above to 17% below
All other	from 34% above to 16% below

Exhibit II (Cont.)

Computation of Manual Rate

These limits have been calculated in accordance with the following formula:

Max. Deviation = Effect of Law Amendment plus ½ (% Change (+ or −) in Premium Level Excluding Law Amendment) plus or minus 25% rounded to the nearest 1%.

For example, the upper limit for the All Other group is:

$+ 1.4\% + ½\ (15.0\%) + 25\% =$

$1.4\% + 7.5\% + 25\% = 33.9\% = 34\%$ (rounded)

The changes in manual premium level used are those derived in Exhibit I, Section G.

Exhibit II (Cont.)

CALCULATION OF PROPOSED RATE CODE 2003—MANUFACTURING GROUP

A. REVIEWED CLASSIFICATIONS

	Serious	Non-Ser.	Medical	Total
1. Proposed pure premiums (Exhibit II-A)	.269	.702	.387	1.36
2. Product of RLAF and test correction factor	.990	.990	.990	xx
3. Adjusted pure premiums, unrounded (1) × (2)	.26631	.69498	.38313	xx
4. Effect of benefit change eff. 1-1-75	1.017	1.023	1.000	xx
5. Proposed pure premiums (3) × (4)	.271	.711	.383	1.37
6. Ratio of manual to earned premium and loss constant offsets				1.0430
7. Permissible loss and loss adjustment ratio				.689
8. Proposed manual rate [(5) × (6) ÷ (7)]				2.07

Calculation of Rates for Non-Reviewed Classifications

The proposed rates for the non-reviewed classifications are obtained as follows:

(1) The current rates are adjusted by removing the specific disease element, if any. The rate exclusive of disease is then modified by the changes in manual premium level excluding the effect of the January 1, 1975 legislation. These changes are calculated as follows:

Industry Group	(1) Final Change In Manual Premium Level Incl. Law Amendment	(2) Effect of Legislation	(3) Change in Man. Premium Level Excl. Effect Of 1975 Legislation Col. (1) ÷ Col. (2)
Mfg.	1.027	1.014	1.013
Cont.	1.152	1.014	1.136
A.O.	1.166	1.014	1.150

(2) The rates resulting from above are increased by applying the effect of the January 1, 1975 legislation to three parts (Serious 1.017, Non-Serious 1.023, Medical 1.000) to the corresponding pure premiums underlying those rates.

(3) The addition of the proposed specific disease element, if any, produces the final manual rate.

EXHIBIT II-A

Code 2003—"Bakeries"

Policy Period 7-1-70 to 4-30-71

Type of Injury	(1) Incurred Losses	(2) Amendment Factor[1]	(3) Development Factor[2]	(4) Loss Adj. Expense	(5) (2) × (3) × (4) Composite	(6) (1) × (5) Modified Loss Adjustment Expense
Death	—	3.075	1.123	1.130	3.902	—
Permanent Total	-	2.392	1.123	1.130	2.782	—
Major Perm. Partial	63,929	1.066	1.123	1.130	1.353	86,496
Serious	63,929					86,496
Minor Perm. Partial	57,893	1.157	1.123	1.130	1.468	84,987
Temporary Total	66,669	1.426	1.123	1.130	1.810	120,671
Non-Serious	124,562					205,658
Medical	101,393	1.000	1.119	1.130	1.264	128,161
Policy Period 5-1-71 to 4-30-72						
Death	—	3.033	1.211	1.130	4.149	-
Permanent Total	-	2.179	1.211	1.130	2.981	—
Major Perm. Partial	30,600	1.055	1.211	1.130	1.443	44,156
Serious	30,600					44,156
Minor Perm. Partial	87,161	1.118	1.211	1.130	1.529	133,269
Temporary Total	69,158	1.294	1.211	1.130	1.770	122,410
Non-Serious	156,319					255,679
Medical	106,865	1.000	1.131	1.130	1.278	136,573
Three Year Fixed Rate Policies						
Policy Period 1968						
Death		3.103	1.145	1.130	4.015	—
Permanent Total	-	2.429	1.145	1.130	3.143	—
Major Perm. Partial	-	1.280	1.145	1.130	1.656	-
Serious	-					
Minor Perm. Partial	—	1.417	1.145	1.130	1.834	-
Temporary Total	-	1.451	1.145	1.130	1.878	—
Non-Serious	—					
Medical	187	1.167	1.120	1.130	1.477	276
Policy Period 1969						
Death	—	3.077	1.145	1.130	3.982	-
Permanent Total	-	2.217	1.145	1.130	2.869	—
Major Perm. Partial	—	1.160	1.145	1.130	1.501	
Serious	—					
Minor Perm. Partial	-	1.267	1.145	1.130	1.639	-
Temporary Total	—	1.419	1.145	1.130	1.836	-
Non-Serious	—					
Medical		1.083	1.120	1.130	1.371	-

[1] See Exhibit II-B
[2] See Exhibit II-C

EXHIBIT II-B

Calculation of Amendment Factors

A separate amendment factor is calculated for each type of injury for each policy period. Each factor is calculated in the same manner as amendment factors used in the rate level; i.e., by use of index numbers the latest benefit level is related to the average benefit level during the policy period to determine the amendment factor.

As an illustration, the calculation of the amendment factor to bring death cases incurred under policy period 1970 – 71 to current level is as follows:

Effective Date of Benefit Changes	Effect of Amendment	Cumulative Index	Weight	Product	Adj. Factor Pres. Index ÷ Sum. Col. (1)
7-1-70	Base	1.000	.583	.583	3.075
7-1-71	1.018	1.018	.350	.356	
1-1-72	1.005	1.023	.067	.069	
1-1-73	1.003	1.026		1.008	
7-1-73	2.881	2.956			
1-1-74	1.029	3.042			
7-1-74	1.019	3.100			

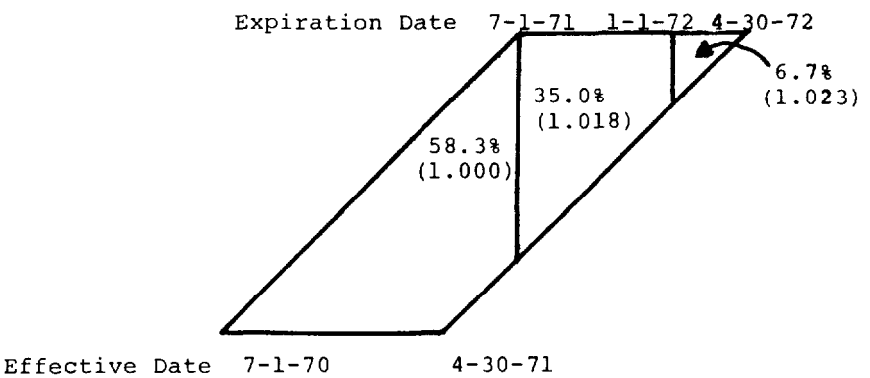


EXHIBIT II-C

Calculation of Development Factors—Unit Plan Data

Policies Becoming Effective During Period	Item	(1)	(2)	(3)	(4)	(5)
		AMOUNT AS PER				
		1st Report	2nd Report	3rd Report	4th Report	5th Report
7-1-66 – 6-30-67	Prem.	xxx	xxx	xxx	49,010,952	49,010,952
	Indem.	xxx	xxx	xxx	17,146,758	16,933,673
	Med.	xxx	xxx	xxx	8,177,953	8,162,219
7-1-67 – 6-30-68	Prem.	xxx	xxx	49,735,163	49,742,733	49,742,733
	Indem.	xxx	xxx	17,028,459	17,140,724	17,059,899
	Med.	xxx	xxx	8,166,397	8,138,786	8,188,438
7-1-68 – 6-30-69	Prem.	xxx	55,356,751	55,356,751	55,356,751	xxx
	Indem.	xxx	18,211,826	18,208,402	18,104,070	xxx
	Med.	xxx	9,113,940	9,112,897	9,147,308	xxx
7-1-69 – 6-30-70	Prem.	65,650,651	65,658,595	65,658,595	xxx	xxx
	Indem.	21,305,115	22,776,486	23,764,284	xxx	xxx
	Med.	11,058,639	11,168,837	11,330,799	xxx	xxx
7-1-70 – 4-30-71	Prem.	67,976,290	67,998,360	xxx	xxx	xxx
	Indem.	19,648,378	21,341,197	xxx	xxx	xxx
	Med.	10,579,794	10,675,280	xxx	xxx	xxx

	Prem.		(a)
	Indem.		(b)
	Med.		(c)
	Indem.	(b) ÷ (a)	
	Med.	(c) ÷ (a)	
7-1-69 – 6-30-70 3rd	Indem.	(b) ÷ (a)	
	Med.	(c) ÷ (a)	
7-1-70 – 4-30-71 2nd	Indem.	(b) ÷ (a)	
	Med.	(c) ÷ (a)	
5-1-71 – 4-30-71 1st	Indem.	(b) ÷ (a)	
	Med.	(c) ÷ (a)	

EXHIBIT II-C

Calculation of Development Factors—Unit Plan Data

(6)	(7)	(8)	(9)	(10)	(11)	(12)
			DEVELOPMENT FACTORS			
1st to 2nd (2)÷(1)	2nd to 3rd (3)÷(2)	3rd to 4th (4)÷(3)	4th to 5th (5)÷(4)	3rd to 5th (8)×(9)	2nd to 5th (7)× [(8)×(9)]	1st to 5th (6)× [(7)×(8)×(9)]
xxx	xxx	xxx	1.000	xx	xx	xx
xxx	xxx	xxx	.988	xx	xx	xx
xxx	xxx	xxx	.998	xx	xx	xx
xxx	xxx	1.000	1.000	xx	xx	xx
xxx	xxx	1.007	.995	xx	xx	xx
xxx	xxx	.997	1.006	xx	xx	xx
xxx	1.000	1.000	xx	xx	xx	xx
xxx	1.000	.994	xx	xx	xx	xx
xxx	1.000	1.004	xx	xx	xx	xx
1.000	1.000	xx	xx	xx	xx	xx
1.069	1.043	xx	xx	xx	xx	xx
1.010	1.015	xx	xx	xx	xx	xx
1.000	xx	xx	xx	xx	xx	xx
1.086	xx	xx	xx	xx	xx	xx
1.009	xx	xx	xx	xx	xx	xx
Unweighted Factors						
1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.078	1.022	1.001	.992	.993	1.015	1.094
1.010	1.008	1.001	1.002	1.003	1.011	1.021
Combined Factors						
xx	xx	xx	xx	.993	xx	xx
xx	xx	xx	xx	1.003	xx	xx
xx	xx	xx	xx	xx	1.015	xx
xx	xx	xx	xx	xx	1.011	xx
xx	xx	xx	xx	xx	xx	1.094
xx	xx	xx	xx	xx	xx	1.021

1968 & 1969 3 Year Fixed Rate Policies

	Indemnity	Medical
3rd to 5th	.993	1.003
2nd to 5th	1.015	1.011
1st to 5th	1.094	1.021
	3/3.102	3/3.035
	1.034	1.012

EXHIBIT II-C (Contd.)

CALCULATION OF DEVELOPMENT FACTORS (5th to Ultimate)

Policies Becoming Effective During Period	(1) TOTAL INCURRED LOSSES FOR CORRESPONDING COMPANIES AS PER 5th Report	(2) 6th Report	(3) 7th Report	(4) 8th Report	(5) 5th to 6th (2) ÷ (1)	(6) DEVELOPMENT FACTORS 6th to 7th (3) ÷ (2)	(7) 7th to 8th (4) ÷ (3)	(8) 5th to 7th (5) × (6)	(9) 5th to 8th (8) × (7)
1964	xxx	xxx	19,800,947	19,782,024	xxx	xxx	.999	xxx	xxx
1965	xxx	xxx	21,430,394	21,671,573	xxx	xxx	1.011	xxx	xxx
1965	xxx	21,239,964	21,350,885	xxx	xxx	1.005	xxx	xxx	xxx
1966	xxx	24,029,594	24,166,650	xxx	xxx	1.006	xxx	xxx	xxx
1966	23,562,465	23,783,049	xxx	xxx	1.009	xxx	xxx	xxx	xxx
1967	25,611,420	25,608,236	xxx	xxx	1.000	xxx	xxx	xxx	xxx
			Unweighted Average:		1.005	1.006	1.005	1.011	1.016

(10) Change in losses from 12-31-71 to 12-31-72 for All Policy Years Prior to 1964 68,575
(11) Total incurred losses for corresponding companies for Policy Year 1963 valued as of 12-31-71 18,504,166
(12) Development Factors from 9th Report to Ultimate Development For All Policy Years Prior to 1964 [(10)+(11)] ÷ (11) 1.004
(13) Change in losses from 12-31-72 to 12-31-73 for All Policy Years Prior to 1965 251,029
(14) Total incurred losses for corresponding companies for Policy Year 1964 valued as of 12-31-72 19,822,402
(15) Development Factors from 9th Report to Ultimate Development For All Policy Years Prior to 1965 [(13)+(14)]÷(14) 1.013
(16) Unweighted Average of 8th to Ultimate Development Factors [(12)+(15)]÷2 1.009
(17) Development Factors from 5th Report to Ultimate Development (9)×(16) 1.025

	2nd to 5th		1st to 5th		5th to	7/1/70 to 4/30/71 2nd to Ultimate		5/1/71 to 4/30/72 1st to Ultimate	
	Indemnity	Medical	Indemnity	Medical	Ultimate	Indemnity	Medical	Indemnity	Medical
2nd	1.015	1.011	xxx	xxx	1.025	1.040	1.036	xxx	xxx
1st	xxx	xxx	1.094	1.021	1.025	xxx	xxx	1.121	1.047

1968 & 1969 3 Year Fixed Rate Policies (Indemnity 1.034 × 1.025 = 1.060) (Medical 1.021 × 1.025 = 1.037)

The above factors are further developed to the level underlying financial data. A factor of 1.080 computed by relating policy year earned loss ratios based on financial data to unit statistical plan data is applied to the above factors.

EXHIBIT II-D

Credibility Group	$E = \sqrt{W3}$	Credibility Criteria On Assignment Level: Serious (9a)×(12)	Non-Serious (9b)×(12)	Medical (9c)×(12)
100	1.000	574,277	396,020	316,816
90	.854	490,433	338,201	270,561
80	.716	411,182	283,550	226,840
70	.586	336,526	232,068	185,654
60	.465	267,039	184,149	147,319
50	.354	203,294	140,191	112,153
40	.253	145,292	100,193	80,154
30	.164	94,181	64,947	51,958
20	.089	51,111	35,246	28,197
10	.032	18,377	12,673	10,138
0	.000	xx	xx	xx

For example, the determination of the required expected losses for at least 60% credibility is as follows:

	Serious	Non-Serious	Medical
1. 100% Criteria	574,277	396,020	316,816
2. $\sqrt{(.60)^3}$	.465	.465	.465
3. 60% Criteria (1)×(2)	267,039	184,149	147,319

EXHIBIT II-E

DETERMINATION OF LOSS CONSTANT OFFSETS

Industry Group	Mfg.	Cont.	A.O.
1. Prem. at Man. Rates	40,053,976	48,104,288	70,673,258
2. Loss Constant Offsets Underlying Manual Rates	.999	.999	.997
3. Prem.—No Loss Constant Program (1)÷(2)	40,094,070	48,152,440	70,885,916
4. Prop. Change in Manual Rate Level	1.027	1.152	1.166
5. Prem. at Proposed Level (No Loss Constant Program) (3)×(4)	41,176,610	55,471,611	82,652,978
6. Number of Risks Under $500 (All Experience Periods)	1997	6598	29069
7. Amount of Loss Constants	15	8	5
8. Amount of Premium Expected from Application of Loss Constant (6)×(7)	29955	52784	145345
9. Prop. Loss Constant Offsets [(5)−(8)]÷(5)	.999	.999	.998
10. Change in Loss Constant Offsets (9)÷(2)	1.000	1.000	1.001

RATEMAKING PROCEDURE — "F" CLASSIFICATIONS

A description of the features of the ratemaking program which are different from the standard ratemaking program follows:

Under the ratemaking program for "F" classifications, rates are based on unit statistical plan data. Policy year aggregate and calendar year data are not currently available for "F" classes separate from other classes. Carriers now are developing programs in order that this information be available in future years.

A. *Pure Premium Calculation*

1. *Indicated Pure Premiums* are derived by compiling past losses reported under the state act and converting them to the current federal law level and adding to such losses past federal losses converted to the current federal benefit level. As a result of the expansion of the Longshoremen's Act in 1972, it is expected that practically all losses previously incurred under the state acts will now be paid under the U.S. law. The losses are developed to ultimate level by using the state development factors. Loss adjustment expenses are also included. The average indicated pure premiums are determined by giving 60% weight to the experience of the latest policy period and 40% weight to the earlier year. The program for giving more weight to the most recent year will apply during the time when the policy periods used for ratemaking contain some experience prior to the 1972 law change. It is believed that experience under the new expanded law is more indicative of future loss level than prior data.

2. *Underlying Present Rates:* These are the pure premiums underlying the "F" classification rates currently in force. The procedure used to determine these underlying pure premiums is the same as has been used for determining underlying pure premiums in general revisions of workers' compensation rates.

3. *Indicated by National Pure Premium:* The losses used to determine the national pure premiums are the sum of the losses for each state as described above. The payrolls for each state are converted to a total payroll rule basis and then summed to determine national payroll. The national payroll is then converted to the state's

payroll limitation rule prior to dividing into the national losses in order to obtain the national pure premium.

4. *Derived by Formula:* The formula pure premium is derived by weighting among the indicated, underlying, and national pure premiums. The weight given to the indicated pure premium varies from zero to 100 percent, depending upon the volume of the expected losses. If the indicated pure premium receives less than 100% credibility, the national pure premium is assigned its national credibility, limited as follows: the national pure premium may not be assigned a credibility greater than one-half of (100% – state credibility). Thus, if a state indicated pure premium is 40% credible and the pure premium indicated by the national figures has 90% credibility, the national pure premium is assigned a weight of 30%, [(100% – 40%) ÷ 2], and the underlying pure premium is also assigned 30%, (100% – 40% – 30%).

B. *Calculation of Proposed Rates*

The following factors are applied to the formula pure premiums to derive rates.

1. *Ratio of Manual Premiums to Earned Premiums*
   Ratios of manual premiums to earned premiums have been calculated on a national basis separately for three groups of "F" classes. The three groups are "Shipbuilding and Repairs", "Stevedoring", and "Non-Appropriated Fund Instrumentalities".

2. *Law Amendments*
   Law amendments not included in the pure premium exhibits are applied by parts (serious, non-serious, and medical).

3. *Expense Allowance*
   The expense allowance, which is the same as in the general rate revision for the state, is included in the rate by dividing the product of the proposed pure premiums and the appropriate factors from (1) and (2) above by the permissible loss and loss adjustment ratio. This operation produces an indicated rate which then is subject to limitations as described in the next paragraph.

C. *Limitation of Rate Change*

It is recognized that a portion of the ratemaking experience now

available is prior to the November 26, 1972 amendment to the Longshoremen's Act and, therefore, is influenced by cost-related conditions as they apply in varying degrees state by state. Therefore, the manual rate is limited according to the following program.

Establish a range as being 10% below to 10% above the national indicated rate for each classification. The following conditions apply:

1. If the present rate and the indicated rate both fall in the range, the indicated rate is proposed without further adjustment.
2. If the present rate falls inside the range and the indicated manual rate falls outside the range, the proposed rate will be limited to the rate establishing the boundary of the range.
3. If the present rate is outside the range and the indicated rate falls inside the range, the indicated rate is used without further adjustment.
4. If both the present and the indicated rate fall outside the range (on the same side), the present rate is retained if the indicated rate is further away from the range; if the indicated rate is closer to the range, then the proposed rate is the indicated rate without adjustment.
5. If both the present and the indicated rate fall outside the range (on opposite sides), then the range boundary nearest the indicated rate is the propsed rate.

Finally, each proposed rate is limited to a change of not more than 50% (up or down) from the present manual rate in order to prevent any drastic rate change from occurring.

CALCULATION OF AN EX-MEDICAL RATE[2]

$$\text{Ex-Medical Rate} = \text{Statutory medical rate} - 70\% \text{ of Medical Rate}$$

$$= \text{Standard Rate} - \frac{.70 \text{ Medical Pure Premiums}}{\text{Permissible Loss Ratio}}$$

$$\text{The Ex-Medical Ratio} = 1.0 - \frac{\text{Ex-Med. Rate}}{\text{Standard Rate}}$$

$$= 1.0 - \left(\frac{\text{Standard Rate} - \dfrac{.70 \text{ Med. P.P.}}{\text{Perm. L. R.}}}{\text{Standard Rate}} \right)$$

$$= 1.0 - \left(1.0 - \frac{.70 \text{ Med. P. P.}}{\text{Perm. L. R.}} \times \frac{1}{\text{Standard Rate}} \right)$$

But Perm. L. R. $\times$ Standard Rate = Total Pure Premium.

$$\text{Therefore Ex-Medical Ratio} = 1.0 - \left(1.0 - .70 \frac{\text{Med. P. P.}}{\text{Total P. P.}} \right)$$

$$= .70 \frac{\text{Med. P. P.}}{\text{Total P. P.}}$$

[2] Reprinted from Marshall, Ralph, "Workmen's Compensation Insurance Ratemaking," Casualty Actuarial Society, 1961