WORKMEN'S COMPENSATION INSURANCE RATEMAKING

BY

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The examination requirements of the Casualty Actuarial Society require some familiarity with ratemaking practices. Mr. R. A. Johnson, Jr. and Mr. C. M. Graham have presented papers before the Society dealing with the calculation of New York Compensation rates, and Mr. G. B. Elliott has dealt with the Pennsylvania procedure. Both of these calculations are somewhat special cases and it therefore seems desirable to set forth the standard ratemaking procedure as followed by the National Council on Compensation Insurance for states where compensation rates are under its jurisdiction.

This paper is aimed primarily at the student, and the writer has attempted to illustrate the complete procedure, citing the source of the data, and the adjustments which are required together with the reasons for such adjustments. The language has been kept as simple and as non-technical as possible. A glossary of technical terms has been included and additional explanations have been given where it seemed desirable to do so. This paper does not pretend to develop any new theories or explore any new fields. It is merely descriptive in nature and the writer hopes that such description will not be found too elementary.

The workmen's compensation rates for each state are determined entirely on state experience. The standard countrywide ratemaking procedure of the National Council on Compensation Insurance involves the following fundamental steps:

(1) The determination of the percentage increase or decrease in manual premium level, overall, and for the three broad industry groups, Manufacturing, Contracting, and All Other. This is termed the determination of rate level. There are three elements involved in the overall rate levels.
   (a) The change in rate level indicated by the latest available 24 months of policy year data exclusive of the effect produced by the credit off-balance of the Experience Rating Plan.
   (b) The correction for off-balance factor to offset such credit off-balance of the Experience Rating Plan.
   (c) The rate level adjustment factor based on the latest 12 month period of calendar year data, terminating either June 30th or December 31st.

(2) Determination of classification relativity in terms of pure premiums. This depends on the latest 24 months of policy year data.

(3) Application of expense allowance to pure premiums to produce compensation rates.

(4) Addition of catastrophe and disease loadings.

I — DETERMINATE OF RATE LEVEL

The determination of the change in manual rate level is made on the basis of the policy year experience of the two latest policy years for which the experience is available, supplemented by the experience of the latest available 12 months of calendar year experience ending either June 30th or December 31st.

A glossary of the various terms employed in the ratemaking procedure is attached. It is perhaps unnecessary to point out that policy year data are statistical figures whereby all premium and loss developments are assigned back to the policy under which they arose. These figures are obtained from summaries of data reported to the National Council in accordance with the requirements of the Unit Statistical Plan. A "Unit Report" is required on each policy, showing the manual classification or classifications applicable to the risk, the payroll exposure under each classification, the earned premium for each classification, and the amount of losses incurred on each classification. The incurred losses are subdivided six ways by type of injury, "Death," "Permanent Total," "Major Permanent Partial," "Minor Permanent Partial," "Temporary Total," and "Medical." A unit report is required to be made for each policy, 18 months after the effective date of the policy, and subsequent reports are required, if there are any changes, 12 months and 24 months after making the original or "First Report." The data on these reports are combined by the National Council for all policies becoming effective during a 12 month period (not necessarily commencing on January 1). The results are known as "Policy Year Experience." It is evident that since policy year payroll exposure, earned premium, and incurred losses all relate to the same policies, it is perfectly feasible to obtain policy year experience by classification or by any grouping of classifications which may be desired.

On the other hand Calendar Year Experience is an accounting figure derived from all premium and loss transactions entered on the books of the insurance carrier during a particular calendar year, and thus may include experience resulting from policies issued during that calendar year, from policies issued during the preceding 12 month period, and also possibly adjustments in reserves on earlier policies. Therefore the calendar year premium and losses do not necessarily arise from the same policies and statewide total figures only are available. The National Council issues an annual call for calendar year earned premium and incurred losses for each completed calendar year (January 1st to December 31st), due the following April 15th, and also an annual call for the experience of the first six calendar months (January 1st to June 30th), due August 15th. The calendar year experience is required on the basis of direct business and excludes any adjustment of premium or losses arising through re-insurance transactions. The Call for the experience from January through December requires in addition to incurred losses, the net earned premiums on direct business, and the corresponding premiums prior to adjustment for premium discounts or retrospective rating, that is premium on a

"standard basis." The Call for the six months experience requests "earned standard premiums" and incurred losses only. The Experience for the last six months of any calendar year is obtained by subtracting the experience of the first six months from the 12 months experience.

It is proposed to illustrate the details of the ratemaking procedure by reproducing some of the exhibits which were submitted to the Connecticut Insurance Commissioner in support of the recently approved filing of workmen's compensation insurance rates.* These exhibits from the filing will be supplemented by footnotes, additional exhibits, and additional explanation, where this seems desirable.

The Connecticut filing letter consisted of a brief statement regarding the proposed effective date (October 1, 1954), the amount of the required change in manual level by industry group and in total, and certain statistics regarding underwriting results and trends in average costs of indemnity and medical costs in support of the requested change. (The requested change was an average increase of 3.5% which was approved as filed). Details of the computations were outlined in the following exhibits which were attached to the filing.

Exhibit I—Determination of Change in Manual Rate Level

Exhibit II—Distribution of Change in Manual Rate Level to Industry Classifications

Exhibit II-A—Pure Premium Exhibits

Exhibit III—Allowance for Expenses, Taxes, Profit and Contingencies

Exhibit IV—Occupational Disease Rates

Exhibit V—Computation of final Manual Rate

Exhibit VI—Proposed Rates and Rating Values

Exhibit VII—Glossary of Ratemaking Terms

For convenience Exhibit VII is included preceding Exhibit I.

Exhibit I illustrates the first step in the ratemaking procedure namely "The determination of rate level" and consists of the following sections:

A. Policy Year Experience

B. Correction For Off-Balance Due to the Experience Rating Plan

C. Policy Year Indicated Change in Manual Rate Level

D. Rate Level Adjustment Factor

E. Change in Manual Rate Level

EXHIBIT VII (From Connecticut Filing)
GLOSSARY OF RATEMAKING TERMS

CALENDAR YEAR EXPERIENCE (EXHIBIT I, SECTION D)

The results of all premium and loss transactions entered on the books of the insurance carrier during a particular calendar period. (Compare this with "Policy Year Experience.")

* Direct quotations from the Connecticut filing are printed in smaller type.

CALENDAR YEAR EARNED PREMIUMS
Premiums written during the calendar year plus unearned premium reserves at the beginning of the year minus unearned premium reserves at the end of the year.

CALENDAR YEAR STANDARD EARNED PREMIUMS (EXHIBIT I, SECTION D)
As above except adjusted to take out the effect of Premium Discounts and Retrospective Rating Plans.

CALENDAR YEAR INCURRED LOSSES (EXHIBIT I, SECTION D)
Losses actually paid during the calendar year plus the reserves for outstanding cases at the end of the year, minus the reserves for outstanding cases at the beginning of the year.

CORRECTION FOR OFF-BALANCE FACTOR (EXHIBIT I, SECTION B)
An adjustment for the extent by which the Experience Rating Plan produces more credits than debits.

DEVELOPMENT FACTORS (EXHIBIT I, SECTION A)
Adjustments to take into consideration the extent to which reported premiums and incurred losses change because of payroll audits and changes in the status of outstanding claims.

LOSSES ON PRESENT LAW LEVEL (EXHIBIT I, SECTION A, COLUMN 5)
These are incurred losses converted to reflect the latest benefit level of the workmen's compensation law involved and modified further by the application of development factors.

POLICY YEAR EXPERIENCE (EXHIBIT I, SECTION A)
Data pertaining to all policies written to expire during the policy year period designated. This term should not be confused with Calendar Year Experience wherein the data depend upon the transactions occurring during the year without regard to policy inception date.

POLICY YEAR INCURRED LOSSES
Loss payments which a carrier becomes obligated to pay because of a claim occurring during the policy period, including the reserves set up for future payments.

PREMIUMS AT PRESENT COLLECTIBLE RATES (EXHIBIT I, SECTION A, COLUMN 4)
To obtain these, the present rates are unloaded for catastrophe and occupational disease and applied against the payrolls by classification. In addition, the correction for off-balance of the Experience Rating Plan is removed. The loss constant premium has been included by restoring the effect of the loss constant offsets.

STANDARD PREMIUMS
Premiums after application of experience rating but excluding the affects of retrospective rating and premium discounts.

Exhibit I supporting the Connecticut filing is as follows. The small figures inserted in parentheses refer to footnote giving a fuller explanation of the various features.

EXHIBIT I

Determination of Change in Manual Rate Level

A. *Policy Year Experience*

The Connecticut experience for policies written to expire during the 24 month period from August 1, 1951 to July 31, 1953 indicates the following loss ratios by industry group, and in total:

Policies Expiring During Year Ending [2]	ACTUAL BASIS [1] Earned Premiums	Incurred Losses	Loss Ratio	MODIFIED BASIS Premiums At 10-1-53 [3] Coll. Rates	Losses On 10-1-53 [4] Law Level	Loss Ratio
	(1)	(2)	(3)	(4)	(5)	(6)
	Manufacturing Group — Schedules 5 to 25 Inclusive [5]					
7-31-52	8,585,333	5,763,809	.671	10,881,556	6,924,802	.636
7-31-53	9,375,886	5,830,843	.622	11,637,349	6,845,893	.588
TOTAL	17,961,219	11,594,652	.646	22,518,905	13,770,695	.612
	Contracting Group — Schedules 26 and 27 [5]					
7-31-52	4,230,319	2,480,346	.586	5,188,599	3,048,917	.583
7-31-53	4,866,760	2,882,930	.592	5,769,604	3,518,691	.610
TOTAL	9,097,079	5,363,276	.590	10,958,203	6,567,608	.599
	All Other Group — All Other Schedules except Schedule 29 [5]					
7-31-52	5,087,118	3,436,534	.676	6,789,295	4,152,498	.612
7-31-53	6,032,531	4,015,543	.666	7,660,255	4,759,435	.621
TOTAL	11,119,649	7,452,077	.670	14,449,550	8,911,933	.617
	All Industry Groups					
7-31-52	17,902,770	11,680,689	.652	22,859,450	14,126,217	.618
7-31-53	20,275,177	12,729,316	.628	25,067,208	15,124,019	.603
TOTAL	38,177,947	24,410,005	.639	47,926,658	29,250,236	.610

Premiums in column (4) above are determined by extension of Connecticut exposures (payroll in $100 units) at the Connecticut rates which became effective October 1, 1953, and thus exclude any premium derived from the Expense Constant[6]. An appropriate adjustment has been made in the expense ratio employed in these calculations to recognize the premium derived from that constant. Also eliminated are occupational disease[7] and catastrophe loadings[8] and the correction factor for the off-balance of the Experience Rating Plan. Corresponding to the elimination of the premium derived from the $.01 catastrophe loading, in cases involving injury to two or more persons the incurred losses shown in column (5) have been limited to the two most costly cases, or twice the Death and Permanent Total average value, whichever is greater. As explained in Section B below, elimination of the correction factor for the off-balance of the Experience Rating Plan produces the "collectible" premiums anticipated by the Connecticut rates. The loss constant premium has been included by restoring the effect of the loss constant[9] offsets in the premiums at present collectible rates.

The losses shown in column (5) have been brought to the present law level and have been developed to an ultimate basis by factors reflecting the development of both premiums and losses. The development factors are 1.046 for indemnity and 1.041 for medical. Computation of these factors is detailed in Exhibit I-A attached.[10]

Neither premiums nor losses pertaining to the so-called "standard exclusions" have been included in any of the figures shown above. These standard exclusions include "a" rated classifications and discontinued classifications which have not been reassigned and for which no current manual rates are available, and also experience not coming under the Connecticut Compensation Act, such as experience under the United States Longshoremen's and Harbor Workers' Compensation act and Maritime experience.

B. *Correction For Off-Balance Due To the Experience Rating Plan*

Manual rates reflect the average experience of all risks, both large and small. The experience of large risks is usually found to be better than the average. Since the Experience Rating Plan gives more credence to the rate indications of the individual risk as the size of the risk increases, it is, therefore, evident that this Plan will produce more reductions from the manual rate (credits) than increases over the manual rates (debits). Under these circumstances the level of manual rates will not be fully realized because of the credit off-balance of the Experience Rating Plan. The manual rates, therefore, include a correction factor for this off-balance so that the resulting premium, after application of the Experience Rating Plan, will agree more closely with the desired collectible level.

The present Connecticut rates include an off-balance factor of 1.076. On the basis of the Connecticut experience for the rate level period as indicated in Section A above, the factor required to correct for the off-balance due to the Experience Rating Plan is increased to 1.087. The change in this factor indicates an increase of 1.0% in the manual rate level over the change indicated by the policy year data.

C. *Policy Year Indicated Change In Manual Rate Level*

The expense allowance underlying Connecticut manual rates is 41.0%. (Exhibit III deals with the expense allowance in greater detail). The corresponding permissible loss ratio is, therefore, the complement of the 41.0% expense loading (1.000 − .410 = .590). When a policy year loss ratio shown in Section A above is below the permissible loss ratio a reduction below the present collectible rate is indicated, and vice versa by group. The amount of such change is found by dividing the policy year loss ratio for each group by the permissible loss ratio indicated above. To the quotient thus produced, the factor representing the change due to the revision of the correction for off-balance factor is applied as a multiplier, as follows:

	Industry Group			Average All
	Mfg.	*Cont.*	*A. O.*	*Groups*
1. Pol. Yr. Aver. Coll. Loss Ratio (Col. (6), Section A)	.612	.599	.617	.610
2. Permissible Loss Ratio	.590	.590	.590	.590
3. Indicated Change in Coll. Level (1) ÷ (2)	1.037	1.015	1.046	1.034
4. Change in Corr. for Off-Balance (Section B)	1.010	1.010	1.010	1.010
5. Pol. Yr. Indicated Change in Manual Rate Level (3) × (4)	1.047	1.025	1.056	1.044

This indicates, prior to modification by the calendar year results, an average increase of 4.7% for the Manufacturing group, an average increase of 2.5% for the Contracting group, and an average increase of 5.6% for the All Other group; producing an average overall increase of 4.4%.

D. *Rate Level Adjustment Factor*

The last policy issued during the rate level period was written to expire as of July 31, 1953. The first policy to be effective under the new rates would become effective October 1, 1954. In order to partially bridge this gap, the standard ratemaking procedure provides for the introduction of a Rate Level Adjustment Factor based on the latest available 12 months of calendar year experience. The calendar year period underlying the proposed Rate Level Adjustment Factor for Connecticut is the 12 month period ending December 31, 1953. This experience includes all premiums earned and losses incurred during this 12 month calendar period, regardless of the effective date of the policies under which the experience was incurred, and thus reflects much later experience than can be reflected by the policy year data which is not reported until 8 months after the last policy has expired.[1] It should be noted that these calendar year data reflect all factors which affect compensation underwriting results. These include not only rising wages but also increasing cost of indemnity cases, increasing cost of medical cases, changes in accident frequency, etc.

The Rate Level Adjustment Factor for Connecticut indicated by the experience of the 12 calendar months ending December 31, 1953 is .991 (a reduction of 0.9% under the policy year indicated manual rate level) and is determined as indicated below. It will be noted that the calendar year data are adjusted to the present rate level and present law level, in order to remove the effect of any trends already recognized by past rate revisions, and is further adjusted to the overall premium level indicated by the policy year experience (see Part C above). This adjustment to the premium level indicated by the policy year experience cancels out any trend effects that may be reflected in both policy year and calendar year data, and leaves as residue only that portion of the various trends continuing beyond the end of the policy period. The calculation of the Connecticut Rate Level Adjustment Factor follows:

	Exper. of 12 Cal. Months Ending 12-31-53		
		Factors to [2]	
	Actual Basis	*Adjust. to Present Law and Rate Level*	*Adjusted Basis*
1. Standard Earned Premium	24,988,967	1.149	28,712,323
2. Incurred Losses	15,546,543	1.092	16,976,825
3. Loss Ratio	.622	xx	.591
4. Overall Pol. Yr. Manual Rate Level Change			1.044
5. Cal. Yr. Loss Ratio Adjusted to Indicated P. Y. Level (3) ÷ (4)			.566
6. Permissible Loss Ratio, adjusted for Exp. Const. premium included in Std. Prem.			.575
7. Rate Level Adj. Factor 1.000 − (.575 − .566)			.991 [3]

E. *Change In Manual Rate Level*

The product of the Policy Year Indicated Change in Manual Rate Level (from Section C above) times the Rate Level Adjustment Factor will produce the required change in Manual Rate Level as follows:

Industry Group	*Pol. Yr. Rate Level Change*	*Rate Level Adjustment Factor*	*Change in Manual Rate Level*
Manufacturing	1.047	.991	1.038
Contracting	1.025	.991	1.016
All Other	1.056	.991	1.046
Total	1.044	.991	1.035

This indicates an average increase in manual rate level of 3.8% for the Manufacturing group, an average increse of 1.6% for the Contracting group, and an average increase of 4.6% for the All Other group, producing an average overall increase of 3.5%.

FOOTNOTES TO SECTION A — POLICY YEAR EXPERIENCE

(1) *Actual Basis.* The figures on the "Actual Basis" are included merely for purposes of information and are not used in that form in the ratemaking procedure. The premiums were earned at various manual levels and the losses incurred under various compensation laws. Rather than trying to adjust the premiums to the level of current rates by flat factors, we go back to the payroll exposures by classification and multiply such exposure for each classification by the appropriate current classification rate.

(2) *Policy Periods.* Two 12 month policy periods are used as the basis for the rate level calculations. In order to bring as much recent experience as possible into the calculations we used in this case the experience of policies becoming effective during the two policy periods August 1, 1950 to July 31, 1951, and August 1, 1951 to July 31, 1952. In order to allow time to prepare the necessary exhibits, obtain Regional Committee action, make the filing and obtain approval in sufficient time to permit 45 days advance notice to the insurance carriers, our usual practice is to include experience of policies expiring up to 14 months before the proposed effective date and to start tabulating the data 6 months before the effective date of the proposed rates. Since the proposed effective date was October 1, 1954 we would therefore include experience of policies expiring up to July 31, 1953 and start the tabulations April 1st, 1954. A policy issued July 31, 1952 would expire July 31, 1953 and under the rules of the Unit Statistical Plan should be reported not later than 20 months after effective date or February 28, 1954. This leaves only the month of March to receive late reports before tabulation commences. Considering that the Unit Statistical Plan formerly allowed the insurance companies a grace period of 3 months to submit reports where audited payrolls are not available at the prescribed filing date, there is always experience being received after the tabulations have been started. This late experience is omitted from the tabulations unless its inclusion would produce a marked effect on the overall rate level, or the experience of an individual classification.

The experience of only the first reports from the Unit Statistical Plan are tabulated, but this experience is modified in accordance with the developments beyond the first reportings, as indicated by previous policy years. This is discussed further in footnote 10.

In the filing the policy periods have been designated by the year of expiration rather than by the 12 month period in which they became effective. This is done to present a truer picture of the age of the data.

(3) **Collectible Rates.** The difference between "Manual" rates and "Collectible" rates will be taken up in the discussion of the "Correction for Off-Balance Factor"—Section B of the filing letter. The figures in column (4) are obtained by extension of the payroll exposure for each classification by the corresponding classification rate.

(4) **Losses on Law Level.** The adjustment to the 10-1-53 law level is made by application of amendment factors, separately to the summation of incurred death losses, incurred permanent total disability losses, major permanent partial losses, etc. for each policy period. Briefly such amendment factors are calculated by valuing the cost of compensating a standard distribution of accidents under the previous state law and under the revised law, using the appropriate state average wage. Formerly the distribution of accidents known as the American Accident Table was used for this purpose but the National Council has just completed a study of distribution of accidents and has produced a new distribution known as the Workmen's Compensation Injury Table which is now being used. The details of a typical calculation using the American Accident Table are given in a paper "A Statistical Analysis of the Benefit Provisions of the Compensation Acts" by Mr. J. J. Smick in the *Proceedings* Volume XXI. The calculations using the new Workmen's Compensation Injury Table are similar.

The adjustment of actual incurred losses to the 10-1-53 law level is shown in the attached Exhibits—Form "E"—1 to 4 inclusive. The policy periods on these exhibits are designated by the more familiar "effective date of policy" system. The actual losses are shown in column (4), law amendment factors in column (5), and converted losses in column (6). The amendment factors in column (5) are the combined results of the 10-1-51 amendment and the 10-1-53 amendment. The 10-1-51 amendment affected the experience of the first policy period to a much greater extent than the second policy period, as all losses of the 8-1-51 to 7-31-52 policy period would be incurred under the 10-1-51 amendment except those occurring in the first two months.

(5) **Industry Group and Schedule.** The schedules refer to the National Council's Code Book in which the classifications are listed numerically by code number on the white pages, and grouped by broad industry schedule on the yellow pages. Schedule 29 includes classifications in the Vessel and Maritime schedule whose losses do not come under any state compensation act.

(6) **Expense Constant.** On risks under $500 premium size, a $10 Expense Constant is charged, or enough to bring the premium to $500

if such amount is less than $10. This $10 fee is earmarked for expenses and is required because the percentage allowance in the manual rates, 41%, does not yield sufficient dollars for expenses on these small policies. From studies of the distribution of policies by premium size, conducted by certain non-participating stock carriers in 1950 to 1951 (see Proceedings of NAIC—1951), it has been established that the premium from the $10 expense constant is equivalent to 2.5% of total premium collected. The standard expense loading, and the adjustment for the effect of the expense consant is as follows:

Adjustment Of Standard Expense Loading For $10 Expense Constant

Item	*Values At Normal Loading (1)*	*% Reduction Due To Exp. Constant (2)*	*Revised % Of Unadjusted Manual Rate (1)–(2) (3)*	*% of Revised Manual Rate (3)÷.975 (4)*
Acquisition	17.5%	.4375%	17.0625%	17.5%
Taxes	2.5	.0625	2.4375	2.5
Profit & Contingencies	2.5	.0625	2.4375	2.5
Claim Adjustment	8.0	—	8.0	8.2
Inspection & Bureau	2.5	—	2.5	2.6
Administration & Audit	9.5	1.9375	7.5625	7.7
Total	42.5%	2.5%	40.0%	41.0%

Indicated Point Reduction in Expense Allowance
Total Col. (1) minus Total Col. (4) = 42.5 – 41.0 = 1.5 points

(7) **Occupational Disease Loadings.** These are supplementary loadings which are added to the manual rate as otherwise determined. See "Exhibit IV" of the filing for a discussion regarding occupational disease loadings.

(8) **Catastrophe Loadings.** An additional loading of $.01 is added to the manual rate as otherwise determined as a catastrophe rate. For compensation ratemaking purposes a catastrophe is any accident involving injury to two or more persons. The amount of losses included in the ratemaking procedure for such cases is limited to the two most costly cases or twice the average value, whichever is greater. Such catastrophies usually arise from fires, explosions, collapse of structures, etc., that is from accidents that are abnormal to the industry or so extremely rare and of such serious nature that their effect on the resulting rates should be tempered.

(9) **Loss Constants.** In addition to the $10 Expense Constant a Loss Constant is also collected on risks below $500 premium. Such Loss Constants vary by industry group; the current loss constants for Connecticut are:

	Loss Constant	*Offsetting Manual Rate Reduction Factor*
Manufacturing	$10.00	.977
Contracting	None	1.000
All Other	3.00	.991

In footnote (6) it was stated that application of the manual rate to payroll exposure did not produce sufficient expense dollars and an additional Expense Constant was required. A comparison of loss

ratios between large and small risks indicates that, while correct on an overall basis, the manual rate also does not yield enough loss dollars for these small risks. Therefore a Loss Constant is charged in addition to the Expense Constant. The adjustment for the effect of the Loss Constants is made by reduction factors applied to the manual rates.

The calculation of the loss constants is a laborious process and the results produced showed such variation from one revision to the next, that it has been felt necessary to temper the results with a considerable element of underwriting judgment. As a result it has become the usual practice to continue the existing loss constants over a period of years rather than change them at each revision. The corresponding offsetting reduction factors applied to manual rates is however examined at the time of each revision.

An outline of the procedure for calculating loss constants omitting much of the detail, is as follows. First a tabulation of payroll exposure by classification is made for risks with premium under $500 (or whatever the dividing point for loss constant application is), and a second similar tabulation is made for risks with over $500 premium. These tabulations also required a separation between the Manufacturing, Contracting, and All Other group. Then after the proposed rates (or pure premiums) are determined, these payrolls for the six different groups are extended to determine the premium at proposed rates for each industry group for risks over $500 and under $500. A similar tabulation of losses by industry group and by size is also made, although tabulation of losses by manual classifications is, of course, not necessary. Then loss ratios for risks under $500 and over $500 are calculated by industry group on the basis of premiums at proposed rates and losses on the proposed law level. If the loss ratio (on this adjusted basis) for risks below $500 is greater than the average industry group loss ratio for large and small risks combined, this fact indicates the need for a loss constant. The procedure for calculating such loss constant is to first determine a differential factor which applied to the premium of the "over $500" risks would increase the loss ratio of these risks to equal the average loss ratio for all size risks. The combined effect of this reduction differential, and the effect of the correction for off-balance factor on the "under $500" risks is calculated. From these calculations a gross amount required to maintain the overall required premium volume is calculated, which when divided by the number of risks under $500 produces, in theory, the amount of the Loss Constant.

The state experience, when split six ways, sometimes has rather small credibility and the results produced frequently vary somewhat from what practical considerations and good judgment would dictate. Therefore the procedure has been to maintain the existing loss constants and re-examine the offsetting reductions.

(10) **Development Factors.** The following exhibit showing the calculation of development factors is included as a part of the Connecticut filing letter.

EXHIBIT I-A

Calculation of Development Factors

Policy Year Expiring	*Item*	*(1)* *1st Report*	*(2)* *Amount as per 2nd Report*	*(3)* *3rd Report*	*(4)* *Development Factors* *1st to 2nd* *(2)÷(1)*	*(5)* *Development Factors* *2nd to 3rd* *(3)÷(2)*	*(6)* *Development Factors* *1st to 3rd* *(4)×(5)*
(1)	Premium	xxx	15,272,685	15,280,938	xxx	1.001	xx
12-31-49	Indemnity	xxx	5,195,308	5,258,773	xxx	1.012	xx
(12 mos.)	Medical	xxx	2,866,359	2,889,327	xxx	1.008	xx
(2)	Premium	26,135,796	26,148,902	26,189,181	1.001	1.002	xx
7-31-51	Indemnity	8,661,949	9,113,646	9,169,440	1.052	1.006	xx
(19 mos.)	Medical	5,301,294	5,404,186	5,475,726	1.019	1.013	xx
(3)	Premium	19,016,447	19,021,292	xxx	1.000	xx	xx
7-31-52	Indemnity	7,602,719	7,814,608	xxx	1.028	xx	xx
(12 mos.)	Medical	4,434,838	4,636,637	xxx	1.046	xx	xx
Unweighted Average — Two Years	(a) Premium				1.001	1.002	1.003
	(b) Indemnity				1.040	1.009	1.049
	(c) Medical				1.033	1.011	1.044
Combined Factors —	Indemnity (b)÷(a)				xx	(1.007)	1.046
	Medical (c)÷(a)				xx	(1.009)	1.041

(1) Policy Year 1948
(2) Policies becoming effective 1-1-49 to 7-31-50
(3) Policies becoming effective 8-1-50 to 7-31-51

It has been found that premiums and losses as reported in the first reporting of the Unit Statistical Plan, valued 18 months after the policy effective date, are subject to change as payrolls for risks previously estimated are audited, and as the reserves on open cases are changed and cases not previously reported come to light.

The calculations of the "Change in Manual Rate Level" are all based on experience derived from first reports under the Unit Statistical Plan and are adjusted by the development factors as derived above to bring it to a "third reporting" or "ultimate" basis. Experience has shown that there is very little development beyond the third Unit Plan report (losses valued 30 months after policy termination) and no attempt is made to develop the experience beyond a third reporting basis.

At one time the rate level in the various states depended upon a tabulation of first reports under the Unit Plan for the latest policy year, and a tabulation of second reports for the earlier policy year, each developed separately to a third reporting basis. Tests revealed however that the use of first reportings for both policy years, developed to a third reporting basis, would have produced practically identical rate levels. Therefore our Actuarial Committee has sanctioned the use of first reports only in the ratemaking procedure, thereby eliminating a great deal of tabulating work.

Referring to Exhibit I-A above, the figures in column (1) are obtained from summaries of all first reportings for all classifications. The figures are taken from a summary of the Unit Plan "affidavits" (Form 27-38 — Letter of Transmittal) in which the total exposure, premiums, and losses, for all Unit Reports submitted at one time are summarized. (It is the usual procedure for an insurance carrier to accumulate the Unit Reports by state and submit them on a monthly basis). It was mentioned in footnote (2) that some Unit Plan reports are received too late to be included in the underlying rate level. The figures in column (1) include these "late reports" which were omitted from the rate levels for previous revisions. The inclusion of such late reports is required to prevent distortion of the development factors. The figures in columns (2) and (3) are also taken directly from hand compiled totals of the summary figures of the "affidavits" submitted in connection with second and third Unit Plan reports (Unit Plan Form 28-38). Second and third Unit Reports are not tabulated by classification.

It is evident that the development factors from a first to a second reporting basis are the unweighted averages of the actual development shown by the two latest policy years for which both first reporting and second reporting total figures are available. Similarly the developments from a second to a third reporting basis are the averages of the two latest policy periods for which both second and third reporting total figures are available. Since the figures in columns (2) and (3) are taken from summary totals it is necessary to use the experience of all classifications including the so-called "standard exclusions."

Referring to the attached exhibits "Form E" it is seen that these development factors are applied in column (7) of Form E. The totals of column (7) are transferred to the exhibit of policy year premiums and losses shown in Exhibit I of the filing. For convenience the premium development factor is applied as a reciprocal on the losses.

COMMENTS REGARDING SECTION B — CORRECTION FOR OFF-BALANCE DUE TO THE EXPERIENCE RATING PLAN

The details of the calculation of the off-balance factor are not reproduced in the Connecticut filing letter. The calculation is as follows:

Policies Becoming Effective During Policy Period	(1) *Premiums At Policy Year Manual*	(2) *Average Policy Period Correction For Off-Balance*	(3) *Premiums At Policy Period Collectible Rates* (1) ÷ (2)	(4) *Policy Period Collected Premiums*	(5) *Ratio Of Collected To Coll. Premiums* (4) ÷ (3)
8-1-50 to 7-31-51	20,094,081	1.028	19,546,771	18,924,360	xx
8-1-51 to 7-31-52	22,922,458	1.034	22,168,721	21,521,028	xx
TOTAL	43,016,539	1.031	41,715,492	40,445,388	.970

(6)	Average correction for off-balance during Policy Period	1.031
(7)	Average class credibility over-all	.507
(8)	Required increase in average correction for off-balance factor	.059
(9)	Required correction for off-balance factor (6) + (8)	1.087*
(10)	Correction factor in present rates	1.076
(11)	Required change in present correction factor (9) ÷ (10)	1.010

*Indication of 1.090 limited to maximum departure of 1% from present 1.076 ($1.076 \times 1.010 = 1.087$).

The calculations in Exhibit I Section A of the filing were carried through in terms of "collectible rates," that is the rates required to pay incurred losses and expenses. The manual rate is obtained by multiplying the collectible rate by the correction for off-balance factor. If such correction for off-balance factor is the right factor, the total earned standard premium will equal the total collectible premium, i.e. the manual premium excluding the correction for off-balance factor.

The calculation consists of a test of how the correction for off-balance factors have worked out in the past. For this purpose we use the experience of the rate level period, namely policies becoming effective between 8-1-50 and 7-31-52 (or written to expire between 8-1-51 and 7-31-53). The premiums in column (4) are the premiums actually earned (or collected) on a standard basis, and are derived from hand totals of the premiums shown in the Letter of Transmittal — Unit Plan Form 27-38, more commonly referred to as "affidavit totals." As each batch of Unit Plan reports is received, the corresponding "Coverage Cards" are removed from our files. These Coverage Cards are submitted to us by our Connecticut Compensation Rating Bureau at the time the policy is approved. These Coverage Cards show the name of the risk, the effective date, the insurance carrier and, among other information, the experience modification if the risk has been experience rated. These reports are matched with the Unit Statistical Plan Report received on each risk in the submission and the risk earned standard premium is divided by the risk experience modification to determine the corresponding manual premium for the risk. If the risk is not subject to experience rating, the manual premium is taken as being equal to the earned premium. Hand totals are taken of both the earned premium and the manual premium, and from these figures the amounts in columns (4) and (1) respectively are compiled. These manual premiums are at the manual rates which were in effect during the policy period, not the current manual rates.

From the past record of changes in rate level an average correction for off-balance factor is calculated for each policy period, assuming an even distribution of payroll exposure throughout the period. Such average factors are shown in column (2) above. The corresponding premiums at policy year "collectible" rates are determined by dividing policy year manual premiums — column (1) — by the average correction for off-balance factors — column (2). In this case the collected premiums — column (4) — fell short of the desired level — column (3) — by 3% as shown in column (5). This means that the average correction for off-balance factor of 1.031 in effect during this 24 month policy period was insufficient and should be increased.

It is not the purpose of this paper to discuss the Experience Rating Plan in detail. In general, the Experience Rating Plan operates to produce a rate for each risk subject to the Plan somewhere between the manual rate and the rate indicated by the individual risk's experience, depending upon the individual risk's credibility. When such risk

credibility is very low the resulting modified rate for the risk will be close to the manual rate and therefore any correction for off-balance factor included in such manual rate will be reflected almost 100% in the modified rate. On the other hand for a risk large enough so that its own experience receives 100% credibility in the experience rating procedure, the resulting modified rate for the risk will be the same as the rate indicated by its own experience regardless of the size of the correction for off-balance factor; in other words none of the correction for off-balance factor will be reflected in the premium collected for this risk. Therefore, in order to make up the deficiency of 3% in collected premium — as indicated by column (5) — it is necessary to increase the correction for off-balance factor by approximately twice that amount. The required increase is .059 as shown in line (8) of the calculation, producing a new correction for off-balance factor of $1.031 + .059 = 1.090$.

The past history of the correction for off-balance factors in the various states indicates that these factors seem to vary in cycles, without much apparent reason. In order to limit the change in these corrections for off-balance factors our Actuarial Committee has approved limitation of the change in the correction for off-balance factor to 1%, up or down, from one revision to the next.

Therefore, instead of a new correction for off-balance factor of 1.090 in the proposed rates, the proposed factor was the present factor of 1.076×1.010 or 1.087.

An elementary relationship between the risk adjusted rate and the manual rate is as follows:

$$(1) \quad A = I \cdot Z + C \cdot F \ (1\text{-}Z)$$

where A = Adjusted Rate

I = Rate Indicated by Risk Experience

= (Risk Losses ÷ Risk Payroll) ÷ Permissible Loss Ratio

Z = Risk Experience Rating Credibility

C = Classification Collectible Rate

F = Correction for Off-Balance Factor

$(1\text{-}Z)$ = Class Credibility

Assuming a revised correction for off-balance factor = F' we have:

$$(2) \quad A' = I \cdot Z + C \cdot F' \ (1\text{-}Z)$$

Subtracting (2) minus (1)

We have

$$A' = I \cdot Z + C \cdot F' \ (1 - Z)$$
$$A = I \cdot Z + C \cdot F \ (1 - Z)$$
$$A' - A = (C \cdot F' - C \cdot F) \ (1 - Z)$$

This same relationship is assumed to hold for the data for all risks combined. "C" is assigned an index number of 1.000 and "A" = Earned or collected premiums ÷ collectible premiums.

In Connecticut A = .970 (column (5)), the desired level for A' = 1.000, and F = 1.031 (line (6)). The average experience rating credibility for all risks, including non-rated risks at zero credibility, was established some time ago from a tabulation of risks by premium size and was found to be .493; the corresponding value for 1 – Z is .507, as shown on line (7) substituting in the above expression:

$$1.000 - .970 = (F' - 1.031) \times .507$$

Solving F' = 1.090, which as previously explained is reduced to 1.087 to limit the change to 1% increase.

Please note that this is a correction for the off-balance of the experience rating plan; it is not intended to make the experience rating plan balance within itself.

COMMENT ON SECTION C — POLICY YEAR INDICATED CHANGE IN MANUAL RATE LEVEL

Very little comment seems necessary in connection with this Section. The process of dividing the policy year loss ratio (on the "modified basis") by the permissible loss ratio is of course algebraically equivalent to

$$\frac{\text{Incurred Losses} \div \text{Permissible Loss Ratio } (= \text{Required Premiums})}{\text{Premiums at Present Collectible Rates}}$$

It is also noted that only the change in the correction for off-balance factor is used in line (4) of the calculation. If this factor does not change, the change in the manual level will of course be exactly the same as the change in the collectible level.

FOOTNOTES TO SECTION D — RATE LEVEL ADJUSTMENT FACTOR

(1) **Policy Year and Calendar Year Data.** The relationship between policy year data and calendar year data can best be illustrated by diagrams setting forth the concept of even distribution of business, as follows:

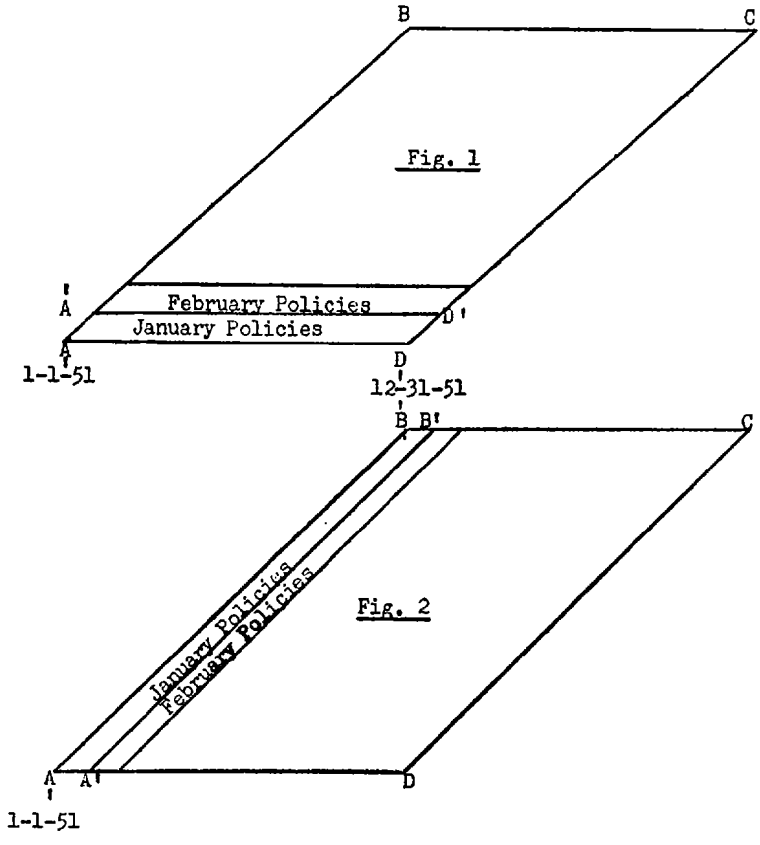


Figure 1 illustrates the "horizontal concept." Policies becoming effective January 1st for a 12 month period are represented by the line AD; policies becoming effective January 2nd by a line immediately above AD etc., until we come to the line BC representing policies becoming effective December 31st. The area of the parallelogram ABCD thus represents the experience of the policy year, that is number of policies, payroll exposure, premium volume, number of accidents or incurred losses, whatever we want to deal with. The experience of January policies is represented by the small parallelogram AA'D'D and is seen to be equal to one-twelfth of the total experience.

Figure 2 represents the more convenient concept of January 1st policies running from A to B, etc. so that the parallelogram ABB'A' represents the experience of January policies. This concept produces the same result as the previous concept represented by Figure 1 but is more convenient when we have to deal with changes in rate level affecting outstanding policies, or with law amendments.

The above diagrams are for a policy year commencing January 1st but the same relationship will hold regardless of the inception date. The relationship between the latest policy period for Connecticut — policies becoming effective between August 1, 1951 and July 31, 1952 — and calendar year 1953 are shown in the following diagram:

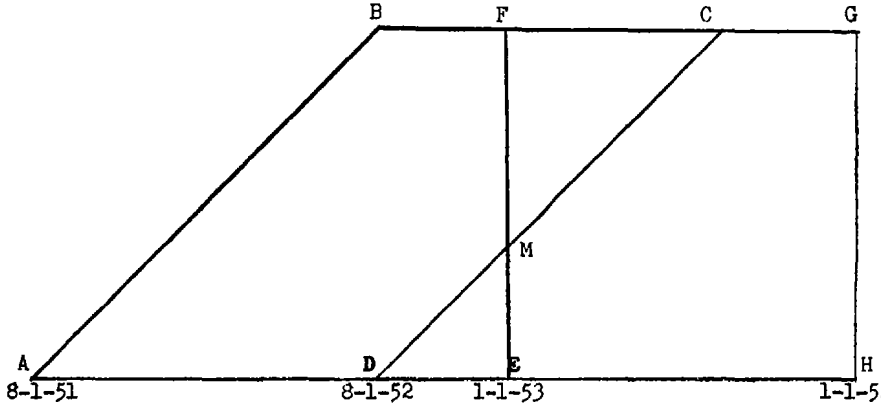
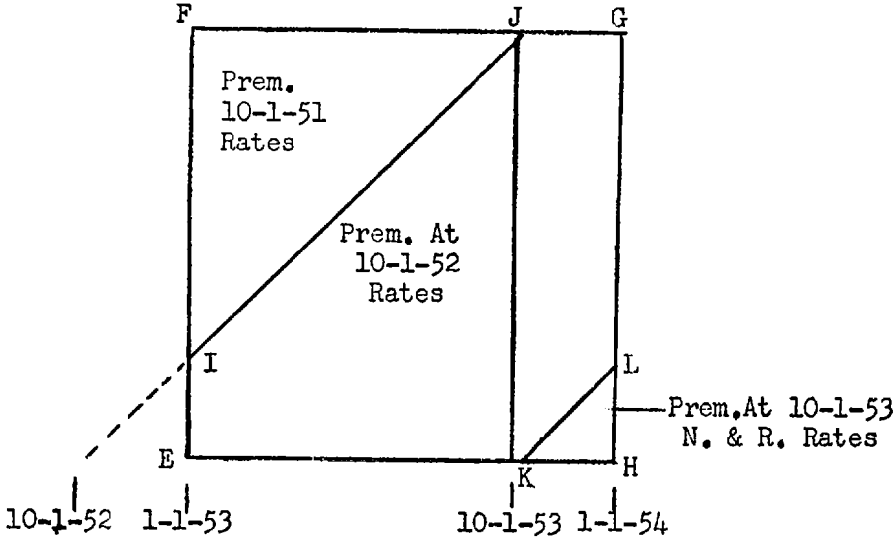


Figure 3

The policy period experience is represented by the parallelogram ABCD, in accordance with the theory previously outlined. On the other hand, Calendar Year 1953 experience does not depend upon the effective date of the policy but includes the experience on all policies in effect during 1953. Calendar Year 1953 experience is therefore represented by the square EFGH in Figure 3. From this diagram it is evident that Calendar Year 1953 experience includes a part of the policy year experience as represented by the triangle FCM. This shows about 17% of the calendar year experience (from relative areas) is derived from this latest policy year.

(2) Adjustment of Calendar Year Data. To adjust the calendar year

premiums we use our original square EFGH and this has been redrawn to avoid confusion:



In the above diagram, the policies are assumed to run diagonally upward to the right. The area F J I therefore represents the portion of the payroll to which the 10-1-51 Connecticut rates were applied. The area I J K E represents payrolls to which the 10-1-52 rates were applied. The area J G L K would also ordinarily be at the 10-1-52 rates, but the revision of 10-1-53 was 12.7% increase on existing policies and 15.9% increase on new and renewal policies; these payrolls were therefore exposed to rates equal to the 10-1-52 rates increase 12.7% Finally K L H represents payrolls to which the 10-1-53 rates were applied.

The calculation of the calendar year premium adjustment factor is as follows:

(1)	*(2)*	*(3)†*	*(4)*
Effective Date Of Manual Change	*Manual Change Over Previous Level*	*Cumulative Index Of Col. (1)*	*Percent Of Calendar Year Payroll At Level of Col. (2)*	*Product (2)×(3)*
10-1-51	Base	1.000	28.1%	.281
10-1-52	1.092	1.092	46.9	.512
10-1-53	1.127 (A.O.)	1.231	21.9	.270
10-1-53	1.159 (N & R)	1.266*	3.1	.039
			100.0	

*1.092 × 1.159 = 1.266

Average Index for Calendar Year (sum col. (4)) = 1.102

Factor to adjust Calendar Year Premium to 10-1-53 Level = 1.266 ÷ 1.102 = 1.149

†Determined from relative areas.

For the Calendar Year Loss Adjustment Factor we use the same calendar year diagram. In this case the area EFJK is assumed to represent cases settled at the Connecticut 10-1-51 level, and the area KJGH cases settled at the 10-1-53 law level. The 10-1-53 amendments were calculated to increase compensation benefits 12.7% Therefore, taking the 10-1-51 cost level at an index of 1.000, ¾ of the calendar year losses were at 1.000 index and ¼ were at a cost index of 1.127. The average cost index for the calendar year is therefore $.75 \times 1.000 + .25 \times 1.127 = 1.032$, and the adjustment factor to correct calendar incurred losses to the current law level is $1.127 \div 1.032 = 1.092$.

In addition to assuming an even distribution of business throughout the calendar year, it is further assumed that the entire earned premium arose either from policies becoming effective during the calendar year or during the previous calendar year, and that the calendar year incurred losses all arose from accidents occurring during the calendar year and excluded any adjustment of reserves during the calendar year on accidents which occurred prior to the beginning of the calendar year. This is not 100% correct, as there would be premium resulting from audits of previous policies, and losses arising from the adjustment of reserves on previously incurred losses.

In view of these defects in the calendar year data, a maximum effect of 10% increase or reduction due to the Rate Level Adjustment Factor is imposed.

(3) **Determination of Rate Level Adjustment Factor.** The process of subtracting the adjusted calendar year loss ratio from the permissible loss ratio places a further restriction on the effect of the calendar year data on the final rate level. The indicated change in rate level for all industry groups combined resulting from the policy year data was found to be 1.044 (See Section C of Exhibit I of the filing). The calendar year loss ratio adjusted to the present rate and law level is shown to be .591 as per line (3) "Adjusted Basis," of Section D. If the rate level were based entirely on calendar year data the overall change would be found by dividing the .591 loss ratio by the permissible loss ratio of .575, as follows $.591 \div .575 = 1.028$. The final manual rate level of 1.035 (See Exhibit I — Section E of filing) is therefore equivalent to giving the calendar year experience 57.5% weight and the policy year experience 42.5% weight, $(1.028 \times .575) + (1.044 \times .425) = 1.035$.

Calendar year data cannot be secured except on an overall basis. Therefore, the same Rate Level Adjustment Factor is applied for each industry group. It should also be noted that premium resulting from the Expense Constant is included in the calendar year premium and the 59.0% permissible is reduced by the 1.5 point equivalent of the Expense Constant, producing a calendar year permissible loss ratio of 57.5% instead of 59.0%.

FORM "E" — 1
ACTUAL LOSSES CONVERTED
TO LATEST LAW LEVEL
AND
TO MANUAL RATE LEVEL

State CONNECTICUT
Date JULY 29, 1954
Local Rev'n. No. 28

Industry Group: GRAND TOTAL
Includes P.C. & State Steve.

(1) Policy Year	(2) No. Cases	(3) Kind of Benefit	(4) Actual Losses	(5) Factors To Pres. 10-1-53 Law Level	(6) Losses Converted to 10-1-53 Law Level (4)×(5)		(7) Partial Total Developed Tot. (6) × Dev. Fact.*	(8) Corr. For Off-Bal. Factor	(9) Losses On Man. Rate Level (7)×(8)
1950-51*	54	Fatal	495,398	1.889					
(Expiring	8	P.T.	166,810	1.789	2,809,059	Ser.	2,938,276	1.087	
during	277	Major	1,321,165	1.192					
year	2,655	Minor	2,510,303	1.192	6,329,907	N.S.	6,621,083		
ending	11,085	T.T.	2,800,022	1.192					
7-31-52)	xx	Med.	4,386,991	1.000	4,386,991	Med.	4,566,858		
	14,079	Total	11,680,689		13,525,957		14,126,217		
1951-52†	75	Fatal	910,954	1.587					
(Expiring	10	P.T.	125,736	1.581	3,473,711	Ser.	3,633,502	1.087	
during	306	Major	1,575,571	1.161					
year	2,525	Minor	2,750,599	1.161	6,418,508	N.S.	6,713,759		
ending	10,618	T.T.	2,777,832	1.161					
7-31-53)	xx	Med.	4,588,624	1.000	4,588,624	Med.	4,776,758		
	13,534	Total	12,729,316		14,480,843		15,124,019		
All	129	Fatal							Ser. 7,143,523
Years	18	P.T.							
	583	Major							N.S. 14,494,973
	5,180	Minor							
	21,703	T.T.							Med. 10,156,511
	27,613	Total							

*DEVELOPMENT FACTORS

Policy Year	Indemnity	Medical
1950-51 & 1951-52	1.046	1.041

8-1-50 to 7-31-51*
8-1-51 to 7-31-52†

FORM "E" — 2
ACTUAL LOSSES CONVERTED
TO LATEST LAW LEVEL
AND
TO MANUAL RATE LEVEL

State CONNECTICUT
Date JULY 29, 1954
Local Rev'n. No. 28

Industry Group: MANUFACTURING

(1) Policy Year	(2) No. Cases	(3) Kind of Benefit	(4) Actual Losses	(5) Factors To Pres. 10-1-53 Law Level	(6) Losses Converted to 10-1-53 Law Level (4)×(5)	(7) Partial Total Developed Tot. (6) × Dev. Fact.*	(8) Corr. For Off-Bal. Factor & Rate Level Adj. Factor	(9) Losses On Man. Rate Level (7)×(8)
1950-51*	22	Fatal	208,150	1.889				
	3	P.T.	58,737	1.789	1,341,857 Ser.	1,403,582		
	142	Major	707,702	1.192				
	1,578	Minor	1,355,775	1.192	3,101,968 N.S.	3,244,659		
	5,418	T.T.	1,246,547	1.192				
	xx	Med.	2,186,898	1.000	2,186,898 Med.	2,276,561		
	7,163	Total	5,763,809		6,630,723	6,924,802		
1951-52†	19	Fatal	204,497	1.587				
	8	P.T.	101,948	1.581	1,276,410 Ser.	1,335,125		
	138	Major	681,045	1.161				
	1,612	Minor	1,508,490	1.161	3,138,993 N.S.	3,283,387		
	5,078	T.T.	1,195,208	1.161				
	xx	Med.	2,139,655	1.000	2,139,655 Med.	2,227,381		
	6,855	Total	5,830,843		6,555,058	6,845,893		

*DEVELOPMENT FACTORS

Policy Year	Indemnity	Medical
1950-51 & 1951-52	1.046	1.041

FORM "E" — 3
ACTUAL LOSSES CONVERTED
TO LATEST LAW LEVEL
AND
TO MANUAL RATE LEVEL

State CONNECTICUT
Date JULY 29, 1954
Local Rev'n. No. 28

Industry Group: CONTRACTING

(1) Policy Year	(2) No. Cases	(3) Kind of Benefit	(4) Actual Losses	(5) Factors To Pres. 10-1-53 Law Level	(6) Losses Converted to 10-1-53 Law Level (4)×(5)	(7) Partial Total Developed Tot. (6) × Dev. Fact.*	(8) Corr. For Off-Bal. Factor & Rate Level Adj. Factor	(9) Losses On Man. Rate Level (7)×(8)
1950-51*	8	Fatal	98,745	1.889				
	4	P.T.	88,105	1.789	761,535 Ser.	796,566		
	66	Major	350,156	1.192				
	345	Minor	491,988	1.192	1,328,099 N.S.	1,389,192		
	1,972	T.T.	622,189	1.192				
	xx	Med.	829,163	1.000	829,163 Med.	863,159		
	2,395	Total	2,480,346		2,918,797	3,048,917		
1951-52†	27	Fatal	370,319	1.587				
	1	P.T.	18,625	1.581	1,166,245 Ser.	1,219,892		
	87	Major	472,957	1.161				
	346	Minor	500,992	1.161	1,304,963 N.S.	1,364,991		
	1,945	T.T.	623,007	1.161				
	xx	Med.	897,030	1.000	897,030 Med.	933,808		
	2,406	Total	2,882,930		3,368,238	3,518,691		

*DEVELOPMENT FACTORS

Policy Year	Indemnity	Medical
1950-51 & 1951-52	1.046	1.041

FORM "E" — 4
ACTUAL LOSSES CONVERTED
TO LATEST LAW LEVEL
AND
TO MANUAL RATE LEVEL

State CONNECTICUT
Date JULY 29, 1954
Local Rev'n. No. 28

Industry Group: ALL OTHER Includes P.C. & State Steve.

(1) Policy Year	(2) No. Cases	(3) Kind of Benefit	(4) Actual Losses	(5) Factors To Pres. 10-1-53 Law Level	(6) Losses Converted to 10-1-53 Law Level (4)×(5)	(7) Partial Total Developed Tot. (6) × Dev. Fact.*	(8) Corr. For Off-Bal. Factor & Rate Level Adj. Factor	(9) Losses On Man. Rate Level (7)×(8)
1950-51*	24	Fatal	188,503	1.889				
	1	P.T.	19,968	1.789	705,667 Ser.	738,128		
	69	Major	263,307	1.192				
	732	Minor	662,540	1.192	1,899,841 N.S.	1,987,232		
	3,695	T.T.	931,286	1.192				
	xx	Med.	1,370,930	1.000	1,370,930 Med.	1,427,138		
	4,521	Total	3,436,534		3,976,438	4,152,498		
1951-52†	29	Fatal	336,138	1.587				
	1	P.T.	5,163	1.581	1,031,055 Ser.	1,078,485		
	81	Major	421,569	1.161				
	567	Minor	741,117	1.161	1,974,552 N.S.	2,065,381		
	3,595	T.T.	959,617	1.161				
	xx	Med.	1,551,939	1.000	1,551,939 Med.	1,615,569		
	4,273	Total	4,015,543		4,557,546	4,759,435		

*DEVELOPMENT FACTORS

Policy Year	Indemnity	Medical
1950-51 & 1951-52	1.046	1.041

II DETERMINATION OF CLASSIFICATION RELATIVITY

Exhibit II and Exhibit II-A included in the Connecticut filing deal with the determination of classification relativity. Exhibit II is reproduced in full, but only a sample of Exhibit II-A has been included. Here again the material of Exhibit II has been amplified by footnotes.

Under the National Council's standard ratemaking procedure classification relativity is determined entirely from policy year data, using the same two policy years as were used in Part I to determine the overall rate levels. In some states, notably California and New York, a longer policy period is used for determination of relativity. The use of a longer period for relativity might seem to produce greater stability but it should be borne in mind that the current pure premium indications are formula rated against the pure premiums underlying the present rate. This procedure results in bringing the experience of earlier policy years into the resulting formula pure premium. This is discussed further in note (5).

Exhibits II and II-A of the Connecticut filing follow:

EXHIBIT II

Distribution Of Change In Manual Rate Level To Industry Classifications

After determining the required changes in manual rate level (see Exhibit I), the next step in the ratemaking procedure is to distribute these changes among the various industry classifications. For this purpose, each classification falls into one of the two broad divisions, Reviewed or Non-Reviewed Classifications.

A. *Reviewed Classifications*

1. The reviewed classifications consist of those classifications whose experience is of sufficient volume to warrant the assignment of some "credibility"[1] or weight to the latest Connecticut experience for the individual classifications. In Connecticut they are 182 in number and represent about 90% of the premium. The attached photostat exhibits[2] (Exhibit II-A) of classification experience show in detail the experience for each Reviewed Classification. The losses are at the present Connecticut benefit level, which became effective October 1, 1953 and include the development factors previously noted (see Exhibit I-A). The correction for off-balance of 1.087 is also injected at this point by applying it as a multiplier to the incurred losses. The Rate Level Adjustment Factor has been excluded entirely from these exhibits of classification experience.

The pure premiums shown on these photostat exhibits are as follows:

(a) *Indicated:*[3] The third line of figures for each classification captioned "Total" shows the pure premiums indicated by the Connecticut experience for the two policy periods combined.

(b) *Present On Rate Level:*[4] These are the pure premiums underlying the present rates (see paragraph "d" below) brought to the proposed rate level by application of the average changes in policy year rate level as derived in Exhibit I, Section C. These factors are 1.047 for classifications in the Manufacturing group, 1.025 for classifications in the Contracting group, and 1.056 for the All Other group. As explained in the next paragraph, a formula pure premium is determined by weighting between the "indications" and the "present on rate level". Since the Rate Level Adjustment Factor has been excluded from these exhibits of classification experience it is necessary to use the changes in manual level excluding

such factor, in order that both sets of pure premiums may be on the same basis before determining the average or "formula" pure premium.

(c) *Derived by Formula:*[5] The formula pure premium is derived by the scientific weighting between the indicated and the present on rate level pure premiums. The weight given to the policy year indicated pure premium varies from zero percent to 100%, depending on the volume of the 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 Rate level. The amount of credibility assigned[6] each portion of the indicated pure premium is shown by the figure following the column captioned "Serious", "Non-Serious", and "Medical". The figure "3" indicates 30% credibility to the indicated pure premium, the figure "4" indicates 40% credibility, etc.; where no figure is shown, a credibility of zero is assigned to the indicated pure premium. For example, for the first reviewed classification Code 1924, shown on the first page of the photostat exhibits, the serious indicated pure premium receives zero credibility, non-serious indicated pure premium receives zero credibility and the medical receives 20%. The table of credibilities shown below was used to assign weights to the indications for each of the three industry groups.

VOLUME OF EXPECTED LOSSES[7]
(Expected Losses equal Payroll times Underlying Present Rate Pure Premium)

Credibility	*Serious*	*Non-Serious*	*Medical*
100%	468,300	154,700	123,800
90%	399,900	132,200	105,700
80%	335,300	110,800	88,600
70%	274,400	90,700	72,500
60%	217,700	72,000	57,600
50%	165,800	54,800	43,800
40%	118,500	39,200	31,300
30%	76,800	25,400	20,300
20%	41,700	13,800	11,000
00	41,700	13,800	11,000

Note: The amounts shown above are the minimum expected losses required to qualify for the credibility indicated. For example, 468,300 or more serious expected losses would qualify for 100% credibility, serious expected losses between 399,900 and 468,299 would qualify for 90% credibility, etc.

(d) *Underlying Present Rates:*[8] These are the pure premiums underlying the present Connecticut rates and were obtained by unloading the present manual rates by the occupational disease and the $.01 catastrophe loading, and adjusting for the effect of the offsetting reduction for loss constants by dividing through by the offsetting reduction for such loss constants, namely, .997 for Manufacturing, 1.000 for Contracting, and .991 for All Other. After adjustment for the effect of the loss constant offsetting reductions, the loading for expenses, taxes, profit and contingencies of 41.0% is also removed, placing these pure premiums on the same basis, except for the indicated change in rate level, as the indicated pure premiums and the formula pure premiums.

(e) *Proposed:*[9] The proposed pure premiums are the middle ones of the indicated, the formula, and the underlying present rate. In order to limit the fluctuation from present rates, the proposed pure premiums have been selected so as to limit the resulting manual rates to the following departures from the present rates:

Manufacturing	25% above or	25% below
Contracting	25% above or	25% below
All Other	25% above or	25% below

These limits have been calculated in accordance with the following formula, rounded to the nearest 5 points:

Max. Deviation = ½ (Change in Man. Rate Level – 1.000)
plus or minus .25

The changes in Manual Rate Level used are those derived in Exhibit I, Section E.

No classifications were affected by such limitations.

B. *Non-Reviewed Classifications*

Those classifications whose expected losses are so small that no credibility can be attached to any one of the partial pure premiums, serious, non-serious or medical, are referred to as non-reviewed. In Connecticut the premium they produce is about 10% of the total. Since the pure premium indications of these non-reviewed classifications receives no credibility, the proposed rates for these classifications are obtained by applying the average change in rate level by industry group (Manufacturing 1.038, Contracting 1.016, All Other 1.046) to the present Connecticut manual rates unloaded for occupational disease and catastrophe, and then adding back the proposed occupational disease loading and the present $.01 catastrophe loading to the resulting product.

C. *Test of Proposed Pure Premiums*[10]

Before computing the proposed rates, the proposed pure premiums for the Reviewed Classifications are tested to see whether they will produce the desired change in rate level. This test is made by extending the payroll exposure for the rate level period for each Reviewed Classification by the Underlying Present Rate pure premium, and by the Proposed pure premium. In order that the results of this test may be compared directly with the changes in manual rate level including the Rate Level Adjustment Factor, the proposed expected losses have been adjusted to include the Rate Level Adjustment Factor of .991.

The results of such test are as follows:

Test of Proposed Pure Premiums—Reviewed Classifications

	(1) Payrolls Extended At	(2)	(3) Change in Manual Level	(4)	(5)
Industry Group	*Present P.P.*	*Proposed P.P.*	*Realized by Proposed P.P.*	*Required*	*Indicated Correction Factor*
Manufacturing	12,712,685	12,880,784	1.013	1.038	1.025
Contracting	6,421,805	6,456,524	1.005	1.016	1.011
All Other	8,437,232	8,637,228	1.024	1.046	1.021
Total	27,571,722	27,974,536	1.015	1.035	xxx

The proposed pure premiums produce the changes in manual rate level indicated in column (3) as compared to the required changes in column (4). It is, therefore, proposed to apply the correction factors as shown in column (5) above to the proposed pure premiums for the reviewed classification before translating them to manual rates.

EXHIBIT II-A (Sample)

1
NATIONAL COUNCIL ON COMPENSATION INSURANCE
STATE CONNECTICUT LOCAL BUREAU # 28 DATE AUGUST 25, 1954

Sch. & Group 1 Code 1924 Class Wire Drawing or Cable Mfg.

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS NO.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS NO.	NON-SERIOUS AMOUNT	NON-SERIOUS P.P.	MEDICAL 2 AMOUNT	MEDICAL 2 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	1,287,6				7	3111		1355		4466	.35
†1951-52	2,349,6				8	8496		2581		11077	.47
TOTAL	3,637,2				15	11607	.32	3936	.11	15543	.43
P. P.: Present on Rate Level				.40			.39		.34		1.13
P. P.: Derived by Formula				.40			.39		.29		1.08
P. P.: Underlying Present Rate				.38			.37		.32		1.07
P. P.: Proposed				.39			.39		.29		1.07

*18-1 to 7-31

Sch. & Group 1 Code 1925 Class Die Casting Mfg.

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS NO.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS NO.	NON-SERIOUS AMOUNT	NON-SERIOUS P.P.	MEDICAL 2 AMOUNT	MEDICAL 2 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	1,056,3				26	14894		5217		20111	1.90
†1951-52	1,208,7	1	3432		25	13665		6889		23986	1.98
TOTAL	2,265,0	1	3432	.15	51	28559	1.26	12106	.54	44097	1.95
P. P.: Present on Rate Level				.28			.62		.53		1.43
P. P.: Derived by Formula				.28			.62		.53		1.43
P. P.: Underlying Present Rate				.27			.59		.51		1.37
P. P.: Proposed				.28			.62		.53		1.43

Sch. & Group 1 Code 2003 Class Bakeries

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS NO.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 9 NO.	NON-SERIOUS 9 AMOUNT	NON-SERIOUS 9 P.P.	MEDICAL 10 AMOUNT	MEDICAL 10 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	14,405,9	1	5763		146	91761		55307		152831	1.06
†1951-52	15,365,7	5	31982		143	80050		51179		163211	1.06
TOTAL	29,771,6	6	37745	.12	289	171811	.58	106486	.36	316042	1.06
P. P.: Present on Rate Level				.14			.47		.57		1.18
P. P.: Derived by Formula				.14			.57		.36		1.07
P. P.: Underlying Present Rate				.13			.45		.54		1.12
P. P.: Proposed				.14			.57		.36		1.07

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2
NATIONAL COUNCIL ON COMPENSATION INSURANCE
STATE CONNECTICUT LOCAL BUREAU # 28 DATE AUGUST 25, 1954

Sch. & Group 1 Code 2070 Class Creameries

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS 2 NO.	SERIOUS 2 AMOUNT	SERIOUS 2 P.P.	NON-SERIOUS 6 NO.	NON-SERIOUS 6 AMOUNT	NON-SERIOUS 6 P.P.	MEDICAL 6 AMOUNT	MEDICAL 6 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	9,624,4	2	63805		79	23148		27032		113985	1.18
†1951-52	10,857,8	5	27759		121	71370		34103		133232	1.41
TOTAL	20,482,2	7	91564	.45	200	94518	.45	61135	.40	247217	1.30
P. P.: Present on Rate Level				.30			.42		.36		1.08
P. P.: Derived by Formula				.33			.44		.38		1.15
P. P.: Underlying Present Rate				.29			.40		.34		1.03
P. P.: Proposed				.33			.44		.38		1.15

*18-1 to 7-31

Sch. & Group 1 Code 2089 Class Packing Houses

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS 2 NO.	SERIOUS 2 AMOUNT	SERIOUS 2 P.P.	NON-SERIOUS 2 NO.	NON-SERIOUS 2 AMOUNT	NON-SERIOUS 2 P.P.	MEDICAL 2 AMOUNT	MEDICAL 2 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	1,778,1	2	3390		60	7196		5899		16485	.93
†1951-52	2,016,7				14	3503		3669		7172	.36
TOTAL	3,794,8	2	3390	.09	74	10699	.28	9568	.25	23657	.62
P. P.: Present on Rate Level				.26			.46		.46		1.18
P. P.: Derived by Formula				.26			.42		.42		1.10
P. P.: Underlying Present Rate				.25			.44		.44		1.13
P. P.: Proposed				.26			.42		.42		1.10

Sch. & Group 1 Code 2157 Class Bottling - (NOC)

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS NO.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 5 NO.	NON-SERIOUS 5 AMOUNT	NON-SERIOUS 5 P.P.	MEDICAL 5 AMOUNT	MEDICAL 5 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	3,098,6	4	39908		91	42531		32988		115427	3.73
†1951-52	3,568,4	3	46864		78	30764		23883		101511	2.84
TOTAL	6,663,0	7	86772	1.30	169	73295	1.10	56871	.86	216938	3.26
P. P.: Present on Rate Level				.38			1.03		.81		2.22
P. P.: Derived by Formula				.38			1.07		.84		2.29
P. P.: Underlying Present Rate				.36			.98		.77		2.11
P. P.: Proposed				.38			1.07		.84		2.29

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EXHIBIT II-A (Sample)

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NATIONAL COUNCIL ON COMPENSATION INSURANCE
STATE CONNECTICUT LOCAL REVN $.28 DATE AUGUST 25, 1954

Sch.& Group 3 Code 9101 Class. Colleges or Schools - all other employees

POLICY PERIOD	PAYROLL (In Hundreds)	SERIOUS No.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 8 No.	NON-SERIOUS 8 AMOUNT	NON-SERIOUS 8 P.P.	MEDICAL 8 AMOUNT	MEDICAL 8 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	10,766,2	2	14104		124	73328		65072		152504	1.42
†1951-52	11,701,2	5	42511		88	36415		58554		137480	1.17
TOTAL	22,467,4	7	56615	.25	212	109743	.49	123626	.55	289984	1.29
P. P.: Present on Rate Level				.18			.56		.48		1.22
P. P.: Derived by Formula				.18			.50		.54		1.22
P. P.: Underlying Present Rate				.17			.53		.45		1.15
P. P.: Proposed				.18			.50		.54		1.22

*18-1 to 7-31

Sch.& Group 3 Code 9403 Class. Garbage, Ashes or Refuse Collecting

POLICY PERIOD	PAYROLL (In Hundreds)	SERIOUS No.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 2 No.	NON-SERIOUS 2 AMOUNT	NON-SERIOUS 2 P.P.	MEDICAL 2 AMOUNT	MEDICAL 2 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	1,092,0				33	11126		8191		19317	1.77
†1951-52	1,150,3	1	4884		23	7156		5024		17064	1.48
TOTAL	2,242,3	1	4884	.22	56	18282	.81	13215	.59	36381	1.62
P. P.: Present on Rate Level				.68			1.13		.68		2.49
P. P.: Derived by Formula				.68			1.07		.66		2.41
P. P.: Underlying Present Rate				.64			1.07		.64		2.35
P. P.: Proposed				.66			1.04		.65		2.35

STATE

Sch.& Group 3 Code 6824 Class. Boat Building - constructing or repairing yachts, etc.

POLICY PERIOD	PAYROLL (In Hundreds)	SERIOUS No.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 2 No.	NON-SERIOUS 2 AMOUNT	NON-SERIOUS 2 P.P.	MEDICAL 2 AMOUNT	MEDICAL 2 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	1,346,9				23	13171	1	7286		20457	1.52
†1951-52	1,468,4				14	11745		5057		16802	1.14
TOTAL	2,815,3				37	24916	.88	12343	.44	37259	1.32
P. P.: Present on Rate Level				.35			.91		.55		1.81
P. P.: Derived by Formula				.35			.90		.53		1.78
P. P.: Underlying Present Rate				.33			.86		.52		1.71
P. P.: Proposed				.34			.86		.51		1.71

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NATIONAL COUNCIL ON COMPENSATION INSURANCE
STATE CONNECTICUT LOCAL REVN $.28 DATE AUGUST 25, 1954
FEDERAL

Sch.& Group 3 Code 6824 Class. Boat Building - constructing or repairing yachts, etc.

POLICY PERIOD	PAYROLL (In Hundreds)	SERIOUS No.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 2 No.	NON-SERIOUS 2 AMOUNT	NON-SERIOUS 2 P.P.	MEDICAL 2 AMOUNT	MEDICAL 2 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	1,346,9				1	125		75		200	.015
†1951-52	1,468,4							396		396	.027
TOTAL	2,815,3				1	125	.004	471	.017	596	.021
P. P.: Present on Rate Level				.132			.023		.009		.164
P. P.: Derived by Formula				.132			.019		.011		.162
P. P.: Underlying Present Rate				.131			.023		.009		.163
P. P.: Proposed				.132			.019		.011		.162

*18-1 to 7-31

Sch.& Group 3 Code 0912 Class. Outservants - Residences and Estates

POLICY PERIOD	MAN EXPOSURE	SERIOUS No.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 5 No.	NON-SERIOUS 5 AMOUNT	NON-SERIOUS 5 P.P.	MEDICAL 4 AMOUNT	MEDICAL 4 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	2,377,2				62	27779		18282		46061	19.38
†1951-52	2,942,1	4	92419		49	28050		35273		155742	52.94
TOTAL	5,319,3	4	92419	17.37	111	55829	10.50	53555	10.07	201803	37.95
P. P.: Present on Rate Level				5.58			11.01		8.29		24.88
P. P.: Derived by Formula				5.58			10.76		9.00		25.34
P. P.: Underlying Present Rate				5.28			10.43		7.85		23.56
P. P.: Proposed				5.58			10.76		9.00		25.34

Sch.& Group 3 Code 0913 Class. Inservants - Residences, Estates and

POLICY PERIOD	MAN EXPOSURE	SERIOUS No.	SERIOUS AMOUNT	SERIOUS P.P.	NON-SERIOUS 7 No.	NON-SERIOUS 7 AMOUNT	NON-SERIOUS 7 P.P.	MEDICAL 7 AMOUNT	MEDICAL 7 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	4,654,7	4	10087		101	51196		45633		106916	22.97
†1951-52	5,432,9	2	6072		90	78096		44764		128932	23.73
TOTAL	10,087,6	6	16159	1.60	191	129292	12.82	90397	8.96	235848	23.38
P. P.: Present on Rate Level				2.49			9.75		8.17		20.41
P. P.: Derived by Formula				2.49			11.90		8.72		23.11
P. P.: Underlying Present Rate				2.36			9.23		7.74		19.33
P. P.: Proposed				2.49			11.90		8.72		23.11

N.C.-201-54

FOOTNOTES TO EXHIBIT II — DISTRIBUTION OF CHANGE IN MANUAL RATE LEVEL TO INDUSTRY CLASSIFICATION

(1) Credibility. Credibility is assigned to each classification on the basis of expected losses, i.e. payroll exposure multiplied by the pure premium underlying the present rate. For a classification with a large premium volume it would not make much difference whether credibility were based on expected losses or actual losses. For a classification with lesser volume of premium where the variation in incurred losses is somewhat fortuitous, it would be unfair to base credibility on actual losses; with, for example, no losses the credibility would be zero and the present pure premium would be continued, and, on the other hand, an abnormal amount of losses would produce an abnormally high credibility and produce a high rate for the risk. To take an extreme case assume a classification with a $.50 rate whose volume is so small that it would receive no credibility on the basis of expected losses. Now if credibility were based on actual losses a $10,000 loss might receive enough credibility to produce a rate of $2.00. Then at the next revision when the losses dropped back to normal the credibility would drop and the classification would be left with a $2.00 rate.

Expected losses are used instead of merely number of employees (or payroll exposure) in order to weight the exposure by the hazard. More accidents are expected in hazardous employments, and therefore their occurrence or non-occurrence should be given more credibility than in a less hazardous industry. Credibility criteria will be discussed later.

(2) Exhibit II-A. Only two sheets of the exhibits of classification experience are attached as a sample.

The information regarding exposure and losses comes directly from the tabulations of the Unit Statistical Plan data. These data are taken off directly on heavy stock which is later separated into experience cards, one card for each classification. A sample of the experience for Code 2003 — Bakeries, as it comes off of the tabulating machine is attached.

Since the policy year period is the same, the sum of the incurred losses for all the individual classifications is, of course, equal to the total policy year losses used to determine the average change in rate level. Therefore, it follows that the same adjustments to such losses must be made by classification in determining the classification rates as were made to the aggregate data to determine the overall rate level. Such adjustments may all be made on the incurred losses, or some of them may be held up and applied to the resulting pure premiums before conversion into rates. Frequently the calendar year data required to determine the rate level adjustment factor is not available when the work on the revision is commenced. Therefore, it is our present practice to exclude this factor from the exhibits of classification experience and apply it as a modification factor on the resulting pure premiums. This procedure was followed in Connecticut.

An exhibit is attached showing the adjustment of the incurred losses for Code 2003 — Bakeries, from the actual basis as reported in the Unit Plan to the modified basis as appearing in Exhibit II-A. It will be noted that the adjustment factors are a combination of the (1) Law Amendment Factors (2) the required correction for Off-Balance Factor of 1.087, and (3) the Development Factors (see Exhibit I-A in Section I). The experience of both policy years is on a first reporting basis. Application of the rate level adjustment factor, the correction factors (to reproduce the required rate level), and the offsetting reduction for loss constants are applied to the pure premiums.

Classification relativity is of course based entirely on policy year data, as calendar year data is not available by classification.

The second page of Exhibit II-A has been included to illustrate the procedure for classifications where the losses may be incurred under either the state compensation act or the U. S. Longshoremen's and Harbor Workers' Act. These classifications are:

Code	*Classification*
6824F	Boat Building
6872F	Ship Repair or Conversion
6874F	Painting — ship hulls
7309F	Stevedoring — N.O.C.
7313F	Coal Dock Operation
7317F	Stevedoring — hand trucks
8709F	Stevedoring — tallymen & checking clerks
8726F	Steamship Lines or Agencies — Port Employees

In these classifications it has been found impracticable to segregate the exposure under the State Act and under the U. S. Longshoremen's Act, as an employee may be exposed under the State Act one hour and under the Federal Act the next hour. Therefore, the Unit Statistical Plan requires reporting of total exposure and an identification of losses as occurring under either the State Act or the Federal Act. In preparing the classification experience two classification experience cards are prepared with identical exposure and one showing losses assigned to the State Act and the other showing losses assigned to the Federal Act. These are treated as separate classifications for determining "state" pure premiums and "federal" pure premiums; these "state" and "federal" pure premiums are then combined and a total rate is determined which contemplates coverage under both Acts. The actual losses are adjusted to the "photostat" level in the same way as illustrated for Code 2003, except the law amendment factors to the latest level of the U. S. Longshoremen's Act. if any, are substituted for the state amendment factors in converting the "Federal" losses.

(3) Indicated Pure Premiums. These are the pure premiums indi-

cated by the state experience for each classification and are obtained by dividing the serious, non-serious, and medical losses on the adjusted basis by the corresponding payroll exposure in $100 units.

(4) Present on Rate Level. Before determining a formula pure premium, the underlying pure premiums are put on the proposed rate level. In this way, when the credibility is zero the classification at least receives the overall average increase or decrease in rate level. In this example the underlying pure premiums are put on the proposed level by multiplying each partial pure premium (serious, non-serious or medical) by the average change in rate level for the industry group. However if the proposed revision should include the effect of newly enacted legislation which is not included in the underlying rates, a modification of the above procedure is introduced. If the effect of the amendment is 10% or over on serious losses, non-serious losses, or medical losses, the product of the partial effect of the amendment times the change in rate level excluding the effect of the law amendment is applied to each partial pure premium. For example an amendment increasing benefit payments to widows from 500 weeks to until death or remarriage would affect serious losses only. The classification actual losses have been adjusted to the proposed law level, and the effect of the law amendment is therefore concentrated in the indicated serious pure premium. Use of the average change in rate level to put the underlying pure premiums on the proposed level would spread the effect of this amendment equally over serious, non-serious and medical. Therefore, the procedure outlined above is followed. As a practical matter, this refinement is only resorted to when the amendments amounts to as much as 10% on one of the three parts.

(5) Derived by Formula. As indicated in the filing exhibit, the formula pure premiums are determined by weighting between the pure premiums indicated by the two latest years and the pure premium underlying the present state rate. If there has been a revision each year, the underlying present rate pure premium will reflect the experience of the second and third latest policy periods, combined with the experience of still earlier years introduced through the formula pure premiums of this previous revision, and so on. Thus the use of the indicated pure premiums for the two latest policy periods, formula rated against the underlying pure premiums, introduces a measure of stability by increasing the experience period for the classification as the classification credibility decreases. This also serves to minimize the effect of old conditions and old industrial procedures which may be no longer applicable, but which would be introduced if relativity were based on a longer policy period. The following table indicates the weight given each policy year according to the credibility assigned to the indicated pure premiums. It is assumed that revisions have been made annually based on the two latest policy years available at each revision, and that the classification indications received the same credibility at each revision.

Policy Year	*Weight of Each Policy Year when Credibility Is*								
	100%	*90%*	*80%*	*70%*	*60%*	*50%*	*40%*	*30%*	*20%*
1st Latest Year	.50	.45	.40	.35	.30	.25	.20	.15	.10
2nd " "	.50	.495	.480	.455	.420	.375	.320	.255	.18
3rd " "	.00	.050	.096	.137	.168	.188	.192	.179	.144
4th " "	.00	.005	.019	.041	.067	.094	.115	.125	.115
5th " "	.00	.0005	.0038	.0123	.027	.047	.069	.0875	.092
6th " "	.00	—	.0008	.0037	.011	.023	.042	.061	.074
7th " "	.00	—	—	—	—	.012	.025	.043	.059
8th " "	.00	—	—	—	—	—	.015	.030	.047
9th " "	.00	—	—	—	—	—	—	—	.038

(6) Assignment of Credibility. Credibility is assigned separately to "serious" pure premium indications, "non-serious", and "medical". This is done in order to recognize the varying nature of hazard by industry. The expectation of "serious" accidents (death, permanent total, or major permanent partial), for example, is greater in a "carpentry" risk than in a "store" risk, even for risks of the same premium size. For Code 5403 — Carpentry N.O.C., the serious pure premium is about 30% of the total pure premium, whereas in Code 8017 — Store Risks — retail, the serious pure premium is slightly under 10% of the total. Therefore, for classification experience of the same size in total (premium or expected loss), the occurrence of a "serious" loss in the store risk should receive much less credibility than in the carpentry risk.

The criteria for 100% credibility has been set on a judgment basis at the following points:

Serious — Expected losses equal 50 × average cost of a Serious Case.

Non-Serious — Expected losses equal 300 × average cost of a Non-Serious Case.

Medical — Criterion equal to 80% of Non-Serious Criterion.

The calculation of the credibility criteria is illustrated in the exhibit "Form J" included herewith. The amounts in columns (2) and (3) are posted from the exhibit "Form E" previously referred to and the amount of expected losses required for 100% credibility are shown in column (6). By reference to the exhibit "Form E", it is noted that the amounts in column (3) of Form J are based on actual losses modified by law amendment factors, development factors, and the correction for off-balance factor, i.e. the loss provision contemplated by the manual rates excluding the rate level adjustment factor, or more simply the expected losses on the proposed policy year rate level.

The expected losses for an individual classification are determined from the partial pure premiums underlying the present rates. These underlying pure premiums are, of course, on the present rate level rather than the indicated rate level. Therefore, to get the expected losses on the same level as the credibility criteria we must either modify each partial pure premium by the average change in rate level, or else modify the criteria so as to bring it to the level of the underlying pure premiums. Since we are dealing with about 200 reviewed classifications, the latter adjustment is the simplest and is the one which is followed. The details of this calculation are shown on the exhibit Form J in columns (7), (8) and (9). Column (7) is the summation of expected losses for each classification determined by extending the two year payroll exposure by the underlying serious, non-serious and medical pure premiums. A sample of this calculation is shown in the exhibit included herewith, designated as "Form H".

The calculations of columns (8) and (9) of the exhibit "Form J" are self-explanatory. It will be noted that the factor of column (8) is the reciprocal of the change in manual rate level indicated by the policy year experience.

The lower part of "Form J" shows the derivation of credibility criteria of less than 100%. The formula is:

$$E = W^{\frac{3}{2}} \text{ where}$$

E (exposure) is the percent of exposure required for 100% credibility to receive W (weight) % credibility. For example to receive 70% credibility we require expected losses equal to the square root of .70 cubed, or 58.6% of the amount required for 100% credibility.

(7) Credibility Criteria. A sample of "Form 'H' — Expected Losses" was referred to in footnote (3). Actually the calculation of these expected losses by classification is one of the first operations in the ratemaking process, and since the expected losses are independent of the proposed rate level, this calculation could be commenced even before the required rate level is determined. After the credibility criteria are determined as described above, the next stop is to compare the expected losses on Form H with these credibility criteria, and the appropriate credibility is noted in the column captioned "Cr"; 2 = 20%, 3 = 30%, etc. At the same time a check mark is put in the right hand margin of the sheet to indicate a "reviewed classification". An exhibit of classification experience as per Exhibit II-A of the filing is prepared for each reviewed classification.

Since the volume of experience by classifications varies from one year to another, as does also the credibility criteria, a classification that qualified for credibility at the last revision of rates may not qualify this year, and vice versa. Therefore, expected losses on Form H are calculated for every classification.

(8) Underlying Present Rate Pure Premiums. As indicated in Exhibit II of the filing these are the present rates, adjusted to restore the offsetting reductions for loss constants (See footnote (a) to Exhibit I Section A for a discussion of loss constants and offsetting reductions), adjusted to remove the supplementary loadings for disease and catastrophe, and then unloaded for the expense allowance.

If the change in policy year rate level should involve a change in the expense allowance as well as the change due to experience, some recognition of this must be made in the derivation of "Present on Rate Level" pure premiums as discussed in footnote (4) above. The indicated pure premiums, depending upon classification payrolls and adjusted losses, of course reflect only the actual experience and are not influenced by any proposed change in the expense allowance. Therefore, one method of procedure would be to calculate an average change in policy year manual level, excluding the effect of the change in expense allowance. However, this would require an additional set

of calculations and additional complications in the explanation of the filing. The same result is obtained by removing the *proposed* expense loading from the present manual rate and applying the *entire* manual change to the resulting underlying pure premiums to obtain "Present on Rate Level". A simple example may make this clearer. Suppose the experience indicated no overall change and the entire revision was due to a proposed increase in the expense allowance. Then if we take out the *proposed* expense allowance from the present manual rate and multiply by the proposed increase in manual level we would come out the same place as if we removed the *present* expense allowance and multiplied by the experience change of 1.000.

(9) Proposed Pure Premiums. The proposed pure premiums represent a compromise between statistical and underwriting practices. Looking for example at Code 1924, the first one on the attached sample of Exhibit II-A, we find

Indicated Pure Premium	Total .43
Formula Pure Premium	Total 1.08
Underlying Pure Premium	Total 1.07

It is normally expected that the total formula pure premium will be between the total indicated pure premium and the total pure premium underlying the present rate. However, this classification receives practically no credibility so the resulting formula pure premium is influenced more by the average change in rate level, 1.047 for the Manufacturing group, than by the risk's own experience. Therefore, we have a situation where we would be proposing an increased pure premium in the face of a decrease indicated by the classification's own experience. Underwriting practice would dictate no increase with favorable experience, at least for classifications whose experience receives some credibility.

Another example of middle pure premium selection is for Code 3381 — Silverware Mfg. (not reproduced here). This classification shows:

	Total P.P.
Classification indications	.39
Formula	.40
Underlying present rate	.36
Proposed pure premium	.39

In this classification an increase in pure premium is indicated, but the proposed increase is limited to the classification indications.

The same principles would apply to decreases, namely no decrease would be granted in face of a classification indicated increase, and any decrease granted would not be below the classification indications.

In this revision 48 classifications out of about 182 reviewed classifications were affected by the middle pure premium selection procedure.

When the proposed pure premium is other than the formula, the total proposed pure premium is reassigned to the parts, serious, nonserious, and medical, in the same proportion as shown by the formula pure premium. The indications of the formula pure premium are considered to be the best guide to the proper division. If the middle pure premium should be the indicated pure premium, for example, we would not want to bring down "zero" as the serious portion of the proposed pure premium; the relationship indicated by the formula is much better.

The proposal to limit the maximum departure in proposed rate to 25% increase or decrease from the present rate is also an underwriting practice designed to prevent too violent fluctuation of the rates from one revision to the next. At one time there was a flat 25% limitation regardless of the proposed change in rate level. It is evident however that with a substantial change in rate level such 25% limitation would have a serious effect on the realized rate level. To take an extreme case a 25% increase overall would result in an increase of 25% or *less* for every classification. Since some classifications indicate more than the average increase and others less, this process of limitation would be strictly a one-way street and the resulting premium would fall far short of requirements. Some modification of the limitations is therefore required for revisions with a substantial change in average rate level. The program adopted by our Actuarial Committee is Maximum Deviation = ½ (Percent change*) plus or minus 25% rounded to the nearest 5%.

*(Rate level change—1.000)

It is evident that the change in rate level must be 5% or over to produce any change in the basic limitation of 25%.

If the average change in rate level includes the effect of a newly enacted law amendment not included in the present rates the formula is modified to

Maximum Deviation = Law Amend + ½ (Percent change excluding L.A.) plus or minus 25%, rounded to nearest 5%.

There is an additional complication in that we desire these limitations to apply to the proposed rates. Since the pure premiums selected from the photostats will have "Correction Factors" (see footnote (10) following), the rate level adjustment factor, and offsetting reductions for loss constants applied to them before converting to a rate basis, it is apparent that something other than the 25% limitation must be applied to the pure premiums prior to the application of such factors. The procedure is to determine preliminary correction factors without regard to pure premium limitations. These are then combined with the rate level adjustment factor and any indicated change in the loss constant offsetting reductions, and the product divided into the 75%, 125% rate limitations. The calculation for Connecticut is as follows:

	Industry Group		
	Mfg.	*Cont.*	*A.O.*
1. Desired upper rate limitation factor	1.25	1.25	1.25
2. Desired lower rate limitation factor	.75	.75	.75
3. "First" correction factors (See footnote (10))	1.025	1.011	1.021
4. Rate level adjustment factor	.991	.991	.991
5. Change in Loss Constant Offsets	1.000	1.000	1.000
6. Composite factor (3)×(4)×(5)	1.015	1.001	1.013
7. Required pure premium upper limit (1)÷(6)	1.232	1.249	1.234
8. Required pure premium lower limit (2)÷(6)	.739	.749	.740

For each reviewed classification the statistical clerk multiplies the total pure premium underlying the present rate by the appropriate upper and lower limit factors as shown above and posts the results on the exhibit of classification experience work sheets. The staff member making pure premium selections then reviews these exhibits of classification experience and selects the middle pure premium between "indications", "formula" and "underlying", with due regard to these limitations. A check mark is placed opposite the selected pure premium as a guide to the typist preparing the originals for photostating.

Underwriting practices dictate certain combinations of classifications for ratemaking purposes. For example Code 2220 — "Yarn or Thread Mfg. — cotton", Code 2222 — Cotton Spinning and Weaving, and Code 2351 — Cord or Twine Mfg. — cotton are usualy combined for ratemaking purposes. A similar combination is Code 2737 — Sash, Door or Assembled Millwork Mfg., and Code 2802 — Carpentry — shop only. There are numerous other standard combinations; their enumeration is not essential to this paper. Although these classifications are usually combined for ratemaking purposes, their separate identities are maintained so that the experience may be examined and separate rates established if such procedure seems desirable.

Also certain classifications are deemed from an underwriting viewpoint to be inherently more hazardous than other related classifications, and the resulting pure premiums are considered in light of this judgment. If the classification considered less hazardous produces a higher selected pure premium than the other classification, the two classifications are usually combined temporarily for ratemaking purposes. A few examples of such prejudged relativity are:

1. Code 2157 — Bottling NOC not less than Code 2156 Bottling — no carbonated or spiritous liquors.
2. Code 2735 — Furniture Stock Mfg. should be higher than Code 2883 — Furniture Mfg.
3. Code 5508 — Street or Road Construction — rock excavation should be higher than Code 5507 Street or Road Construction — clearing right of way.
4. Code 8033 — Meat Grocery and Provision Stores not less than Code 8006 — Grocery Stores — retail.

In addition there are a number of "rate as" classifications where the rate for the classification, if non-reviewed, is determined by analogy to a predetermined reviewed classification, or combination of classifications, as determined by underwriting considerations.

These "proposed" pure premiums are not the true final proposed pure premiums as they are subject to correction factors as indicated in the following footnote, and also must be further modified by the rate level adjustment factor.

(10) Test of Proposed Pure Premiums. The process of determining formula pure premiums and departures from such pure premiums by the middle pure premium selection procedure, produces departures from the required rate level. Of course it is also possible that the reviewed classifications may produce a somewhat different rate level than all classifications combined, but there could not be much difference as the reviewed classifications represent the bulk of the volume.

The purpose of the test of proposed pure premiums is to determine the required correction factors so that these proposed pure premiums may reproduce the required rate level. The procedure is described in the extract from the filing and further comment seems unnecessary.

There is however one point that might be mentioned in this connection. In the previous foootnote (9) regarding pure premium limitations it was brought out that a preliminary test is made on the basis of the selected middle pure premium prior to consideration of any limitations (plus or minus 25% departure* from the underlying pure premiums). Having limited such pure premiums it is necessary to correct this previous test in order to determine revised correction factors. (In Connecticut there were no changes in pure premium selection so the first test was the final.) In theory we should then go back and examine our previous pure premium limitations in the light of the new correction factors and, possibly, determine additional limited classifications, revise the correction factors for the third time, etc. Actually this is not done, but the correction factors based on the limited pure premiums are used to determine manual rates. The manual rates are then tested to see that they fall within the desired rate limitation, thus picking up any possible new limited classifications due to revised correction factors and also any effect of rounding to the nearest $.01 in determining the manual rate.

* Modified as indicated above.

UNIT PLAN EXPERIENCE CODE 2003 — BAKERIES FROM TABULATING DEPARTMENT

50
51 | 1 | | | 050 — POL. YR | RPT | SCH | EXP.

CONNECTICUT

	CLASS CODE	INJ.			NO. OF CASES	† STATE	EARNED PAYROLL		EARNED PREMIUM	
SERIOUS — EXPECTED LOSSES ON BASIC LEVEL	2003	0	0	0	257	POLICIES INCL MEDICAL AID	14405879	POLICIES INCL MEDICAL AID	133640	0
NON SERIOUS						POLICIES EXCL MEDICAL AID		POLICIES EXCL MEDICAL AID		1
MEDICAL					257G	TOTAL	14405879G	TOTAL	133640G	
							INDEMNITY		MEDICAL	
TOTAL						1 DEATH 1		DEATH 1		
						2 P.T. 2		P.T. 2		
SERIOUS — ACTUAL LOSSES ON BASIC LEVEL	2003	1	0	3	1	3 MAJOR 3	4250	MAJOR 3	50	
NON SERIOUS	2003	1	0	4	25	4 MINOR 4	33299	MINOR 4	13786	
MEDICAL	2003	1	0	5	121	5 TEMP. 5	34371	TEMP. 5	25521	
TOTAL	2003	1	0	6	497	6 NON-COMP. 6	X X X X	NON-COMP. 6	9501	
O. D. ALLOC. CLAIM EXP.					X X X	7 CONTRACT 7	X X X X	CONTRACT 7		
					644G	TOTAL	71920G	TOTAL	48858G	TOTAL
MANUAL PREMIUM						SERIOUS		SERIOUS		
						NON-SERIOUS		NON-SERIOUS		
⊕						MEDICAL		MEDICAL		GRAND

ACTUAL INCURRED LOSSES — FORM NC-235 REV.

120778

51
52 | 1 | | | 050 — POL. YR | RPT | SCH | EXP.

CONNECTICUT

	CLASS CODE	INJ.			NO. OF CASES	† STATE	EARNED PAYROLL		EARNED PREMIUM	
SERIOUS — EXPECTED LOSSES ON BASIC LEVEL	2003	0	0	0	264	POLICIES INCL MEDICAL AID	15365707	POLICIES INCL MEDICAL AID	144800	0
NON SERIOUS						POLICIES EXCL MEDICAL AID		POLICIES EXCL MEDICAL AID		1
MEDICAL					264G	TOTAL	15365707G	TOTAL	144800G	
							INDEMNITY		MEDICAL	
TOTAL						1 DEATH 1		DEATH 1		
						2 P.T. 2		P.T. 2		
SERIOUS — ACTUAL LOSSES ON BASIC LEVEL	2003	1	0	3	5	3 MAJOR 3	24229	MAJOR 3	6410	
NON SERIOUS	2003	1	0	4	25	4 MINOR 4	28789	MINOR 4	8256	
MEDICAL	2003	1	0	5	118	5 TEMP. 5	31855	TEMP. 5	19451	
TOTAL	2003	1	0	6	498	6 NON-COMP. 6	X X X X	NON-COMP. 6	11094	
O. D. ALLOC. CLAIM EXP.					X X X	7 CONTRACT 7	X X X X	CONTRACT 7		
					646G	TOTAL	84873G	TOTAL	45211G	TOTAL
MANUAL PREMIUM						SERIOUS		SERIOUS		
						NON-SERIOUS		NON-SERIOUS		
⊕						MEDICAL		MEDICAL		GRAND

ACTUAL INCURRED LOSSES — FORM NC-235 REV.

300

Adjustment Of Incurred Losses — Code 2003 — Bakeries

(1) Incurred Losses			(2) Law Amend.	(3) Corr. For	(4)	(5) Comp.		(6) Adjusted
No.	*Kind*	*Amount*	*Factor*	*Off-Bal.*	*Develop. Factors*	*Factor (2)×(3)×(4)*		*Losses (1)×(5)*
			Policy Period 8-1-50 to 7-31-51					
0	Death	—	1.889	1.087	1.046	2.147		—
0	P.T.	—	1.789	1.087	1.046	2.034		—
1	Major	4,250	1.192	1.087	1.046	1.356		5,763
							(Ser.)	5,763
25	Minor	33,299	1.192	1.087	1.046	1.356		45,153
121	Temp.	34,371	1.192	1.087	1.046	1.356		46,608
							(N.S.)	91,761
xx	Med.	48,858	1.000	1.087	1.041	1.132		55,307
			Policy Period 8-1-51 to 7-31-52					
0	Death	—	1.587	1.087	1.046	1.804		—
0	P.T.	—	1.581	1.087	1.046	1.798		—
5	Major	24,229	1.161	1.087	1.046	1.320		31,982
							(Ser.)	31,982
25	Minor	28,789	1.161	1.087	1.046	1.320		38,001
118	Temp.	31,855	1.161	1.087	1.046	1.320		42,049
							(N.S.)	80,050
xx	Med.	45,211	1.000	1.087	1.041	1.132		51,179

NATIONAL COUNCIL ON COMPENSATION INSURANCE STATE CONNECTICUT

FORM "H" DATE JULY 29, 1954

MANUFACTURING EXPECTED LOSSES LOCAL REV'N. NO. 28

	1950-51 & 1951-52 Payroll	Expected Losses: Payroll x Underlying P.P.										
		Serious			Non-Serious			Medical			Total	
Code	(Hundreds)	P.P.	Amount	Cr	P.P.	Amount	Cr	P.P.	Amount	Cr	Amount	P.P.
1803	531,2	1.36	7224		.72	3825		.60	3187		14236	2.68
1852	1,200,8	.36	4323		.31	3722		.16	1921		9967	.83
1853	-										-	
1860	446,2	.19	848		.21	937		.39	1740		3525	.79
1924	3,637,2	.38	13821		.37	13458		.32	11639	2	38918	1.07
1925	2,265,0	.27	6116		.59	13364		.51	11552	2	31031	1.37
2001	-										-	
2002	475,6	.32	1522		.52	2473		.60	2854		6849	1.44
2003	29,771,6	.13	38703		.45	133972	9	.54	160767	10	333442	1.12
2014	324,8	.37	1202		.45	1462		.54	1754		4417	1.36
2016	-										-	
2021	-										-	
2030	-										-	
2039	3,230,0	.30	9690		.32	10336		.29	9367		29393	.91
2041 2045	2,354,2	.08	1883		.20	4708		.25	5886		12477	.53
2042	7,1	.17	12		.26	18		.43	31		61	.86
2065	29,8	.26	77		.32	95		.50	149		322	1.08
2070	20,482,2	.29	59398	2	.40	81929	6	.34	69639	6	210967	1.03
2081	520,5	.49	2550		.89	4632		1.10	5726		12908	2.48
2089	3,794,8	.25	9487		.44	16697	2	.44	16697	2	42881	1.13
2095	1,526,7	.24	3664		.44	6717		.55	8397		18778	1.23
2101	7,8	.21	16		.60	47		.74	58		121	1.55

* 8-1-50 to 7-31-51
† 8-1-51 to 7-31-52

NATIONAL COUNCIL ON COMPENSATION INSURANCE — FORM "J" — STATE CONNECTICUT

CREDIBILITY CRITERIA * † — DATE JULY 29, 1954

(Based on Policy Years 1950-51 & 1951-52) — LOCAL REV'N. NO. 28

(1)	(2) Losses on Manual Rate Level: Number [Form E:- Col. (2)]	(3) Losses on Manual Rate Level: Amount [Form E:- Col. (9)]	(4) Average Cost (3)÷(2)	(5) Basis of Credibility Criteria	(6) Full Cred. Criteria on N. R. L. (4) x (5)*	(7) Expected Losses on Present Level	(8) Ratio: Present to State M.R.L. (7) ÷ (3)	(9) Full Cred.Crit. on Assignment Level (6) x (8) d
a - Serious	730	7143523	9786	50 Cases	489300	6923407	xxx	468260
b - Non-Serious	26883	14494973	539	300 Cases	161700	13916731	xxx	154747
c - Medical	xx	10156511	xx	80% N.S.	129360*	9594694	xxx	123798
d -	27613	31795007	xx		xxx	30434832	.957	xxx

*Full Credibility Criteria For Medical = .80 x 6 (b)

(10) Credibility group	(11) Local Credibility	(12) $E=\sqrt{W^3}$	(13) Credibility Criteria on Assignment Level: Serious (9a) x (12)	(14) Non-Serious (9b) x (12)	(15) Medical (9c) x (12)	(16) Credibility Criteria on Assignment Level - Rounded: Serious	(17) Non-Serious	(18) Medical
10	1.00	1.000	468260	154747	123798	468300	154700	123800
9	.90	.854	399894	132154	105723	399900	132200	105700
8	.80	.716	335274	110799	88639	335300	110800	88600
7	.70	.586	274400	90682	72546	274400	90700	72500
6	.60	.465	217741	71957	57566	217700	72000	57600
5	.50	.354	165764	54780	43824	165800	54800	43800
4	.40	.253	118470	39151	31321	118500	39200	31300
3	.30	.164	76795	25379	20303	76800	25400	20300
2	.20	.089	41675	13772	11018	41700	13800	11000
0	.00	.000	xx	xx	Less Than	(16:2) 41700	(17:2) 13800	(18:2) 11000

8-5a

III DETERMINATION OF MANUAL RATES

Exhibits II and II-A illustrated the procedure for determining the loss portion of the proposed manual rates, or the proposed pure premiums. It now remains to convert such proposed pure premiums to rates by application of correction factors, expense loading, and catastrophe and disease loadings.

This last step in the ratemaking procedure is illustrated in the attached extracts from the Connecticut filing.

Exhibit III—Allowances for Expense, Taxes and Profit and Contingencies

Exhibit V—Computation of Final Manual Rate

Exhibit IV—Occupational Disease Rates

Exhibit VI—Schedule of Rates and Rating Values

(The order of Exhibits IV and V has been reversed here for the sake of continuity.)

CONNECTICUT FILING
EXHIBIT III

Allowances For Expenses, Taxes and Profit and Contingencies

Underlying the present and proposed rates are allowances of 36.0% for expenses, 2.5% for taxes and 2.5% for profit and contingencies. The items comprising these allowances are:

Item	*Allowances*
Acquisition and Field Supervision	17.5%
General Administration, Payroll Audit and Bureau	8.3
Inspection and Safety Engineering	2.0
Claim Adjustment	8.2
Total for Expenses	36.0%
Taxes, Licenses and Fees other than Federal Income Taxes	2.5
Profit and Contingencies	2.5
Total for Expenses, Taxes and Profits and Contingencies	41.0%
Permissible Loss Ratic for Manual Rates	59.0
Plus Expense Constant of $10.00	

It should be borne in mind that the allowances shown above apply only to the first $1000 of premium. For risks with premium over $1000 which in Connecticut represent about 8% of the total number of risks and about 74% 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 Administration with increasing premium size. The approved Connecticut premum discount percentages, which we propose be continued, are as follows:

Division of Standard Premium		*Stock Co. Discount*	*Non-Stock Co. Discount*
First	$ 1,000	—	—
Next	4,000	9.0%	3.5%
Next	95.000	14.5%	6.5%
Over	100,000	16.0%	6.5%

A tabulation of Connecticut experience by risk size from policies written to expire between August 1, 1952 and July 31, 1953 (the latest available policy period) shows that for nonparticipating stock carriers the above discounts produced a net discount of 5.8%. 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 states other than Connecticut.

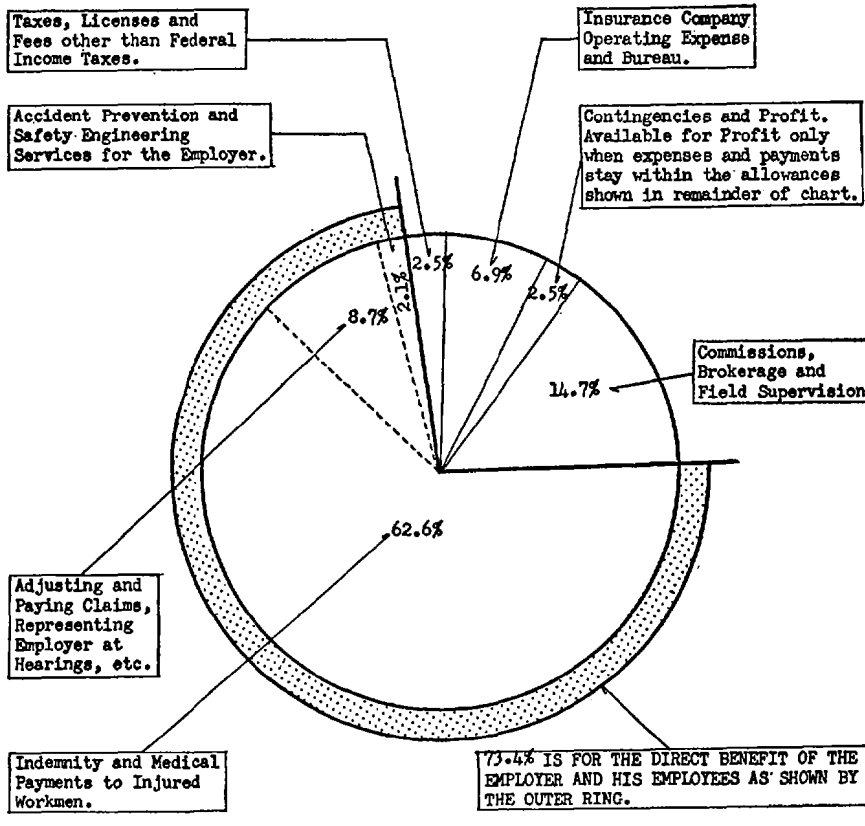
The tables below indicate for the non-participating stock carriers, the expense, taxes and profit and contingencies allowances on two bases. Column (1) lists the net allowances for the various items after reduction for premium discounts. Column (2) relates the various items to the premium actually collected i.e. 94.2% after premium discounts. Thus, losses in column (2) represent .59/.942th of the total.

Item	*(1) Percent Of Standard Premium (Adjusted for Discount)*	*(2) Related To 94.2% Of Standard Premium*
Acquisition and Field Supervision	13.8%	14.7%
General Administration, Payroll Audit and Bureau	6.5	6.9
Inspection and Safety Engineering	2.0	2.1
Claim Adjustment	8.2	8.7
Total for Expenses	30.5%	32.4%
Taxes, Licenses and Fees other than Federal Income Taxes	2.35	2.5
Profit and Contingencies	2.35	2.5
Losses	59.0	62.6
Total	94.2%	100.0%
Premium Discounts	5.8	—
	100.0%	100.0%

The circular chart on the next page is a graphic presentation of the figures in column (2) above.

NON-PARTICIPATING STOCK COMPANIES

BREAKDOWN OF NET PREMIUM RATE



NOTES:

1. Based on data from policies written to expire between 8/1/52 and 7/31/53
2. These figures do not contemplate premium from expense constants.

CONNECTICUT FILING

EXHIBIT V

Computation of Final Manual Rate

To obtain the final manual rate the following items are combined with the proposed pure premium. Then, the expense allowance, the occupational disease and the catastrophe loadings are added:

A. *Rate Level Adjustment Factor*

As previously stated, the classification experience shown in Exhibit II-A has been compiled excluding the rate level adjustment factor. It is necessary to bring in this factor before translating the proposed pure premiums to rates.

B. *Loss Constants and 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 by size of risk of Connecticut experience for the policy year rate level period (policies written to expire between August 1, 1951 and July 31, 1953) indicate that the present offsetting reductions will be appropriate for use with the proposed rates. By industry groups, loss constants and offsetting reductions follow:

Industry Group	*Loss Constant*	*Offsetting Reduction in Manual Rate*
Manufacturing	$10.00	.997
Contracting	—	1.000
All Other	3.00	.991

C. *Proposed Rates*

1. Reviewed Classifications — The proposed rates for the reviewed classifications are obtained by applying to the proposed pure premiums (From Exhibit II-A) a composite factor composed of the correction factor as calculated in Exhibit II, Section C and the Rate Level Adjustment Factor (Exhibit I, Section D), and then applying against that product rounded to two decimal places the loss constant offsetting reduction shown above divided by the permissible loss ratio of .590. This gives a rate composed of 59% for losses and 41% for expenses, taxes, profits and contingencies. The addition of the proposed occupational disease and catastrophe loadings gives the final basic manual rate.

The factors used in this proposal are the following:

(1)	(2)	(3)	(4)	(5)
Industry Group	*Correction Factor*	*Rate Level Adjust. Factor*	*Composite Factor (2)×(3)*	*Loss Constant Offsetting Reduction*
Manufacturing	1.025	.991	1.016	.997
Contracting	1.011	.991	1.002	1.000
All Other	1.021	.991	1.012	.991

2. *Non-Reviewed Classifications* — The proposed rates for the non-reviewed classifications are obtained by applying the Change in Manual Rate Level by Industry Group as determined in Exhibit I, Section E (Manufacturing 1.038, Contracting 1.016, All Other 1.046) to the present manual rates unloaded for catastrophe and occupational disease, and then adding the proposed occupational disease and catastrophe loadings.

A schedule of the proposed rates and rating values is attached.

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EXHIBIT IV

Occupational Disease Rates

The standard occupational disease program of the National Council on Compensation Insurance provides for an annual 20% reduction in the specific occupational disease elements for dust diseases until a minimum specific element equal to 20% of the National Occupational Disease One (b) Rate is reached. It is further provided that for any classification where 20% of the National O.D. One (b) rate is less than $.05, the specific element shall be eliminated entirely when the annual reduction process brings such element under $.05.

In view of the known existence of workmen who have already contracted dust diseases but who continue to work, and in view of the expected "catastrophic" nature of the emergence of claims for dust diseases in the event of an economic depression, it is felt that some loading in the compensation rates over and above the reflection of actual losses so far incurred is necessary. The minimum limit of 20% of the National O.D. One (b) rate is purely a matter of underwriting judgment.

The proposed manual rates shown in Exhibit VI include a general Occupational Disease element of $.01 for all classifications (except the per capita classes for which the general element is $.08 for Codes 0908 and 0909, and $.15 for Codes 0912 and 0913). In addition, for those classifications where they apply, specific occupational disease elements have been added.

No change in the present general occupational disease elements is proposed. However, the specific elements included in the proposed rates have been reduced in accordance with the program outlined above.

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EXHIBIT VI

RATES AND RATING VALUES

Code No.	*Rate*	*Min. Prem.*	*Loss Const.*	*Table II — Expected Loss Rates All Years*	*D Ratios Std.*	*D Ratios Ex-Med.*	*Ex-Med. Ratio*
0005	2.86	56.	3	1.49	.46	.30	.22
0006	3.53	66.	3.	1.84	.60	.42	.23
0008	2.86	56.	3.	1.49	.46	.30	.22
0034	2.64	53.	3.	1.37	.64	.43	.25
0035	1.78	40.	3.	.92	.60	.37	.29
0042	2.81	55.	3.	1.46	.61	.46	.19
0050	8.28	b137.	3.	4.33	.62	.39	.29
0059D	2.78	—	—	.89	.60	.50	—
0065D	.18	—	—	—	—	—	—
0066D	.27	—	—	.04	.63	.47	—
etc.	etc.	etc.	etc.	etc.	etc.	etc.	etc.

COMMENTS REGARDING EXHIBIT III —

ALLOWANCE FOR EXPENSES, TAXES AND PROFIT AND CONTINGENCIES

In addition to providing premium for the payment of losses, the manual rates must also provide an allowance for the expenses of doing business. This expense allowance is based upon the average requirements of non-participating stock carriers and is keyed to countrywide requirements since the usual insurance company operations are such as to preclude obtaining expense figures by state. The standard expense allowance is 41.0% which is made up as follows:

Acquisition and Field Supervision	17.5%
Claim Adjustment Expenses	8.2
Inspection and Accident Prevention	2.0
Bureau Expenses	0.6
General Administration and Payroll Audit	7.7
State Premium Tax	2.0*
Miscellaneous Taxes Licenses & Fees	0.5
Profit and Contingencies	2.5
Total Expense Allowance	41.0%*
Permissible Loss Ratio	59.0

Mention has been made that on risks below $500 an additional $10 Expense Constant is collected to make up for deficiencies on small risks in expense dollars resulting from the 41.0% allowance in the manual rates.

For large risks the 41.0% expense allowances produces more expense dollars than are actually required and the rating program provides for a premium discount on the risk's premium in excess of $1000. As shown in Exhibit III of the Connecticut filing these discounts are:

Risk Premium Distribution		*Stock Carriers*	*Non-Stock Carriers*
First	1,000	—	—
Next	4,000	9.0%	3.5%
Next	95,000	14.5	6.5
Over	100,000	16.0	6.5

*Subject to increase by amount state premium tax exceeds 2.0% Corresponding adjustment is made in the Permissible Loss Ratio.

These discounts are determined from the following gradation of expense allowances:

Premium Distribution		*Stock Co.'s Allow. For Acquisition*(1)	*Gen'l. Admin.*(2)	*Total*	*Non-Stock Allowance Acq. and Admin.*(3)
First	1,000	17.5%	7.7%	25.2%	25.2%
Next	4,000	12.5	4.1	16.6	22.1
Next	95,000	7.5	4.1	11.6	19.2
Over	100,000	6.0	4.1	10.1	19.2

Notes: (1) Acquisition is a budgetary item

(2) General Administration Expense gradation was determined from studies by size of risk

(3) The Non-Stock gradation is given in total only

From the above it is seen that the stock carrier expense allowance on premium from \$1000 to \$5000 has been reduced $25.2\% - 16.6\% = 8.6\%$. When further loaded for unrealized taxes and profit this becomes $8.6 \div .950 = 9.05\%$, which when rounded to the nearest 0.5 points becomes 9.0%. The other premium discount percentages were calculated in a similar manner.

It should be particularly noted that these premium discounts come entirely from savings in expenses; the original \$.59 out of each \$1.00 of manual rate, or rate adjusted for the experience rating modification, is required for losses. Therefore, in order to be able to compare the losses incurred with the provision for losses in the earned premium, it is necessary that the premium be reported to the National Council on a "Standard Basis", that is before premium discounts or the effect of retrospective rating. All Unit Statistical Plan Reports made to the National Council are on a standard premium basis, and all of our calls for Calendar Year data specify that, in addition to net earned premiums on direct business, the corresponding premium prior to premium discounts and retrospective rating shall also be reported. All ratemaking calculations are carried through in terms of standard premium.

Although risks which are retrospectively rated are not subject to premium discounts, the equivalents of the premium discounts are built into the retrospective rating values.

Thus it appears that the 41% expense loading is a statistical figure. The insurance carriers are placed in the unfortunate position of having to talk about a 41% expense loading in explaining the calculation of the manual rate, whereas the amount of the net earned premium actually available for expenses is a much smaller figure.

According to the figures shown for stock carriers for the latest policy year, these premium discounts (or their equivalent in the retrospective rating values) produced an average discount of 5.8%, reducing the 41.0% expense loading to 35.2% of standard premium, or $35.2 \div .942 = 37.4\%$ of the net premium. The makeup of the net premium dollar (on direct business) for stock companies is shown by the circular chart included as an appendix to Exhibit III of the Connecticut filing. As indicated on this chart claim adjustment expenses, and inspection and accident prevention work are expenses incurred in rendering service to the employer and his employees. This leaves a net overhead of 26.6% for the insurance carrier.

The derivation of the average 5.8% discount may be of interest. From our Unit Statistical Plan reports for the latest policy period we secure a tabulation of risks written by stock companies according to size of standard premium. This tabulation is summarized as follows:

Standard Premium Size	*(1)* *No. Of Risks*	*(2)* *Earned Standard Premium*	*(3)*	*(4)*	*(5)*	*(6)*
			Distribution of Premium For Each Group			
			1st 1,000	*Next 4,000*	*Next 95,000*	*Over 100,000*
0 to 1,000	27,074	4,447,368	4,447,368	xxx	xxx	xxx
1,000 to 5,000	1,556	3,095,002	1,556,000	1,539,002	xxx	xxx
5,001 to 100,000	349	4,558,215	349,000	1,396,000	2,813,215	xxx
Over 100,000	3	395,530	3,000	12,000	285,000	95,530
(a) Total	28,982	12,496,115	6,355,368	2,947,002	3,098,215	95,530
(b) Discount Applicable			0.0%	9.0%	14.5%	16.0%
(c) Amount of Discount			—	265,230	449,241	15,285

The total discount, sum of line (c), is 729,576, or 5.8% of the total standard premium shown in column (2).

This figure is undoubtedly on the conservative side since the Premium Discount Plan works on the basis of total risk size for all states, the first $1000 of risk premium, the next $4000 of risk premium, etc. being divided between states in proportion to the total risk premium. For example a risk with $1000 premium in Connecticut and $4000 in New York would have the following premium divisions for purposes of applying premium discounts:

State	*1st 1000*	*Next 4000*	*State Total*
Connecticut	200	800	1000
New York	800	3200	4000
Risk Total	1000	4000	5000

The $800 of Connecticut premium would be entitled to 9.0% discount. The $3200 of New York premium would also be subject to discount but at a different rate.

On an interstate risk with a substantial premium volume and numerous states involved, this procedure of division of premium and assignment to states can become very complicated. However there is a much simpler alternative available to the carriers through the use of published Premium Discount Tables which give the average percentage discount for various sizes of total risk premium. The procedure would be to determine the appropriate average discount for $5000 total risk premium from the Connecticut Premium Discount Table, and apply such percentage to the $1000 of Connecticut standard premium. The Discount Tables have been so constructed that this procedure produces the same result within 0.1%, as the "block" procedure illustrated above, and of course is much easier to apply when a sizeable premium volume and a substantial number of states are involved.

The total risk premium in all states is used for determining the appropriate discount percentages in states where premium discounts apply, even though some of the states included in the total premium may not have approved the premium discount principle.

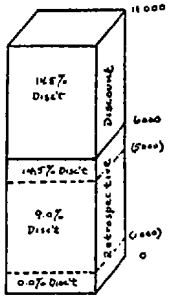
I might also include briefly the theory underlying the procedure when premium discounts and retrospective rating are involved on the same risk. As previously stated the retrospective rating values have the equivalent of the premium discounts built into the Basic Premium Ratios. The Premium Discount Rules provide

(1) Calculate the discount if the entire risk were subject to premium discounts.

(2) Calculate the discount if only the retrospective standard premium were subject to discount.

(3) Net discount equals (1)–(2)

Consider an $11,000 risk written by a stock-carrier, $6000 being subject to retrospective rating.



If we visualize the risk standard premium as being stacked or piled up with the premium subject to retrospective at the bottom, and the premium subject to discount piled on top, we would have a figure similar to the one at the left. It is readily seen that the $5000 of premium not subject to retrospective rating would be entitled to the 14.5% discount on premium over $5000. $5000 \times .145 = \$725$ discount. The procedure outlined above produces the same result.

Step (1) $(1000\times 0)+(4000\times .09)+(6000\times .145) = 360+870 = 1230$

Step (2) $(1000\times 0)+(4000\times .09)+(1000\times .145) = 360+145 = \quad 505$

Step (3) Net Discount (1)–(2) 725

Getting back to the average 5.8% discount for Connecticut, the portions of such discount due to acquisition graduation and general administration are determined from the risk distribution and the graduation of these allowances previously given. From this calculation it results that the average acquisition allowance contributes $17.5\% - 13.8\% = 3.7$ percentage points, and general administration etc. $8.3\% - 6.5\% = 1.8$ percentage points; the remainder of the 5.8% comes from taxes, profit and contingencies, since these amounts are figured on net premium collected. Thus it is seen that the insurance carrier has contributed 1.8 points out of 8.3 or about 22% of their share of expense money while the agents have contributed 3.7 points out of 17.5 or about 21% of their share.

COMMENTS REGARDING EXHIBIT V —COMPUTATION OF FINAL MANUAL RATE LEVEL

This Exhibit V merely recites the adjustments required to convert the proposed pure premiums to rates:

A. Rate Level Adjustment Factor: As indicated in Exhibit II the rate level adjustment was excluded throughout in the calculations involving classification experience. It is therefore necessary to apply this factor as a multiplier to the proposed pure premiums.

B. Loss Constants and Offsetting Reductions: As indicated in the discussion in footnote (9) to Exhibit I, it is customary to continue the present loss constants. In order that the application of such loss constants shall not increase the estimated manual premium in the aggregate, the anticipated return from such constants is applied as a discounting factor to the proposed manual rates. The details of the calculation for Connecticut are as follows:

	Industry Group		
	Mfg.	*Cont.*	*A.O.*
1. Premium at Present Collectible Rates (See Exhibit I Section A)	22,518,905	10,958,203	14,449,550
2. Present Corr. for Off.-Bal. Factor	1.076	1.076	1.076
3. Premiums at Present Manual Rates (1) × (2)	24,230,342	11,791,026	15,547,716
4. Proposed Change in Manual Level	1.038	1.016	1.046
5. Premiums at Proposed Manual Rates (3) × (4)	25,151,095	11,979,682	16,262,911
6. No. of Risks below $500 (From Tabulations)	6,558	10,531	41,297
7. Amount of Present Loss Constant	$10.00	0	3.00
8. Premium from Application of Constants (6) × (7)	65,580	0	123,891
9. Percentage Reduction Indicated (8) ÷ (5)	.003	0	.008
10. Offsetting Reduction in Manual Rates 1.0 − (a)	.997	1.000	.992

C. Proposed Rates

1. Reviewed Classifications. The correction factors required to make the proposed pure premiums reproduce the required rate levels by industry group have already been discussed in Exhibit II. These correction factors are combined with the rate level adjustment factor of .991 to produce a composite multiplier. This composite multiplier is applied to the proposed pure premiums shown on the photostats and the products rounded to the nearest two decimal places are entered on a form used for rate calculations. This gives us the "pure premiums underlying present rates" which will be required in connection with the next annual revision of rates. The loss constant offsetting reductions are divided by the permissible loss ratio .590 to obtain rate multipliers (our calculations are in part made on Comptometers where multiplication is much easier than division). Such rate multipliers are usually carried to four decimal places.
2. Non-Reviewed Classifications. Since the state experience for these non-reviewed classifications receives no credibility, the proposed rates for these classifications are obtained by multiplying the present rates for these classifications, unloaded by the catastrophe and disease loadings (general and specific, if any), by the appropriate industry group change in manual rate level, and then adding back the proposed catastrophe and disease loadings. However, sometime before the next rate revision, it will be necessary to go back and determine the underlying serious, non-serious, medical, and total pure premiums corresponding to the revised rate, so that these classifications can again be tested for credibility. It is entirely possible that a non-reviewed classification in one revision may become a reviewed classification in the next revision, and vice-versa.

Illustration Of Calculation Of Manual Rate — Code 2003 — Bakeries

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Proposed P.P. From Exhibit II-A	*Correction Factor (Exh. II — Part C)*	*Rate Level Adj. Factor*	*Composite Factor (2)×(3)*	*P.P. Underlying Proposed Rate (1)×(4)*	*Composite Multiplier*	*Prop. Rate (5)×(6) + .02†*
Serious .14	1.025	.991	1.016	.14	xx	xx
Non-Ser. .57	1.025	.991	1.016	.58	xx	xx
Medical .36	1.025	.991	1.016	.37	xx	xx
Total 1.07	1.025	.991	1.016	1.09	1.6898*	1.86

*Mfg. Loss Const. Offset of .977 ÷ permissible .590 = 1.6898.
†1¢ catastrophe loading + 1¢ general disease loading.

Expected Loss Rate = (1.86 − .02) × .524 Expected Loss Rate Factor = .96.

COMMENTS ON EXHIBIT IV

The matter of occupational disease rates is a complex and troublesome one. To attempt to give a complete picture of the past history of this subject is beyond the scope of this paper.

Concurrently with the adoption of the new policy form for Workmen's Compensation Insurance a simplified disease rate program has also been adopted effective October 1, 1954. The discussion herein relates only to this simplified program.

At the present time most state compensation acts include occupational diseases under the Act. Some state acts include a list of diseases which are compensable, others include occupational diseases by the definition of injury, and in still others a separate occupational disease act has been established.

Under the new program for treatment of occupational diseases it is provided that the manual rates include an allowance for complete coverage for diseases under both Coverage A and Coverage B (up to basic limits) of the policy. If the rules of the Workmen's Compensation Manual permit rejection of disease coverage under either Coverage A or Coverage B provision is made for a corresponding reduction of the manual rate. The new policy has also been broadened somewhat by elimination of the word "occupational" so it now refers simply to "Disease".

Diseases may be divided into two kinds. Dust Diseases of which silicosis is the prime example, and "Non-Dust Diseases" such as lead poisoning, mercury poisoning, dermatitis, etc. These latter non-dust diseases are considered to be controllable and hence not requiring any special recognition in the ratemaking procedure, except during the infancy of the act until such time as the disease losses are reflected in the underlying ratemaking data.

On the other hand silicosis is a matter of great concern to the insurance carriers. It is known through the use of chest x-rays, etc., that there are many employees working in foundries and similar dusty industries who have already contracted silicosis to some degree and need only to be thrown out of work to become a compensation claim. Under these circumstances the insurance companies feel that there should be something additional in the compensation manual rate for these classifications beyond the actual incurred loss indications, to take care of these latent cases. The opinion regarding the amount of such additional specific element has varied from time to time. The current thinking is that a minimum specific element equal to 20% of the National rate for disease coverage under Coverage B of the new policy would be reasonable.

As a matter of interest I have included a schedule showing such National Coverage B rates. In order to arrive at the minimum specific disease elements, the current disease rating program provides for a reduction of the present elements by 20% annual until such minimum is reached. The program further provides that any specific disease element falling below $.05 by such procedure shall be dropped entirely.

The Connecticut Compensation Act and some of the Acts of other states provide the same benefits for disability due to silicosis as for similar disability due to traumatic injury. More recently however it has been the trend to limit the amount of benefit payable for silicosis to a nominal amount, usually $500, if the disease claim is brought

during the month in which silicosis was brought under the Act. This maximum amount is increased with the age of the Act, usually at the rate of $50 per month until the same monetary limit as for other injuries is reached. Partial disability is not compensable. This type of legislation is usually referred to as an "Escalator Act" and creates special problems in ratemaking.

Under the escalator type act, incurred losses if of sufficient volume to affect the results must be revalued to the average escalator value for the period during which the proposed rates are to be effective. Also the increasing benefit provision theoretically require an increase in the specific disease elements each year, just as an increase in traumatic benefits due to a law amendment must be recognized. Finally the program is complicated by that portion of the general program which provides for a minimum specific element to be reached eventually by a 20% annual reduction in the specific element.

The current program in these states is to calculate a theoretical maximum specific disease element corresponding to the top limit provided by the escalator provisions of the Act. Then when disease exposure is reflected in the policy year data used for ratemaking purposes, such theoretical maximum element is reduced 20% for that revision, 20% additional for the next annual revision, etc. thus creating a theoretical "descending escalator" with 20% of the national dust disease Coverage B rate at the bottom. When such "descending escalator" produces lower specific disease elements than the normal increase which the increasing cost provisions of the Act would produce, we shift over onto the escalator "down". The disease benefit provisions of most state Acts are now of sufficient age so that the maximum escalator benefits are payable.

The incurred disease losses, revalued if necessary for escalator provisions are included in the ratemaking procedure for all states.

In addition to specific elements for dust diseases, the program also calls for a general element of $.01 to be added to the rate for each classification to provide for the miscellaneous and unforeseen diseases which occur from time to time in many classifications which are not considered to carry any special disease hazard.

The collection of the specific disease loadings for these silicosis cases where a claim has not yet been brought is of somewhat doubtful utility from the overall viewpoint. Unless the carrier includes some sort of reserve in the calendar year experience for these potential, but not incurred losses, the additional premium resulting from the specific disease elements will appear as underwriting profit and serve to reduce the overall rate level through the operation of the Rate Level Adjustment Factor. However the inclusion of such specific disease elements does result in the allocation of a larger portion of the total net premium to these particular classifications than would otherwise be realized.

NATIONAL COVERAGE B RATES FOR DUST DISEASES

Code	*Classification*	*Cover B Rates*	*Minimum Element*
0059	Incidental Abrasive or Sand Blasting	5.38	1.08
0065	Incidental Foundries—steel	.78	.16
0066	Incidental Foundries—non-ferrous	.78	.16
0067	Incidental Foundries—iron	.78	.16
1164	Mining—not coal—with shafts	.80	.16
1165	Mining—not coal—surface	.40	.08
1605	Rock Excavation	.40	.08
1624	Quarries	.40	.08
1710	Stone Crushing	.40	.08
1741	Flint or Spar Grinding	5.40	1.08
1747	Emery Works	.35	.07
1748	Abrasive Wheel Mfg.	.12	.00*
1803	Stone Cutting or Polishing	4.80	.96
1852	Asbestos Goods Mfg.	3.00	.60
1860	Abrasive Paper or Cloth Preparation	.24	.05
3081	Foundries—iron	.80	.16
3082	Foundries—steel castings	1.00	.20
3085	Foundries—non-ferrous metals	1.00	.20
3089	Pipe Mfg.—cast iron	.08	.00*
3091	Enameled Iron Ware Mfg.	.08	.00*
3122	Cutlery Mfg.	.43	.09
3175	Radiator or Heater Mfg.—cast iron	.40	.08
3224	Agate or Enamel Ware Mfg.	.12	.00*
4021	Brick or Clay Products Mfg.	.10	.00*
4024	Refractory Products Mfg.	.43	.09
4053	Potteries—China or Tableware Mfg.	.50	.10
4054	Terra Cotta Mfg.	.20	.00*
4061	Potteries—glazed or porcelain—hand molded	.20	.00*
4062	Potteries—Porcelain ware by mechanical press	.10	.00*
5469	Cleaning or Renovating Outside Surfaces of Bldgs.	2.52	.50
5508	Street or Road Const.—rock excavation	.40	.08
6251	Tunneling—not pneumatic	.80	.16
6252	Shaft Sinking	.80	.16

*Minimum less than .05

MISCELLANEOUS RATING VALUES

In addition to showing Manual Rates, the schedule of proposed rates and rating values, Exhibit VI, also shows Minimum Premiums, Ex-Medical Ratios, and Expected Loss Rates and "D" ratios for the Experience Rating Plan.

The Minimum Premium is the lowest amount for which a carrier is willing to write a policy. It assumes a single employee with an annual wage of $1500 as representing a minimum size risk. $1500, of course, represent 15 units of payroll exposure and the minimum premium formula is therefor

$$15 \times \text{Manual Rate} + \text{Expense Constant} + \text{Loss Constant}$$

Due to special conditions existing in some classifications, special minimum premiums have been established on a judgment basis. Such minimum premiums are indicated by the symbols "b" on the exhibit of rates and rating values.

If a risk meets certain requirements it may be allowed to take care of its own medical costs, in which case a reduction in the manual (or adjusted) rate is allowed. Such risks are said to be written on an ex-medical basis and the Ex-Medical Ratios represent the percentage reduction in rate granted in these circumstances. Although the risk may agree to take care of his own medical losses, in the event of his failure to do so the liability would revert back to the insurance carrier. Also the carrier may wish to maintain some supervision over the type of medical treatment given, and possibly intervene and incur some medical costs on such ex-medical policies. Furthermore the general administration expenses are the same on an ex-medical policy as for a statutory medical. Therefore, it is considered necessary to retain part of the medical portion of the rate and the manual rate is reduced only by 70% of the medical portion of the rate. The formula is therefore:

$$\text{Ex-Med. Ratio} = \frac{\text{Medical pure premium} \times .70}{\text{Total pure premium}}$$

It is more convenient to work in terms of pure premium than in terms of rate as only the pure premiums are divided into serious, non-serious, and medical.

Instead of being written on an ex-medical basis an employer may wish to offer his employees benefits beyond the statutory benefit provisions. In Connecticut the Compensation Act provides unlimited medical benefits but in some other states a monetary limit is put on the amount of medical provided by the Act. From a tabulation of medical losses by size of loss for states with unlimited medical benefits, a distribution is obtained of the percent of total medical losses in excess of various monetary amounts per case. From such distribution the percentage medical increase from the state monetary limit to unlimited medical is calculated. This is then related to the total manual rate in the same manner as for the Ex-Medical Ratio. Such Extra Legal Medical Ratios may be shown by classification, or a flat adjustment factor to produce the equivalent result when applied to the

Ex-Medical Ratio may be calculated. Where the latter procedure is followed the relationship is as follows:

$$\text{Extra Legal Ratio} = \frac{\text{Med. P.P.} \times \text{Med. \% increase}}{\text{Total Pure Premium}}$$

$$\text{Extra Legal Med. Factor} \times \text{Ex-Med. Ratio} = \text{Extra Legal Med. Ratio}$$

$$\text{Extra Legal Med. Factor} \times \frac{\text{Med. P.P.} \times .70}{\text{Total P.P.}} = \frac{\text{Med. P.P.} \times \text{Med. \% increase}}{\text{Total P.P.}}$$

$$\text{or Extra Legal Med. Factor} = \frac{\text{Med. \% Increase}}{.70}$$

As an additional safeguard against excessive loss on a single case a limit of $10,000 per person beyond the statutory limit is provided, with provision for increasing such limit for an additional charge.

The Expected Loss Rates and D ratios are Experience Rating Plan values. The Expected Loss Rates are dependent upon the Manual rates and their derivation will be described briefly. The experience used in determining the Experience Rating Plan modifications for risks to be written at the proposed rates will, on the average, be the same two policy years as used to determine the manual rates plus a subsequent policy year not yet developed at the time of calculating the rates. The Experience Rating Plan uses actual incurred losses without modification, except for death and permanent total cases where an average value on the latest law level is used. Therefore, in order to get expected losses on a "raw" level comparable with the actual losses, the manual rates are unloaded by the averages of the various factors which were applied to such losses (or the resulting pure premiums) in developing such manual rates. These factors include average law amendment factors, development factors, the rate level adjustment factor, and the expense loading. The correction for off-balance factor is not removed, as the theory underlying this factor requires that it be left in the expected losses of the Experience Rating Plan. The amendment factor is adjusted to recognize that death and permanent total cases are included at the present law level. These factors are combined into a composite Expected Loss Rate Factor which is applied to the manual rates after unloading them by the disease and catastrophe loadings. The calculation of this expected loss rate factor for Connecticut is as follows:

Policy Period	*(1) Average Amendment Factor*	*(2) Average Loss Devel. Factors*	*(3) Rate Level Adjustment Factor*	*(4) Expense Allowance Factor*	*(5) E.R.P. Loading Factor*	*(6) Product (1)×(2)×(3) ×(4)×(5)*	*(7) Expected Loss Rate Factor 1.0÷(6)*
8-1-50 to 7-31-51	1.109	1.000	.991	1.695	1.03	1.920	.521
8-1-51 to 7-31-52	1.090	1.008	.991	1.695	1.03	1.902	.526
8-1-52 to 7-31-53	1.055	1.044	.991	1.695	1.03	1.906	.525
						Unweighted Average	.524

Referring to the above calculation, the first two policy periods are those used in determining the manual rate level and classification rates. The 8-1-52 to 7-1-53 experience will be used in the experience rating of individual risks but is not yet available for ratemaking purposes. The amendment factors in column (1) are the weighted average of the following factors as used in the ratemaking procedure (compare with Exhibits Form "E" in Section I):

	1950-51	*1951-52*	*1952-53*
Death	1.000	1.000	1.000
P.T.	1.000	1.000	1.000
Major	1.192	1.161	1.098
Minor	1.192	1.161	1.098
Temporary	1.192	1.161	1.098
Medical	1.000	1.000	1.000

Notes: D. & P.T. cases are included at an average value on the present law level; therefore, the amendment factors as used in this calculation to work back to the level of losses included in the experience rating calculation are 1.000.

The factors for the 1952-53 are those which will apply when this year enters into the ratemaking procedure, and are weighted by the 1951-52 distribution to determine the 1.055 factor used in column (1).

The average loss development factors shown in column (2) are obtained from Exhibit I-A (See Section I) and correspond to the "reporting basis" of the losses as used in the individual risk rating; for example in an experience rating calculation the losses for the latest experience year (1952-53) will be on a first reporting basis, the losses for 1951-52 will be on a second reporting basis, and the losses for 1950-51 will be on a third reporting basis. The rate level adjustment factor of .991 was derived in Section I, and the Expense Allowance Factor is merely the reciprocal of the permissible loss ratio $1.0 \div .590 = 1.695$. The Experience Rating Plan Loading Factor of 1.03 shown in column (5) is a traditional factor which was introduced in the old experience rating plan prior to either the Unit Plan or the Multi-Split Experience Rating Plan and has been retained ever since; I believe its original purpose was to compensate for the difference in losses as reported for ratemaking purposes and experience rating purposes. Its continuation reduces the required correction for off balance factor.

No attempt will be made to explain the "D" ratios, since these values are determined entirely from statistics obtained from the computations of experience rating modifications, and are independent of the ratemaking computations.

CONCLUSION

The author hopes that he has been able to remove some of the mysteries from the compensation ratemaking procedure and reveal it as a simple, logical process in spite of the many details involved.

Much of the detail has developed from the modification of past practices and procedures as required by the introduction of new elements in the ratemaking procedure. The present procedure can by no means be considered a finished product; for example at present a suggestion to relate claim adjustment expenses to losses is now being considered. If this procedure is adopted, it would seem logical to apply a "claim expense multiplier" to the classification pure premiums. What changes might be necessary to adapt the ratemaking procedure to electronic machine computation is beyond the present scope of this author.

ADDENDUM

Subsequent to the November meeting of the Casualty Actuarial Society at which this paper was summarized, certain changes in detail of the expense allowance and its method of application have been made. No fundamental changes in principle are involved, but it seems desirable to outline these changes and their effect on the ratemaking procedure.

At the December 1954 session of the National Association of Insurance Commissioners, the Workmen's Compensation Committee of the NAIC was informed that the standard ratemaking procedure of the National Council had been revised to provide:

(1) The allowance in the manual rates for service and overhead items other than loss adjustment expenses, taxes, profit and contingencies be reduced from the present 27.8% of standard premium to 27.0% of such premium; and

(2) Loss adjustment expense, in lieu of being treated for ratemaking as a percentage of standard premium, be treated as a percentage of losses, and be combined with such losses, in accordance with the procedure followed in automobile and general liability insurance.

A comparison of the proposed expense allowance with the present as shown in Exhibit III of the Connecticut filing letter is as follows:

Item	*Expense Allowance* *Present*	*Proposed*
Acquisition & Field Supervision	17.5%	17.5%
General Administration, Payroll Audit & Bur.	8.3	7.5
Inspection & Safety Engineering	2.0	2.0
Total for Expenses — ex Loss Adjustment	27.8%	27.0%

Taxes, Licenses & Fees other than Federal Income Tax	2.5	2.5
Profit & Contingencies	2.5	2.5
Total for Company Expenses Taxes, Profit & Contingencies	32.8%	32.0%
Permissible Loss & Loss Adjustment Ratio	67.2%	68.0%
Expected Loss Ratio	59.0%	59.6%
Loss Adjustment Expense:		
Related to Premium	8.2%	8.4%
Related to Expected Losses	13.9%	14.0%
Expense Constant	$10.00	$10.00

To illustrate the application of the revised procedure to the calculation of the overall change in rate level, the previous Connecticut figures have been revised in accordance with the new program.

In Exhibit I of the Connecticut filing, Part A showing policy year premiums and losses would be revised to show:

Policies Expiring During Year Ending	*(1) Premiums At 10-1-53 Coll. Rates*	*(2) Loss and Loss Adjustment Expense On 10-1-53 Law Level*	*(3) Loss and Loss Adjustment Ratio*
Manufacturing Group — Schedules 5 to 25 Inclusive			
7-31-52	10,881,556	7,894,274	.725
7-31-53	11,637,349	7,804,318	.671
TOTAL	22,518,905	15,698,592	.697
Contracting Group — Schedules 26 and 27			
7-31-52	5,188,599	3,475,765	.666
7-31-53	5,769,604	4,011,308	.695
TOTAL	10,958,203	7,487,073	.683
All Other Group — All Other Schedules Except Schedule 29			
7-31-52	6,789,295	4,733,848	.697
7-31-53	7,660,255	5,425,756	.708
TOTAL	14,449,550	10,159,604	.703
All Industry Groups			
7-31-52	22,859,450	16,103,887	.704
7-31-53	25,067,208	17,241,382	.688
TOTAL	47,926,658	33,345,269	.696

It will be noted that the experience on the "Actual Basis" is not shown. Since this experience serves no useful purpose in the ratemaking procedure, it has been decided to delete this from the body of Exhibit I and submit these data as a supporting exhibit.

The premiums at the 10-1-53 collectible level are the same as in the original exhibit. The "Loss and Loss Adjustment Expenses" shown in column (2) above are the figures from column (5) of the original exhibit multiplied by 1.14 to introduce loss adjustment expense. The ratios in column (3) above are combination loss and loss adjustment ratios.

The Correction for Off-Balance Factor would not be affected by the revised procedure.

Part C showing the policy year indicated change in manual rate level would be revised as follows:

	Industry Group			*Average All*
	Mfg.	*Cont.*	*A. O.*	*Groups*
1. Pol. Yr. Average Collectible Loss and Loss Adjustment Ratio (Part A Col. (6))	.697	.683	.703	.696
2. Permissible Loss and Loss Adjustment Ratio	.680	.680	.680	.680
3. Indicated Change in Coll. Level (1) ÷ (2)	1.025	1.004	1.034	1.024
4. Change in Corr. for Off-Balance	1.010	1.010	1.010	1.010
5. Pol. Yr. Indicated Change in Manual Rate Level (3) × (4)	1.035	1.014	1.044	1.034

The net effect of the revised procedure is a reduction of 1% as indicated by the ratio of expected loss ratios .590 ÷ .596 = .990. The previous changes in policy year rate level 1.047, 1.025, 1.056, and 1.044 (see the body of the paper) multiplied by .990 produce approximately the above figures; exact agreement is not attained due to our standard procedure of rounding each partial result in a chain calculation to the nearest three decimal places.

PART D — RATE LEVEL ADJUSTMENT FACTOR

The method of calculating the rate level adjustment factor described in the body of the paper is to place the calendar year premiums on the rate level indicated by the policy year data and calendar year losses on the latest law level, and then subtract the resulting loss ratio from the calendar year permissible. It will be recalled that an adjustment of the permissible loss ratio was made to recognize that the calendar year premium included premium from the expense constant. It was also demonstrated in the footnote (6) of Section A Exhibit I that such expense constant premium was equivalent to 1.5 points in expense allowance.

The expense constant premium is still considered to amount to 2.5% of the total premium, but it can be demonstrated that the appropriate adjustment of the revised expense allowance, excluding loss adjustment expenses, is revised to 1.7 points:

1.	Expenses (ex loss adjustment) in premium derived from manual rate, i.e. excluding expense constant premium.	.320
2.	Expenses (ex loss adjustment) in manual premium related to total (incl. expense constant) premium (1) $\times$.975	.312
3.	Expense constant premium, ratio to total premium	.025
4.	Total expenses (ex loss adjustment) related to total premium (2) + (3)	.337
5.	Indicate point offset for expense constant (4) − (1)	.017

The use of different permissible loss ratios for policy year data and calendar year data has always been troublesome to explain, and a shift from 1.5 points to 1.7 points for the effect of the expense constant would undoubtedly add to the difficulties. Therefore it has been decided to adjust the calendar year premium by reducing it 2.5% for the effect of the expense constant, thus producing a calendar year permissible loss and loss adjustment ratio of 68.0% (in a standard 2.5% tax state), the same as for the policy year data.

As indicated in the discussion of the rate level adjustment factor in the body of the paper, the process of subtracting the calendar year adjusted loss ratio from the permissible automatically assigns a weight to the calendar year indications equal to the permissible loss ratio used. With the inclusion of loss adjustment expenses with losses, the former procedure would assign a weight of 68% to the calendar year data. The various Committees of the National Council agreed with the Council Staff that an increase in the effect of the calendar year data on the final rate level was undesirable.

The revised procedure for calculating the rate level adjustment factor provides that the policy year data and the calendar year data (both on the level of present collectible rates and present law and with calendar year premium adjusted to exclude expense constant premium) shall receive equal weight in determining the final rate level. Or in formula form:

$$\frac{(\text{Pol. Yr. Loss Ratio} \times .50) + (\text{Cal. Yr. Loss Ratio} \times .50)}{\text{Permissible Loss Ratio}} = \text{Rate Level}$$

The corresponding rate level adjustment factor is therefore

$$\frac{(\text{Pol. Yr. Loss Ratio} + \text{Cal. Yr. Loss Ratio}) \times .50}{\text{Pol. Yr. Loss Ratio}}$$

The calculation of the Connecticut rate level adjustment factor under the revised procedure therefore becomes:

	Experience of 12 Cal. Months End. 12-13-53		
	(a) Actual Basis	*(b) Factor to Adjust To Present Rate and Law Level*	*(c) Adjusted Basis*
1. Standard Earned Premium	24,988,967	1.120*	27,987,643
2. Incurred Loss & Loss Adj. Exp.	17,723,059†	1.092	19,353,580
3. Loss & Loss Adjust. Ratio	.709	xx	.692
4. Policy Year Loss & Loss Adj. Ratio			.696
5. Mean of (3) and (4)			.694
6. Rate Level Adjustment Factor (5) ÷ (4)			.997

*Previous factor of $1.149 \times .975 = 1.120$
†Incurred losses of $15,546,543 \times 1.14 = 17,723,059$

The revised changes in manual rate level, shown in Part E of Exhibit I of the Connecticut filing would be as follows:

Industry Group	*Pol. Yr. Rate Level Change*	*Rate Level Adjustment Factor*	*Change In Manual Rate Level*
Manufacturing	1.035	.997	1.032
Contracting	1.014	.997	1.011
All Other	1.044	.997	1.041
Total	1.034	.997	1.031

II. DETERMINATION OF CLASSIFICATION RELATIVITY

The determination of classification relativity would be essentially the same as previously described. In addition to law amendment factors and development factors applied to the losses by classification we would also include a loss adjustment expense factor of 1.14 in the composite multiplier applied to "raw" losses. The resulting pure premiums would of course reflect loss adjustment expense. Under the new procedure, the correction for off-balance factor would not be in-

cluded with the losses at this point, but would be combined with the final multiplier to convert proposed pure premiums to rates.

In getting the "underlying present rate pure premiums", after removing the catastrophe and disease loadings and restoring the offsetting reductions for loss constants, the correction for off-balance factor would also be removed, leaving rates at present collectible level. The proposed permissible loss and loss adjustment ratio of 68.0% would then be applied, producing underlying pure premiums including loss adjustment expenses.

Since the correction for off-balance factor is being excluded from these exhibits of classification experience, the proposed changes in policy year collectible level (Manufacturing 1.025, Contracting 1.004, All Other 1.034 — see line 3 of the revised Part C Exhibit I) would be applied to these "underlying present rate pure premiums" to produce "Present on Rate Level."

The formula pure premiums would be determined as formerly. In assigning credibility, the losses in column (3) of Form J would include the 1.14 factor for loss adjustment expenses and would exclude the correction for off-balance factor. Similarly the expected losses on present level shown in column (7) of Form J would be determined from pure premiums including loss adjustment expenses, i.e. from the "underlying present rate pure premium" as derived for exhibition in the classification experience exhibits. Actually it may be more convenient for this first cycle of revisions to exclude loss adjustment expenses from both the credibility criteria and the expected losses. In any event, there is an automatic safeguard provided in the adjustment factor of column (8) so that if there should be a slip up whereby the 1.14 factor were omitted from either column (3) or column (7), the correct credibility would nevertheless be assigned. In the calculation of manual rates, the proposed loss and loss adjustment pure premiums would be modified by the rate level adjustment factor and the test correction factors, to determine "underlying present rate" pure premiums for the next revision, and would then be modified by the correction for off-balance factor, loss constant offsets, and the expense multiplier corresponding to the proposed 68% permissible loss and loss adjustment ratio ($1.0 \div .680 = 1.471$).

MISCELLANEOUS VALUES

In the experience rating procedure, there would be no modification of the risk actual losses used in determining an experience modification. Therefore in determining "expected loss rates" for the Experience Rating Plan the entire expense allowance would be removed from the manual rate. That is expected loss rates would be practically the same as at present.

Concurrently with the introduction of the revised expense program, the stock and non-stock carriers propose a revision of the graduation of expense provisions, as follows:

	Stock Carriers			*Non-Stock Carriers*
	Acquisition	*Admin. & Audit*	*Total*	*Acquisition Admin. & Audit*
First $1,000	17.5%	7.0%	24.5%	24.5%
Next 4,000	12.5	4.1	16.6	22.1
Next 95,000	7.5	4.1	11.6	19.2
Over 100,000	6.0	4.1	10.1	17.8

Corresponding to the revised expense allowance, an adjustment of Premium Discounts is required, as follows:

	Stock		*Non-Stock*	
	Present	*Revised*	*Present*	*Revised*
First $1,000	—	—	—	—
Next 4,000	9.0%	8.5%	3.5%	2.5%
Next 95,000	14.5	13.5	6.5	5.5
Over 100,000	16.0	15.0	6.5	7.0

Finally, although this does not apply in Connecticut, the procedure for calculating the premium charge for an additional medical endorsement has been revised. The present procedure provides, in states where the compensation act stipulates a maximum monetary limit to medical benefits, for a varying charge by classification depending upon the ratio of medical pure premium to total pure premium for the classification. For this there is substituted a flat percentage, based upon average state requirements, of the premium for standard limits of coverage (under Coverage B of the policy) at manual or experience adjusted rates.