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NOTICE

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PROCEEDINGS

May 26-27, 1955

SOME RANDOM COMMENTS ON ELECTRONICS

PRESIDENTIAL ADDRESS BY SEYMOUR E. SMITH

A great many things have been and will continue to be said about the casualty and fire insurance business, covering a wide range of varying comment. To my knowledge, however, no one has ever accused us of suffering from a lack of problems. We always have them with us, both the big ones and the little ones. From casual observation it would appear that at any one period of time, one of these large size problems seems, by common consent, to be what in another field of activity would be called "Number One on the Hit Parade." No meeting or speech may be considered properly complete without some reference to it. Basically, this widespread concentration bespeaks a most commendable effort to arrive at sound solutions for the business as a whole. In addition, the wide base of thought and opinion insures the likelihood of reasonable and sensible conclusions after all segments have had full opportunity to be heard. The process of arriving at these conclusions, however, often takes a considerable amount of time and energy, and frequently takes paths that temporarily lead far astray from the ultimate answers.

Not too many years ago, the subject of rate regulation was the one uppermost in practically all discussions of our business. I am sure that you will all recall the period when it was considered almost indecent for any speech not to contain at least some reference to SEUA. I do not mean in any way to belittle the importance or magnitude of this problem, but at times in the past the predictions and suggested solutions were wondrous to behold. Upon occasions we were told that our entire business must undergo the most drastic and complete upheavals. Our methods of doing business and our relations with our customers all had to be changed. Rating methods and procedures that had been evolved over the years, and which had produced equitable and satisfactory results, must be relegated to the discard. Creative imagination and sound judgment had to be completely eliminated and we were all to be cast into a rigid mold designated by a ponderous bureaucracy, with our rates and rating methods given entirely into the hands of fusty, myopic technicians who would be the ruination of our business.

Fortunately these predictions did not come to pass, and, as it had to be, basically sound and sensible solutions prevailed. There were, of course, considerable difficulties and occasional skirmishes that arose, and there will be others in the future that must be resolved. But the basic system appears to be working out so that competition in service and in price will continue to be an important factor in our business — that an even greater premium is placed upon creative imagination and sound, informed judgment — that those companies and individuals who do the best job in providing protection and service to the public will prosper accordingly. The main result is to require sound, logical and demonstrable justification for our rates and rating procedures. It is, of course, not a complete path of roses, since evolution is not a painless process, but fundamentally it appears to be one of common sense.

In the more recent past, as you all recall, our business as well as many other industries came to the realization that the matter of public relations had not received as much attention as its importance deserved. It became the number one problem of the time. I will not attempt to burden you with a recitation of all of the various suggestions that were advanced or of the many diverse tangents that resulted in expenditures of wasted effort. The point is that our business collectively arrived at common sense conclusions and avoided the unhappy consequences of proceeding on the assumption that public relations consists of expending large amounts of money on full page advertisements devoted to nauseating folksiness or barefoot boy nostalgia, or of recruiting a small army of smiling and dashingly handsome public relations vice presidents outfitted in the current equivalent of pink shirts and charcoal grey flannels. The practically unanimous realization was that good public relations first of all requires doing a good worth-while job in providing protection and service at a fair price, in being a good citizen in the business community, and in fair and courteous treatment of all members of the public. The second requirement is to keep these facts before the public by appropriate means and to explain our problems and procedures in an articulate manner.

One of our current problems, which, if not in the number one position is very close to it, is the subject of electronics. The purpose of these comments is not to make any substantial addition to your knowledge of this subject — in fact I doubt if I could do this even if I tried — but is in the endeavor that the Casualty Actuarial Society, through its collective membership, may speed up and assist in our general industry understanding of the subject and make our final conclusions somewhat easier of determination than was the case of the two previously mentioned examples. Since the greatest potential impact of this new development is initially in the actuarial and statistical area, it would appear that our Society would be the natural group to lead in this understanding. A very substantial contribution has already been made by the excellent "Progress Report on Elec-

tronics" by our Research Committee, which was published last year. I believe, however, that quite a bit more is necessary to clarify both understandings and misunderstandings within the industry. This need not necessarily be done by formalized or concerted action, but can well be accomplished by our individual members acting as such.

It is somewhat disconcerting to read and to hear many of the statements and predictions regarding the application of electronic developments to our business and the various changes that are advocated. It indicates a rather widespread misconception of potential realities that, if not corrected, could act to the detriment of the valuable contributions which electronics can make. Lest my comment be misconstrued, I hasten to say that the representatives of the equipment manufacturers are only deserving of praise in this connection. From contact with a considerable number of them it is apparent that they are most anxious to avoid leaving any misconceptions as to the functions that their machines are capable of undertaking. The difficulty appears to be within our own industry. I believe that we should attempt to foster a broader understanding not only of the potentialities of what electronics can reasonably be expected to do for us, but also of what it cannot do.

A few random comments may serve to illustrate. The following are a few of the things which appear to be reasonable to anticipate in the way of benefits to our business. The first of these is due not to the use of electronic machines, but to their mere existence. Many, if not most companies and organizations, aware of the existence of these machines and the many possibilities inherent in their application, would naturally investigate the desirability of having one or more of them for their own use. Since these machines involve considerable sums of money, normal prudence would dictate a thorough study of exactly what it might be used for to determine its feasibility. This in turn, in view of the nature of the equipment, calls for a thorough analysis of the detailed procedures of a substantial portion of the company's clerical operations. Such a study, undertaken with a critical examination of each of a great many details is bound to turn up a number of ways in which worthwhile savings and improvements can be made, even if no electronic application is undertaken.

A great deal has been said of the tremendous speeds at which electronic equipment can perform certain calculations. This is, of course, a very great attribute, but for the casualty and fire insurance applications it seems to have produced certain misconceptions as to possible processing time. Admittedly it has been pointed out on many occasions, but there does not seem to be full appreciation of the fact that the entire operation is dependent not so much upon processing time as it is upon the realizable speed of input and output operations, which may be very different indeed. Even with the problems connected with the input and output of data, electronics will make available tremendous savings in the time required to develop desired information. The potential benefits of operating speed are many. Faster and more

up to date information should go far toward reducing the impact of our old time lag problem in the difference between our data and the period for which it is to be used. Both rating and underwriting decisions may be more closely allied to existing conditions. Greatly increased processing speed should enable many desirable additional studies to be made which are not currently feasible because of the lengthy and laborious procedures which are necessary. The practical opportunity to undertake these studies should open up innumerable potentialities for improved methods of company operation, underwriting and rating procedures. Although there are very definite limitations, there is the possibility that the use of more current or additional data made available by faster processing will result in materially alleviating the many problems resulting from the wide swings in underwriting results that frequently occur in some of our lines of insurance.

There is, of course, the obvious advantage that results from the practical application of machinery to perform laborious manual operations. Every company has a great many detailed records of various kinds that must be maintained, and which involve clerical work that is repetitive, comparatively simple in process and in many cases rather dull and monotonous to the personnel concerned with it. Over the years much has been done to shift some of this detailed work to mechanical processing, but there are definite limitations as to how much of this can be done with conventional machine equipment. Electronic developments should enable very sizeable expansion of mechanization in these areas of detailed operations, with resulting benefits to all concerned. Initially there is the alleviation of restricting shortages in clerical personnel. Practically every company in the business today has, to at least some degree, a serious problem in obtaining the necessary clerical help to carry out properly the many things that it must do or would like to do. Compromises have had to be made all down the line to meet this situation, and in some cases this has meant some curtailment in either service or in operating thoroughness. To the extent that electronic equipment can release personnel from the less-interesting clerical detail, there will be improved service to the public, better operating technique, and the opportunity for better and more interesting jobs for the personnel involved.

For the long pull, there should be realized a definite reduction in expense ratios. As your Research Committee has pointed out, the competitive nature of our business will result in this expense saving ultimately being passed on to the public in the form of lower rates. This still is to the definite benefit of the companies as well as to our policyholders. A healthy, competitive and efficiently operated industry has little to fear from public criticism or from detractors who advocate that its functions be performed under state operation.

In the effort to remove misconceptions of potential electronic machine applications to our business, it would appear at the moment that it is important not so much to clarify what this development

may do as it is to bring about a more complete understanding of what it will not do. Even though it has been said many times, it is worth repeating until thoroughly understood by all that electronic machine application, or automatic data processing, is not automation. Its widespread application, which will ultimately be realized, does not mean the automatic insurance office in which the machine has taken over. It merely means the addition of one more forward step in the many improvements that have been made over the years in enabling us to use ingenious discoveries to do things better, more easily, more quickly and at less unit expense. It will not produce drastic changes in operating methods, although in individual instances there is the likelihood of its affecting internal organizational structure. In many companies separate departments have been set up over the years because the most efficient way to handle large volumes of data was to have a separate unit or department to handle each major segment or step of the necessary processing. In quite a few cases the data handled by two or more departments comes from the same basic source. Where such is the case, and where efficiency and speed can be increased by the use of electronic machines, a realignment of internal departments may be called for. There is also the possibility that certain individual items which are currently handled on a decentralized basis may be centrally processed with greater efficiency and still not seriously disturb the many well-recognized advantages connected with decentralization.

Electronics will not result in the loss of jobs in the insurance business. In this respect, it will be similar to a host of other great improvements in production machinery in our general business and industrial economy. It will mean more jobs that are interesting and that allow the full application of human intelligence to replace those jobs that are dull, repetitious or monotonous. It will not result in a sudden and dramatic reduction in expenses. In most cases what it will do is to reduce expense ratios gradually over a period of years by permitting companies to handle a greater volume of business without incurring proportionate increases in expenses. Like most other advances, its greatest potential is in increased volume at reduced unit costs.

Despite some current comment to the contrary, I cannot believe that it will result in any appreciable changes in the marketing of insurance. Any major changes which may be made by any group in the business would have been made anyway, whether or not electronic equipment had been available. There is, of course, the very real possibility of minor changes in some of the mechanical or physical aspects of handling the details of some marketing transactions which improved data processing methods may develop for the benefit of all concerned. The basic structure, however, will not be changed. The market will still consist of participating and non-participating companies and those who are agency companies and those who are direct writers. Electronic machine applications will merely be one more

addition to a very long list of items to which individual companies may apply their talents to improve all aspects of their insurance operations. They will prosper to the extent that they are ingenious, imaginative and resourceful in improving their service and protection to the public, regardless of their basic marketing methods.

It would seem to be in order to improve the understanding of the practical limitations of some of the gains which will come from electronic data processing. A great deal has been said about the many advantages which will ensue from more up-to-date statistical data and from desirable information which is not currently available. These advantages will be very sizeable indeed, and will certainly furnish the opportunity to improve our rating and underwriting procedures. But there will be very definite practical limitations to the changes that can be realized. No matter how up to date our statistical data may be and no matter how quickly information is available on changing conditions in various lines of insurance, classifications or territories, there are certain realities that limit action that may be taken in response thereto.

Rate and classification changes can only be made every so often. Even if conditions are changing very rapidly in certain classes or areas of the business, and full justification can be made for equally responsive action, there must be a minimum degree of pricing stability. The various procedures that must be followed to effectuate changes under rate regulatory laws and the fact that our policies are in effect at their initial rates for periods ranging from six months to five years are appreciable factors. In addition, the business as a whole cannot afford the adverse public reaction that would result from a confusing series of rapidly changing rates that would be disruptive to the insurance market. A somewhat similar situation exists in the limitations inherent in individual company underwriting responses that may be made in conjunction with improved statistical information. Naturally, each carrier is going to attempt to obtain the best underwriting results that it can. Improvements in the pertinent information that will be made available from electronic processing will be of substantial assistance in this connection. However, underwriting realities and responsibilities will continue to exist as they have in the past. Companies must meet the needs of their customers and their production forces. As a business we have a responsibility at all times to furnish to the extent that we are able a reasonable market at a fair price for the legitimate insurance needs of all members of the public. This will not change. Neither will the fact that, no matter how excellent the information available and no matter how many improvements may be made in our rating methods, there will always be times when some rates will be lower or higher than they should be, and underwriting results will continue to fluctuate.

All of this boils down to the fact that electronic developments will be just one more step forward in the continuing improvements in our business. I hope that early and widespread appreciation and

understanding of this development may be realized. In this way our business as a whole may obtain the most progress inherent in electronic potentialities. This is particularly so if done in such a manner as to produce the steady day to day advances that result in orderly and permanent gain, and if successful avoidance is made of old-fashioned inertia or of spectacular adjustments that are disruptive and impermanent.

NEW YORK DISABILITY BENEFITS LAW INSURANCE EXPERIENCE 1951-1954

BY

MAX J. SCHWARTZ

In my 1950 paper on D.B.L. Insurance,[1] I outlined the D.B.L. coverage, as also the assumptions made in developing rates. Since that time there have been a number of changes in the Law and regulations, and we also have the actual experience available for the past four years. The main purpose of this paper is to make available a tabulation of the actual experience as reported to the New York Insurance Department,[2] to compare the original assumptions made at the time the rates were developed with the actual experience on this type of insurance, and to report other developments in this field.

The statistics reported to the New York Insurance Department are reported separately for Precisely Statutory Coverage, Substantially Statutory Coverage, and Plan Coverage (other than Substantially Statutory Coverage).

Precisely Statutory Coverage provides the exact coverage required by the Disability Benefits Law,[3] namely, a weekly benefit equal to 50% of an employee's wages beginning with the 8th day of non-occupational disability with a minimum benefit of $10.00 a week, or the actual wages whichever is lower, and a maximum of $33.00 a week for a maximum period of 13 weeks for any disability, or during a period of 52 consecutive calendar weeks (excluding disability due to maternity) for any disability which begins during employment or during the first four weeks of unemployment. For any disability which begins after the first four weeks of unemployment but within the first 26 weeks of unemployment, coverage is provided by the Special Fund for Disability Benefits, which fund is financed by periodic assessments on all insurance carriers. Essentially, D.B.L. Insurance is similar to group non-occupational disability insurance which provides benefits beginning with the 8th day of disability for a maximum period of 13 weeks with the following important differences.

1. Day of disability is defined as, "any day on which the employee was prevented from performing work because of disability and *for which he has not received* his regular remuneration."[4] (emphasis supplied) Thus an employee is not considered disabled if he receives his full salary and, therefore, does not

[1] M. J. Schwartz "New York Statutory Disability Benefits Law, Coverage, Rates and Rating Plans." Proceedings Casualty Actuarial Society, Vol. XXXVII, Pg. 57 (1950).

[2] See Tables I, II and III attached.

[3] Article 9 of the Workmen's Compensation Law.

[4] Workmen's Compensation Law, Section 201, Subdivision 13.

receive any disability benefits until the 8th day of disability for which he has received no wages, while in group insurance, disability begins on the day he is unable to work even though he is on paid sick leave.

2. Benefits are payable for a maximum period of 13 weeks for any disability or during any 52 consecutive calendar weeks, while in group insurance, benefits are payable for a maximum period of 13 weeks for any disability.
3. Coverage is provided by the carrier directly for the first four weeks of unemployment, and indirectly for the next 22 weeks of unemployment at no additional premium, while in group insurance, no coverage is provided for any period for which a premium is not paid.

Substantially Statutory Coverage is defined as coverage under which benefits are payable (1) after a waiting period of 7 days, (2) for a maximum of 13 weeks, (3) at a maximum weekly rate which is the same as the maximum rate for Statutory Coverage, (4) in the amount of 50% of earnings or in accordance with a salary levels schedule approximating thereto, and (5) excluding benefits in maternity cases.

Plan Coverage is all other coverage which meets the statutory requirements. A plan to qualify must provide benefits which are actuarially equal to or more favorable than Statutory Coverage. Plans are evaluated based on tables promulgated by the Workmen's Compensation Board.

Table I shows an analysis of the combined experience for Precisely Statutory, plus Substantially Statutory Coverage. Table II shows the experience for Precisely Statutory Coverage only, and Table III shows the experience for Substantially Statutory Coverage. The experience under Plan Coverage is not shown because it includes differing waiting periods, maximum amounts and durations, and therefore these statistics are of no value in analyzing the experience.

In order to properly evaluate the experience under Precisely Statutory and Substantially Statutory Coverage, it should be noted that the Law has been amended twice increasing the maximum rate of weekly benefits. In 1950 Statutory Coverage provided benefits at a maximum rate of $26.00 a week. Effective April 1, 1952, the maximum benefit rate was increased to $30.00 a week, and effective July 1, 1954, the maximum was increased to $33.00 a week.

TABLE I

(1) Average number of employees covered was arrived at by averaging the number of employees covered during the payroll period nearest the 15th of the second calendar month of each calendar quarter.

(2) Covered payroll is defined as the first $3,000 of earnings of each employee during the calendar year.

(3) The number of weekly claims allowed includes all claims originally allowed during the calendar year, regardless of the date of disability.

(5) It should be noted that the losses are shown on a paid basis. The incurred figures are not available.

(7) The increase in the average weekly rate of benefits paid from 1951 to 1954 is due to the increase of the statutory maximum benefit rate. The increase in the average weekly benefit rate is also due to wage increases due to inflation.

(9)&(10) The increases from 1951 to 1953 are due to the same factors shown under (7). The decreases from 1953 to 1954 might be due to the shifting of some of the high salary groups from Statutory to Plan Coverage or to self insurance. This assumption is supported by the 5% drop in the number of covered employees for Statutory Coverages.

(12) The increase in the average annual covered payroll is probably due to wage increases due to inflation.

TABLE II and III

These tables show separately the tabulations for Statutory and for Substantially Statutory Coverage.

Substantially Statutory Coverage provides somewhat broader coverage than Statutory Coverage because some of the exclusions and limitations contained in the Law are omitted, and therefore the claim costs per unit of coverage are somewhat higher than the claim costs for Statutory Coverage.

Annual Claim Cost—Males

The claim costs shown in the attached tables are not broken down by sex since this information is not available separately. However, an all male rate might be derived by using the following assumptions:

1. Mr. Rowell found[5] that for group accident and sickness coverage beginning with the 8th day of disability for a maximum period of 13 weeks the morbidity for women is about 1.75 of the morbidity for men. The unpublished D.B.L. experience of a large carrier, which is on file in this Department, shows that the morbidity for women is 1.7 of the morbidity for men.

[5]J. H. Rowell Written Discussion of "N. Y. Statutory Disability Benefits Law, Coverage, Rates and Rating Plans." Proceedings of the Casualty Actuarial Society, Vol. XXXVIII, Pg. 79 (1951).

2. The covered payroll for women is estimated at 22% of the total covered payroll.[6]

Based on the assumptions that the average female exposure was 22% and the morbidity for women is 1.7 of the morbidity for men, the average rate would be 115%[7] of the male rate. The average claim cost per $1.00 of weekly benefits exposed for the years 1951-1954 was $.326. Therefore, the average annual claim cost for males per $1.00 of weekly benefits exposed was $\frac{\$.326}{1.15} = \$.284$

Comparison of Group Experience with D.B.L. Experience

When D.B.L. rates were developed in 1950, all rates were based on the Inter-company Morbidity Studies published by the Society of Actuaries.[8] The 1947-49 Inter-company Morbidity Study[9] shows that the net cost for male lives of non-occupational weekly indemnity coverage beginning with the 8th day of disability for a maximum period of 13 weeks to be $.48 per year per $1.00 of weekly benefits exposed. This net cost figure is also confirmed by subsequent inter-company morbidity studies. For Statutory D.B.L. Coverage, the net cost per year for males was $.284.[10] Thus, the D. B. L. experience shows that the cost for Statutory Coverage is approximately 60% of the cost of the 8th day, 13 weeks plan. A number of reasons have been advanced for the sharp difference between the D.B.L. experience and group experience. Among them are the following:

1. The difference in definition of "day of disability". (See discussion above under "Precisely Statutory Coverage".)
2. Prior to 1950 many of the large employers provided group weekly indemnity insurance for their employees. Very few employers of smaller groups provided such insurance and no groups of less than 25 lives were insured under group coverage since the N. Y. Insurance Law[11] defined a group as not less than 25 employees. In 1949 the Insurance Law was amended to define a group as two or more employees. D.B.L. coverage is written on groups of four or more employees. It is reasonable to assume that many of the employers, particularly small employers, who had not previously provided group insurance for

[6]This figure is based on State Labor Department figures (not published).

[7]$.22 \times 1.70 = .374$
$.78 \times 1.00 = .780$
1.15

[8]For reference see footnote 1 supra.

[9]M. D. Miller, "Group Weekly Indemnity Continuation Table Study", Transactions, Society of Actuaries, Vol. III (1951) Eastern Spring Number.

[10]See above under "Annual Claim Cost — Males".

[11]Section 221.

their employees, purchased Precisely Statutory Coverage when required by law. Thus, much of the experience reported under Statutory Coverage is experience for small groups, since many of the larger groups are insured for Plan Coverage. There are some indications that the morbidity for small groups is more favorable than the morbidity on larger groups. Fitzhugh[12] found that for 8th day, 13 weeks coverage, the morbidity on groups of less than 50 lives was 92.7% of the morbidity for groups of all sizes. The experience of a large carrier for the policy year 1946-47 shows the following loss ratios by size of the insured group for group weekly indemnity insurance:[13]

Annual Premium	*Ratio of Claims Payments to Premiums*
Less than $500.00	42%
$ 10,000-$ 20,000	63%
$100,000-$250,000	68%

It is, therefore, likely that one of the reasons for the more favorable experience for Precisely Statutory Coverage is that that group includes a large number of small groups.

3. In group insurance generally a minimum participation of 75% of the employees is required. As a result, some of the young healthy employees may not elect to participate. D.B.L. insurance is compulsory insurance and, therefore, required 100% participation.
4. In group insurance, an 8th day, 13 weeks plan generally pays for a maximum period of 13 weeks for any one disability. Statutory D.B.L. coverage limits the benefits to a maximum of 13 weeks in any 52 calendar weeks. Under a group policy, an employee who is disabled more than once in any year might be paid benefits for more than 13 weeks.

WORKMEN'S COMPENSATION BOARD ASSESSMENT FOR ADMINISTRATION

The law is administered by the Workmen's Compensation Board. After April 1 of each year, an assessment is levied by the Board to

[12]G. W. Fitzhugh "Recent Morbidity upon Lives Insured Under Group Accident and Health Policies and Premiums Based Thereon".
Transactions of the Actuarial Society of America, Vol. XXXVIII, Pg. 374, Part II.

[13]"Studies in Disability Insurance" State of N. Y. Department of Labor Special Bulletin No. 224 (1949) Pg. 115.
These figures are quoted in the "Studies in Disability Insurance" to show that smaller groups experience a lower claim rate than larger groups (see Pg. 82, Studies in Disability Insurance). We must, therefore, assume that the claim rates are related to the same basic premium rates; otherwise, the quoted figures would be meaningless.

reimburse it for the expenses for the previous fiscal year (April 1-March 31). The assessment is levied on all the covered payrolls for the previous calendar year. This assessment was approximately .01 of 1% of covered payrolls for each of the past three years.

RESERVE FOR ASSESSMENTS FOR THE SPECIAL FUND FOR DISABILITY BENEFITS

D.B.L. coverage for workers who are unemployed more than four weeks but less than 26 weeks is provided by the "Special Fund", which fund is administered by the Workmen's Compensation Board. This fund was established in 1950 by levying an assessment of .2 of 1% on all payrolls (maximum assessment $.12 per week per employee) for the first six months of 1950. This assessment was expected to raise twelve million dollars. The law[14] provides that whenever on April 1 of any year the net assets of the Fund shall be one million dollars below either (1) the sum of twelve million dollars or (2) twice the sum of benefits paid during the preceding fiscal year, whichever is the greater, the Chairman of the Workmen's Compensation Board shall assess and collect from all carriers an amount sufficient to restore the Fund to an amount equal to twelve million dollars or twice the sum of benefits paid during the preceding fiscal year, whichever is the greater. In 1951 an assessment at the rate of approximately .05 of 1% was levied to restore the fund to the required $12,000,000. Because of the low unemployment rate and consequent low disbursements from the Fund, and because of interest earnings of the fund, the net assets did not fall below $11,000,000 until April 1, 1955, and therefore no assessment was levied until May, 1955. In May, 1955 an assessment was levied at the rate of approximately .01165 of 1% of covered payrolls.

It is expected that in a depression year, the assessment to restore the Special Fund for Disability Benefits to the required minimum will be very large since the required minimum is twice the amount paid to the sick unemployed if the amount paid out in the previous calendar year is over $6 million. The assessment will be levied on shrunken payrolls. This would result in sharp increases in D.B.L. premium rates making a bad economic situation worse. It might also deplete the surplus funds of some insurance companies. For these reasons, the Insurance Department requires companies to set up in prosperous times a reserve for assessments for the sick unemployed in amounts considerably higher than the assessment anticipated the next year. Thus, when assessments are substantially higher than average, the difference would be taken from this reserve instead of increasing the premium rate or depleting the surplus funds.

The rationale of the Department for requiring reserves higher than the anticipated assessment for the current year was stated in 1952

[14]Workmen's Compensation Law, Section 214, Subdivision 2.

by the then Deputy Superintendent J. F. Murphy in the following words:[15]

"The following factors were considered in arriving at the reserve liabilities set out herein.

1. Current favorable employment rates may not continue indefinitely and wide fluctuations in the number of persons employed are possible and are often sudden.
2. The reserve should make advance provision for unusual losses in any one year so as to permit annual premium charges to be equalized.
3. In the event of widespread unemployment the assessment under the law is indeterminate and the fixing of a reserve to meet such a liability is a matter requiring conservative judgment.
4. The reserves for 1953 and succeeding years should not be fixed so as to accumulate an excessive amount."

The reserve requirements of the Department for the years 1950 to 1953 were as follows:[16]

Dec. 31, 1950		.1 of 1% of Covered Payrolls of the Second Half of 1950.
Dec. 31, 1951	Reserves set up as of Dec. 31, 1950, plus	.1 of 1% of Covered Payrolls for 1951, minus Assessments paid in 1951.
Dec. 31, 1952	Reserves set up as of Dec. 31, 1951, plus	.08 of 1% of Covered Payrolls for 1952.
Dec. 31, 1953	Reserves set up as of Dec. 31, 1952, plus	.05 of 1% of Covered Payrolls for 1953.

At the end of 1953, insurers under the supervision of the Department, held reserves for the assessment for the Special Fund approximating .24% of the 1953 Covered Payroll. Up to this time the Department has made no finding as to how much reserve should be required in the aggregate or how this requirement should be geared to current writings. In a circular letter dated June 3, 1954, the then Deputy Superintendent J. F. Murphy stated that in the opinion of the Department the aggregate reserve as of December 31, 1953 is adequate and reasonable and that barring unforeseen developments no further substantial accumulation is required. In the same letter

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[15]See Department circular letter dated May 16, 1952.

[16]See Department circular letters dated April 12, 1950, May 16, 1952, and May 7, 1953.

the reserve requirements for December 31, 1954 and for subsequent years were established as follows:

"The required reserve to be reported in the annual statement by each insurer on December 31, 1954 and on December 31 of subsequent years shall be determined by either (a), (b), or (c), *whichever is the lowest:*

(a) .08 of 1% of covered payrolls for the year of report and the two immediately preceding years.

(b) Reserve established on December 31 of year preceding year of report plus .05 of 1% of covered payrolls of year of report.

(c) .30 of 1% of covered payrolls of year of report.

In the case of insurers which have operated continuously since the enactment of the law, the general effect of (a) is to establish a ceiling for the required reserve while (b) and (c) are principally necessary to take care of insurers more recently entering the D.B.L. field or where the volume of D.B.L. business in the year of report has declined."

As to provision in D.B.L. rates for these reserves, the letter also states, that:

"Provision in D.B.L. rates for the subject reserve requirements or the refund of any such amounts heretofore charged are a matter of contract between an insurer and insured subject to applicable provisions of the Insurance Law."

CONCLUSION

Because aggregate figures only are available to the author, the reasons advanced for the difference between group and D.B.L. experience cannot be documented. It is hoped that this paper will have full discussion and critical review and that members of the Society will furnish experience to confirm or refute some of the assumptions made.

TABLE I

D.B.L. EXPERIENCE FOR THE CALENDAR YEARS 1951 - 1954

COMBINED EXPERIENCE PRECISELY STATUTORY PLUS SUBSTANTIALLY STATUTORY COVERAGE

	1951	1952	1953	1954	1951 - 1954
(1) Average Number of Employees Covered	2,331,137	2,290,736	2,313,872	2,218,484	9,154,229
(2) Amount of Covered Payroll	$5,466,683,536	$5,782,306,816	$5,929,364,381	$5,717,179,363	$22,895,534,096
(3) Number of Initial Claims Allowed	134,439	134,568	137,540	124,613	531,160
(4) Total Number of Weeks Paid	718,734	749,964	784,917	728,885	2,982,500
(5) Losses Paid	$ 15,773,958	$ 17,542,416	$ 19,136,879	$ 17,994,930	$ 70,448,183
(6) Annual Claim Frequency per 100 Covered Employees (3)/(1)×100	5.8	5.9	5.9	5.6	5.8
(7) Average Weekly Rate of Benefits Paid (5)/(4)	$ 21.95	$ 23.39	$ 24.38	$ 24.69	$ 23.62
(8) Average Disability Period (in weeks) Compensated per Claim (4)/(3)	5.35	5.57	5.71	5.85	5.62
(9) Annual Claim Cost per Employee Insured (5)/(1)	$ 6.77	$ 7.66	$ 8.27	$ 8.11	$ 7.70
(10) Annual Claim Cost as % of Covered Payroll (5)/(2)	.29%	.30%	.32%	.31%	.31%
(11) Annual Claim Cost per $1.00 of Weekly Benefits Exposed (4)/(1)×$1.00	$ .308	$ .327	$ .339	$ .329	$ .326
(12) Average Annual Covered Payroll per Employee (2)/(1)	$ 2,345	$ 2,524	$ 2,563	$ 2,577	$ 2,501
(13) Average Cost per Claim (5)/(3)	$ 117.33	$ 130.36	$ 139.14	$ 144.41	$ 132.63

TABLE II

D.B.L. EXPERIENCE FOR THE CALENDAR YEARS 1951 - 1954
PRECISELY STATUTORY COVERAGE

	1951	1952	1953	1954	1951 - 1954
(1) Average Number of Employees Covered	1,610,685	1,601,026	1,626,568	1,596,615	6,434,894
(2) Amount of Covered Payroll	$3,738,795,900	$3,967,710,537	$4,187,311,960	$4,119,586,165	$16,013,404,562
(3) Number of Initial Claims Allowed	86,477	86,532	92,590	87,997	353,596
(4) Total Number of Weeks Paid	476,847	491,952	531,939	520,938	2,021,676
(5) Losses Paid	$ 10,347,110	$ 11,331,304	$ 12,898,804	$ 12,810,523	$ 47,387,741
(6) Annual Claim Frequency per 100 Covered Employees (3)/(1)×100	5.4	5.4	5.7	5.5	5.5
(7) Average Weekly Rate of Benefits Paid (5)/(4)	$ 21.70	$ 23.03	$ 24.25	$ 24.59	$ 23.44
(8) Average Disability Period (in weeks) Compensated per Claim (4)/(3)	5.51	5.69	5.75	5.92	5.72
(9) Annual Claim Cost per Employee Insured (5)/(1)	$ 6.42	$ 7.08	$ 7.93	$ 8.02	$ 7.36
(10) Annual Claim Cost as % of Covered Payroll (5)/(2)	.28%	.29%	.31%	.31%	.30%
(11) Annual Claim Cost per $1.00 of Weekly Benefits Exposed (4)/(1)×$1.00	$ .296	$ .307	$ .327	$ .326	$ .314
(12) Average Annual Covered Payroll per Employee (2)/(1)	$ 2,321	$ 2,478	$ 2,574	$ 2,580	$ 2,489
(13) Average Cost per Claim (5)/(3)	$ 119.65	$ 130.95	$ 139.31	$ 145.58	$ 134.02

TABLE III

D.B.L. EXPERIENCE FOR THE CALENDAR YEARS 1951 - 1954
SUBSTANTIALLY STATUTORY COVERAGE

	1951	1952	1953	1954	1951 - 1954
(1) Average Number of Employees Covered	720,452	689,710	687,304	621,869	2,719,335
(2) Amount of Covered Payroll	$1,727,887,636	$1,814,596,279	$1,742,052,421	$1,597,593,198	$6,882,129,534
(3) Number of Initial Claims Allowed	47,962	48,036	44,950	36,616	177,564
(4) Total Number of Weeks Paid	241,887	258,012	252,978	207,947	960,824
(5) Losses Paid	$ 5,426,848	$ 6,211,112	$ 6,238,075	$ 5,184,407	$ 23,060,442
(6) Annual Claim Frequency per 100 Covered Employees (3)/(1)×100	6.7	7.0	6.5	5.9	6.5
(7) Average Weekly Rate of Benefits Paid (5)/(4)	$ 22.44	$ 24.07	$ 24.66	$ 24.93	$ 24.00
(8) Average Disability Period (in weeks) Compensated per Claim (4)/(3)	5.04	5.37	5.63	5.68	5.41
(9) Annual Claim Cost per Employee Insured (5)/(1)	$ 7.53	$ 9.01	$ 9.08	$ 8.34	$ 8.48
(10) Annual Claim Cost as % of Covered Payroll (5)/(2)	.31%	.34%	.36%	.32%	.34%
(11) Annual Claim Cost per $1.00 of Weekly Benefits Exposed (4)/(1)×$1.00	$ .336	$ .374	$ .368	$ .334	$ .353
(12) Average Annual Covered Payroll per Employee (2)/(1)	$ 2,398	$ 2,631	$ 2,535	$ 2,569	$ 2,531
(13) Average Cost per Claim (5)/(3)	$ 113.15	$ 129.30	$ 138.78	$ 141.60	$ 129.87

COMPULSORY AUTOMOBILE INSURANCE RATE MAKING IN MASSACHUSETTS

BY

M. G. McDONALD

For the past few years the subject of Compulsory Automobile Insurance has been one of paramount importance to the industry, to the legislatures in many of the states and to the motoring public. Annually the Massachusetts Insurance Department receives hundreds of requests from legislators throughout the Country to "please send (or wire) me collect all the data you have on compulsory insurance; I am filing a bill in my state to provide for compulsory automobile insurance". The reply, "The Department has 90 four-drawer files of data on the subject" usually elicits a more reasonable and specific request.

While much has been written and said about Compulsory Insurance, only two papers pertaining to the rate making phase of this form of coverage appear in the *Proceedings*, and these are not of recent date.[1]

It will be remembered that the statutes require coverage for $5/10,000 limits only on the ways of the Commonwealth. Guest Occupant Coverage had also been required until 1936 when Chapter 459, Acts of 1935 excluded this coverage, effective January 1, 1936 so that in order to compare the data presented in this paper with experience under National Standard Policies, it will be necessary to adjust Massachusetts compulsory experience to include coverage off the ways of the Commonwealth and guest occupant coverage, on and off the ways of the Commonwealth.

Despite the fact that hundreds of proposals to amend or repeal the Act have been considered by the Legislature over the years, there have been very few substantive changes in the Law.[2] Chapter 570, Acts of 1953, recommended by the Governor, established a Statutory Assigned Risk Plan, created a Highway Safety Committee, and inaugurated a system of Demerit Rating.

STATUTORY ASSIGNED RISK PLAN

For many years the insurance companies operated a voluntary assigned risk plan. In 1948 approximately 25,000 risks were assigned. This number increased to 45,000 in 1952 and over 60,000 in 1953. The tightening market made it increasingly difficult to secure voluntary cooperation of all companies in any plan. For this reason, the Governor deemed it desirable to have a statutory plan in the event voluntary agreement could not be reached. The statute requires, in substance, that the companies cooperate in the preparation of a plan

[1] P.C.A.S. — XII — p. 205 G. F. Michelbacher.
XIII — p. 188 & XV — p. 171 W. J. Constable.

[2] Of the 130 bills heard by the Insurance Committee of the General Court in 1954, 69 pertained to Compulsory Insurance.

for the fair and equitable apportionment of risks who are in good faith entitled to insurance and who are unable to procure through ordinary channels, motor vehicle liability insurance. In addition to the compulsory coverage, companies must, if requested by the applicant, furnish coverage off the ways of the Commonwealth, guest occupant coverage and property damage. A plan similar to the voluntary plan was approved by the Commissioner, effective October 16, 1953.

HIGHWAY SAFETY COMMITTEE AND THE POINT SYSTEM

Governor Christian A. Herter in his inaugural address in 1953 expressed his concern over the mounting toll of highway accidents and the attendant death and suffering. He proposed legislation: "To reduce frequency of accidents on our highways—to reward careful drivers with the lowest premium rate—to establish a system under which accident-prone drivers pay stiff, additional cost penalties—to establish a long-range program which will eventually stop the constant increase in accident frequency and insurance rates—to establish a fair, but firm system for sorting out very bad drivers who are a threat to the life and safety of all of us and our families and ruling them off the road."

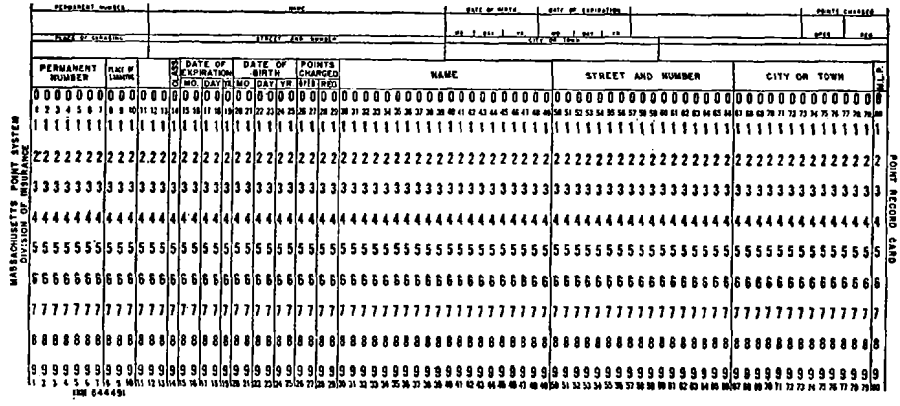
In substance, the Highway Safety Measure provides for the assessment of points for violations of the rules of the road and for "at fault" in a bodily injury accident or "at fault" in a property damage accident in which there is damage in excess of one hundred dollars to any one vehicle or other property. The Act became effective January 1, 1954, and the administration of the "Point System", including the determination of the party at fault in accidents is under the direction of the Registrar of Motor Vehicles. Due to shortage of trained personnel and the scarcity of punch card equipment, the Point System operated on an abbreviated Schedule of Points. Effective September 1, 1954, the full schedule of violations became operative and will be employed to evaluate Massachusetts motor vehicle operators. Points accruing to owners and operators are recorded on the license at time of renewal.

DEMERIT RATING

The Demerit Rating Plan is based on the theory that the combination of frequency of violations of the rules of the road with accident frequency will be a reliable yardstick for measuring driving ability and assessing insurance surcharges. The Demerit Rating Law provides that the Commissioner of Insurance shall establish a schedule of premium surcharges to apply to policies issued on and after January 1, 1956, covering private passenger cars and motorcycles which are not subject to Experience Rating. In addition, the Commissioner must give consideration to the surcharges to be collected by territory in determining the manual rates. Under the law the owner of a vehicle may be assessed points by the Registrar of Motor Vehicles

because of the operation of the vehicle by another. Points are recorded as operator's or registrant's, and the sum of operator's and registrant's points must be used in determining the surcharge.

For each point assessment the Registry of Motor Vehicles punches a card containing pertinent data, including date of license expiration. As of 90 days prior to expiration all assessment cards are matched by license number and master carded for listing of necessary data for the license bureau. At the time of listing, required data are reproduced in duplicate on a Point Record Card (IBM 844491) for the Insurance Department. The records of the Registrar of Motor Vehicles pertaining to the Point System are not public records.



The Insurance Department must code and punch on the Point Record Card: (1) The place of principal garaging, in order that surcharges by territory may be tabulated; (2) name of current carrier, for listing for insurance company information and collection of surcharges; and (3) Class, (Private Passenger, Motor Cycle, Commercial, Taxicab, etc.) in order that those operators who do not own a private passenger car or motorcycle can be excluded for calculation of surcharge offset. Two files are maintained within the Insurance Department. One is an alphabetical file, kept for reference purposes, of all who have been assessed points, the other, a statistical file containing cards for those who are eligible for surcharges.

Listings of non-licensed registrants and non-licensed, non-registrants who have been assessed points will be furnished the Insurance Department annually by the Registrar of Motor Vehicles. Points assessed will remain on the individual's record for four years (two license periods) and, will result in surcharges for four years. The law further requires that the schedule of surcharges shall provide for an equal surcharge in dollars throughout the commonwealth, irrespective of zones, and shall not be set up as a percentage of premiums.

In drafting the legislation, and establishing administrative procedure, extreme care was exercised to provide a practical and enforce-

able system at a minimum of expense. The assessment of points and surcharges is administered by state agencies, rather than by private industry. The Highway Safety Committee, with the Registrar of Motor Vehicles as permanent chairman, must meet monthly to study the problem of safety in connection with the operation of motor vehicles; to consult and cooperate with all departments of state government in regard to highway safety; to promote and encourage uniform and effective programs of safety on highways and to assist in the coordination of such programs among state departments, local government agencies, other governmental agencies, and private organizations; to encourage highway safety education in the commonwealth; and to make recommendations to the Legislature with respect to the problem of highway safety.

A point system has been in successful operation in several states, e.g., Connecticut, New Jersey and the District of Columbia. However, no other state has attempted to unite the Point System with a Demerit Rating Plan for automobile liability insurance. Many inquiries have been received from legislators in other states relative to the Point System and the Demerit Rating Plan. The experiment is being watched with interest by supervisory officials in other states.

There are currently several bills before the Legislature which would amend or repeal this Highway Safety Act. Officials and members of unions representing drivers of public vehicles are disturbed over the possibility of a driver of a bus or a municipal or state-owned vehicle, being assessed points by virtue of his operation of the vehicle which will result in surcharges on the insurance premium of his privately owned car. Instances have been cited of bus drivers who have refused to move their vehicles until icy streets have been sanded, for fear of involvement in an accident which might result in surcharges on their personal automobile insurance premiums. Such actions may inconvenience the public to some extent, but if such actions result in the elimination of accidents and the consequential damages, the inconvenience is outweighed by more important considerations.

PUBLIC HEARING

The Commissioner is required, by Section 113B, C175 G.L., to fix and establish, *after due hearing*, fair and reasonable classifications of risks, and adequate, just, reasonable and non-discriminatory premium charges for motor vehicle liability policies and bonds.

Over the twenty-eight years of compulsory insurance, a pattern for the quasi-judicial public hearing has evolved. An opportunity is afforded every interested party to introduce evidence, to testify, to argue, or to cross-examine witnesses. Insurance Department witnesses must present all the evidence used by the Commissioner in establishing rates.[3] Witnesses of the Massachusetts Automobile Rat-

[3]American Employers' Insurance Company vs. Commissioner of Insurance, 298 Massachusetts.

ing and Accident Prevention Bureau present evidence in behalf of the carriers. The transcript of the hearing on the 1954 rates contains 340 pages, plus 80 pages of communications pertaining to rates. The hearing was called to order at 10:00 A.M., and from that hour until 4:00 P.M., with a recess for lunch, 206 pages of argument by the general public were recorded before the Insurance Department ever presented its evidence. The Actuary and the Assistant Actuary of the Department took up 54 pages of the transcript in introducing and explaining the evidence for the state. The Chief Examiner, in describing the check of losses and statistical data under his supervision, covered 7 pages. The next 35 pages are devoted to cross-examination of the Department Actuary by various persons along several lines. Witnesses of the Bureau testified through 22 pages, and were subjected to cross-examination for another 22 pages, until the hearing adjourned at 8:45 P.M.

Prior to the hearing the Commissioner must advertise the proposed rates and classifications of risks in the newspapers of certain of the larger cities of the Commonwealth. Following the advertisement there is an influx of public officials from cities and towns into the Department to determine why the rates for a particular city or town or class have been increased. In most instances the representatives are surprised to find that the loss experience is available in detail for their particular municipality, and on departing, are reasonably satisfied that there exists adequate justification for the rate increases.

There are, however, some appearing regularly each year who absorb certain rate making techniques and who offer various and sundry suggestions for improving rate making methods. A few of the suggestions or theories offered in recent years, and the investigations or studies conducted by the Department in an attempt to prove or disprove these contentions, are cited for general interest.

EXPENSE LOADING BY TERRITORY VS. STATEWIDE

It is the practice of the Commissioner to issue a call to each insurance company each year for expenses incurred in connection with Compulsory Insurance, and on the basis of the expense returns, to establish a state wide loading for expenses for all classifications. Proprietors of taxicabs and public officials from high-rate municipalities have frequently complained that a statewide expense loading for all classifications is not just or reasonable. These persons advocate that the territorial rates should be so calculated that the *amount* of the expense provision in the rate should be uniform in each territory, instead of being pro-rated among the territories in proportion to the territorial gross premium as has been the custom over the years in liability insurance rate making. In addition to being proportional to territorial gross premiums the pro rating of expense is proportional to territorial expected losses since the rate is determined by loading

the expected losses by a percentage which is the same for all territories and classifications.

Under the requirements of the Department's call for expenses, the returns are segregated into the following groups:

1. Investigation and Adjustment of Claims
   A. Allocated
   B. Unallocated
2. Acquisition
   A. Commissions
   B. All Other
3. Taxes, licenses and fees
4. General Administration

The following analysis was made to determine if there was any merit in the contention that the expense loading should not be uniform by territory and by classification. Considering first commissions and taxes, it is apparent that both of these items are currently paid as a percentage of premium because of the universal practice of the industry in the negotiation of contracts between insurance companies and their producers, and because the great majority of taxes are imposed on gross premium by statute. In 1951, the items of commissions and taxes amounted to 12.6% of total 1951 stock company premiums and in 1952, 12.9%. It is obvious then that these two expense items are directly related to gross premiums.

The investigation and adjustment of claims is the next largest item of expense. Allocated claim expense is defined as those expenses incurred in the settlement of claims which can be directly allocated to a particular claim. Unallocated claim expense represents all other expenses incurred in connection with the recording and adjusting of claims.

In Massachusetts bodily injury insurance, allocated claim expense is not included with losses but is reported separately on punch cards when paid. A special survey indicated that through a fourth reporting, approximately 95% of losses and 90% of allocated claim expense was paid, and, through a third reporting, 90% and 80% respectively. Accordingly, a detailed statistical analysis of allocated claim expense for policy years 1946 and 1947, by rating territory and classification, was made and the results are contained in Exhibit A.

It had been argued that with wide variation in rate level between classifications and with claim frequency ranging from 2 to 100, per hundred car years of exposure, the higher-rated territories and classifications were paying more than their proportionate share of claims expense when pure premiums were loaded uniformly. Reference to Exhibit A conclusively demonstrates that allocated claim expense varies by rating territory directly in accordance with territorial losses

and consequently with territorial gross premiums. In addition, it is apparent that allocated claim expense varies by major classification directly in proportion to classification losses and classification pure premiums.

It is not possible to make a similar analysis of unallocated claim expense. The following table compiled from expense data and loss statistics furnished the Insurance Department is indicative:

Year	*Total Claim Expense*	*Developed Losses*	*Number of Claims*	*Ratio Expense to Losses*	*Ratio* Expense to No. of Claims*
1946	$2,938,438	$16,955,768	52,714	17.3%	5.6%
1947	3,239,002	18,793,444	56,847	17.2	5.7
1948	3,609,814	20,257,476	61,166	17.8	5.9
1949	3,984,063	23,134,223	65,793	17.2	6.1
1950	5,149,401	29,427,424	79,607	17.5	6.5
1951	5,420,838	33,560,683	85,460	16.2	6.3

*Expenses in thousands of dollars to number of claims.

This table indicates a remarkably close correlation between claim expense and losses and between claim expense and number of claims. This is to be expected because claim expense by definition consists of those expenses associated with the investigation, adjustment, recording and payment of claims. Therefore, the more claims, the greater the claim expense. Reference to a schedule of territory experience shows that the higher pure premiums are directly associated with comparatively high claim frequencies. It naturally follows that expenses connected with the settlement of claims in the territories with the higher frequencies should also be comparatively high and to approximately the same degree.

In 1951 claim expense, allocated and unallocated, constituted 12.8% of total stock company premiums; in 1952, 12.9%. With commissions, claim expense and taxes, we have now accounted for approximately 70% of the expense loading. There remain only other acquisition and general expenses to analyze.

These remaining items of expense do not lend themselves to analyses as readily as the preceding items since it is necessary to resort to cost accounting procedures to determine what portion of these expenses are chargeable to each line of insurance. In a multiple line company, the machine section — floor space, machines, personnel, records, power, heat, light, etc., for example, services all lines the company insures. A time study must be conducted to establish what part of the cost of this section is attributable to automobile bodily injury. Then a basis must be determined to allocate this item

of expense by state. The Uniform Accounting Regulations prescribe methods of determining these expenses by line, and the Massachusetts Automobile Bodily Injury Expense Plan further defines procedures for allocation by state and for separating compulsory and all other bodily injury expenses within these categories.

These procedures give reasonably accurate information within a broad area of expense allocation such as by line and by state. However, an attempt to further allocate general expenses and other acquisition costs to a more restricted area such as a rating territory within a state under the procedures outlined, or for that matter any other conceivable method, would result in substantially less accurate or reliable data.

To obtain even an approximate statistical answer as to whether or not expenses incurred in connection with general expenses and other acquisition costs are incurred in proportion to the number of policies written, to the gross premiums written, to the number or amount of claims incurred, or to some other base, many assumptions and inferences would have to be made because of the practical impossibility of making an objective analysis. Furthermore, even though each individual company might be successful in making an approximate allocation, it is to be expected that wide variations would exist between companies, because of the different methods of operation by the various companies in the rating territories. Therefore, it is apparent that some of the expenses in these categories are incurred in proportion to the number of policies written, many are incurred more nearly in proportion to the number or amount of losses incurred, and consequently in proportion to gross premium, because of the preponderance of company procedures which are directly or indirectly associated with the occurrence of a claim.

It is quite apparent that by far the greater proportion of the expense items are directly related to losses and premiums. The remaining proportion of the expenses which might conceivably be determined on a uniform basis throughout the various territories and classifications is very small. Even if it were possible to institute such procedures any advantage to be gained would be offset by the prohibitive cost of analysis involved, and by the impracticability of attempting further refinement of the presently prescribed cost accounting program.

In conclusion, it has been demonstrated that expenses incurred do vary substantially by territory; that this variation is overwhelmingly in proportion to the territorial gross premium and expected losses, and the customary method of expense loading is reasonable and realistic in relation to the actual facts. It is significant that in two court cases, American Employers Insurance Company vs. Commissioner, 298 Massachusetts 161, 164, 165 and Gaffer vs. Commissioner, Supreme Judicial Court, Equity 67540, Suffolk, the methods of the Department in fixing the expense loading were reviewed in detail and impliedly approved.

TRAFFIC CONGESTION HAZARD FACTOR

A former City Solicitor of one of the larger cities in Massachusetts in addition to being a lawyer is an accomplished mathematician. At one time he submitted to the Department an "Outline of Method of Computing 'Traffic-Hazard Credit' in Establishing Motor Vehicle Insurance Rates." Briefly the suggested method was:

To assume that insurance losses of equal amount result from the same exposure while operating in a certain area regardless of the place of principal garaging. It was proposed to develop area pure premiums representing the cost of exposure of one car year in a certain area and an acceptable method of calculating area pure premiums was proposed. With these pure premiums the exposures in the given areas were to be calculated. The density of traffic in each area was to be determined by dividing the exposure by the number of street miles in the area. The area pure premium and area traffic density was to be compared for correlation, if any. Next it was proposed to adjust the area rate by whatever extent the risk was increased by the presence of vehicles garaged outside the area, within the area.

The method outlined was tested and demonstrated the original assumption was incorrect. After calculating the different exposures, it was found that only 6.7% of the total exposure of the state would be in the area from which the proposal originated, whereas 9.7% of the vehicles in the state were principally garaged in that area. This result was in the nature of a *reductio ad absurdum.*

Designating the area from which the proposal came as Area 1 and the remainder of the State as Area 2; Area 1 developed a premium of $87.92, Area 2 of $16.49. The exposure in Area 1 for cars principally garaged in Area 1 was 22,645 car years; the exposure in Area 1 for cars garaged in Area 2 was 20,160 car years. The exposure in Area 2 for cars garaged in Area 1 was 39,551 car years; the exposure in Area 2 for cars garaged in Area 2 was 555,911 car years. The total exposure in Area 1 would then be 6.7% of the total of the State. The method of determining the subdivisions of exposure is illustrated in Exhibit J.

Further research produced the following: 18,348 claims amounting to $3,763,426 arose from accidents occurring in Area 1. Of this number, 9,451 amounting to $1,990,981 were charged to vehicles garaged in Area 1, and the balance 8,897 claims amounting to $1,772,445 were charged to vehicles garaged in Area 2. This meant that 52.9% of the losses occurring in Area 1 were charged to Area 1 and 47.1% of the losses occurring in Area 1 were charged to Area 2. Traffic surveys indicated that two-thirds of the vehicles driven in Area 1 were principally garaged in Area 2. Using these figures, index numbers representing pure premiums were developed for Area 1, $.529 \div .333 = 1.59$, and for Area 2, $.471 \div .667 = 0.71$. The ratio of 0.71 to 1.59 is 45%. This indicated that for each unit of exposure,

vehicles garaged in Area 2 caused 45% of the losses caused by cars garaged in Area 1, all while operating in Area 1. The ratio of the actual rate for Area 2 to that of Area 1 was 54%.

This comparison demonstrated that cars garaged in Area 2 do not cause as much in the way of losses as cars garaged in Area 1 while being operated in Area 1. Similarly, the regular statistics showed that this was true in approximately the same ratio for statewide operation. It was concluded that the difference in rate between Areas 1 and 2 was not due to traffic congestion in Area 1. In passing it might be added that the actuarial staff of the Department were indeed thankful that this method was not acceptable. The prospect of solving a set of seventeen simultaneous equations each year was not particularly appealing.

THE EFFECT ON RATES OF RACE TRACKS, AMUSEMENT PARKS AND BEACHES

In a recent court case one of the petitioners alleged, among other charges, that the Commissioner in fixing the rates "did not make any allowances to any territory for traffic hazards caused by special attractions", located in such territory.[4] In amplification of this allegation the petitioner stated that the Commissioner failed to take "into consideration special attractions or hazards in a city such as beaches, horse tracks, dog tracks or large shopping districts". It was argued that a territory in which such attractions are located is subjected to increased traffic hazards brought about to a considerable extent by automobiles coming from other territories where the hazards and rates are less, thereby placing an unfair burden on the automobile owners who garage their vehicles in the more hazardous area. The court said, "The petitioner's contention does not go beyond a bald assertion". However, it appeared desirable to investigate the effect of such attractions on accidents, if any.

Accordingly, a territory containing a large beach, an amusement park, a shopping center, a dog track and a horse track was selected for an anlysis of its experience. Private Passenger claims by month of accident, statewide and for the selected territory, were plotted and are shown on Exhibit B, to determine first if there were any deviation from the expected distribution during the months when the race tracks, beaches and amusement parks were in operation. The deviation was very slight, in fact the distribution statewide and for the territory was remarkably close.

Next, the claims charged against the territory were segregated by location of accident, within the territory or outside the territory. 70.8% of the claims charged against vehicles garaged in the territory arose from accidents occurring outside the territory and 29.2% from accidents occurring within the territory. The study, covering a period

[4]Massachusetts Bonding & Insurance Company & Others vs. Commissioner of Insurance (And a Companion Case) Adv. Sh. (1952) 829.

of a year, indicated that vehicles garaged in the territory were involved in accidents outside the territory which produced 2.44 times as many claims as accidents caused by vehicles garaged in the territory, within the territory. During the months the attractions were operating the ratio was 2.47 to 1; during the period the attractions were not operating the ratio was 2.37 to 1. From this study it was apparent that the allegation was without merit.

THE USE OF OUTSTANDING LOSSES IN RATE MAKING PRODUCES EXCESSIVE RATES — TEST OF DEVELOPMENT FACTORS

For many years the Commissioner has been criticized for using incurred losses rather than paid losses in making the compulsory rates. The charges allege that the outstanding losses are insurance company estimates of what they expect to pay in the future and are excessive, so that rates based on incurred losses, part of which are paid and a substantial amount unpaid, are excessive. These allegations had been repeated year in and year out, despite the testimony of the Chief Examiner of the extent to which the Department checks the data underlying the rates. The Department Actuary each year had testified to the calculation of development factors designed to adjust raw losses to ultimate on the basis of past experience. Members of the public still persisted in their arguments against the inclusion of unpaid losses in rate making. It was apparent from reading transcripts of hearings for several years that these lay people had no conception of the function of development factors. A simple test readily comprehended by the layman has been devised which illustrated the actual results of the application of development factors in dollars and cents.

Exhibit C shows a test of developed losses used in 1943 rates as compared with the ultimate losses of the tenth reporting. The proximity of the two figures is startling. The only objection was to the age of the data. In subsequent years losses through a fifth reporting have been used in support of the accuracy of the results produced by the application of development factors to raw losses, because, through a fifth reporting experience indicates in excess of 95% of the amount of the losses have been paid. The most recent test made in 1954 indicates developed losses used by the Department in the 1950 rates will be redundant to the extent of about $1.2 millions or 1.3%. From these tests it has been generally concluded by the Public and the Supreme Court that the development factors used by the Department in the past have been remarkably accurate in translating raw losses into ultimate losses.

SPECIAL CONSIDERATIONS IN COMPULSORY RATEMAKING DEVELOPMENT FACTORS

One may readily conclude from the preceding part of this paper that compulsory ratemaking is open to wider scrutiny by the public

in general in comparison with other lines. A witness for the companies at one of the recent hearings, an officer in one of the largest rating bureaus outside Massachusetts, commented that he had never seen a set of rates supported by such minute detail and so compresively introduced in evidence.

The development factors used in Massachusetts compulsory insurance are calculated from the incurred loss experience covering a period of ten years, using the average development of the two latest years available for each successive reporting. Under the requirement of the Commissioner's Statistical Plan, all loss payments under the compulsory law for a policy year are reported monthly through March 31 of the following year, at which time outstanding losses are valued and reported to complete the incurred losses for the first reporting of the policy year. On the following December 31, those losses still outstanding are valued and reported and together with prior payments constitute the second reporting of the policy year. At yearly intervals thereafter, policy year losses are reported up to and including a tenth report.

The incurred loss figures of the latest two policy years for which both a first and second reporting are available are utilized; similarly, the incurred losses of the latest two policy years for which both a second and third reporting are available are employed, and so on for a third to fourth and so on to ultimate. The use of the most recent experience bases loss development on the most recent settlements which are most likely to influence further settlements. Cumulative multiplication of the development factors thus obtained, produces the factors to be applied to the first, second, etc. reportings of incurred losses to reflect the expected ultimate development. To illustrate the calculation of the development factors the computation is shown for the factors used in the 1954 rates in Exhibit D. Application of Development Factors will be covered in the succeeding part of this paper.

SHORT RATE — SHORT TERM FACTOR

In Massachusetts the statute requires that the compulsory insurance be co-terminous with the period of registration which results in a substantial number of policies being written for less than one year. The policy year and calendar year coincide by law. Experience of the short-term private passenger risks is considerably worse than that of risks written on January 1, which necessitates charges for short-term policies considerably in excess of pro rata. A comprehensive study of private passenger short-term charges in 1950 demonstrated that such charges were inadequate. A study of the latest ten years experience compared with that of the four post-war years, 1946-1949, was found to be quite similar. The experience of these four years by month of issue is included as Exhibit E to illustrate the degree by which short-term experience differs from full term.

It is apparent that the application of short-term factors and short-

rate cancellation factors result in the collection of premiums over and above the pro rata provided in full-term rates. Therefore, it is necessary to compensate for this excess by decreasing the full-term rates by a factor measuring the percentage relationship of such premium above pro rata.

The ratio of the total pro rata premium to total collected premium represents for the latest year the short-term and short-rate offset. Pro rata premium is obtained by application of manual rates to territory exposure. In the revision of rates for 1954, the private passenger short-term and short-rate offset was 0.9630, a reduction of 3.70%. In the succeeding part of this paper the use of the offset will be demonstrated.

PROJECTION FACTORS

Prior to the advent of Compulsory Insurance in Massachusetts there had been eight rating territories, but under a Compulsory law the companies recommended three territories for 1927: Boston and 17 surrounding cities and towns, Boston Suburban plus four large cities in other parts of the State and the remainder of the State. As the 1927 experience became available in 1928 it was quite apparent that there was wide variation in experience within the territories. For 1929 the Commissioner proposed five territories and the commotion eventually resulted in his resignation without the establishment of a set of rates for 1929. The Supreme Court ordered the Acting Commissioner to establish rates for 1929 and he promulgated the five territories originally proposed by his predecessor.

Since 1929 cities and towns have been grouped in territories on the basis of similar experience without regard to geographic location. From 1929-1939 the movement of towns was on a judgment basis. From 1940 to date a formula has been applied.

Approximately fifteen years ago, the Commissioner of Insurance was concerned with the large number of cities and towns being moved from one territory to another each year by the application of the territory formula then in use. His concern was a practical one, in that each movement of a municipality upwards necessitated justification to those persons affected thereby and the explanations to laymen were difficult and unsatisfactory.

The effect of weather conditions, highway and road construction, reserve practice of certain companies and other extenuating circumstances caused various degrees of fluctuation, some tangible, others not, particularly in the experience of the smaller towns. To offset the effect of these fluctuations, the Actuarial Staff was instructed to develop what in reality amounted to a stabilizing factor to be used in conjunction with the territory formula for private passenger cars.

Using a five year base, as is the case in Massachusetts, the Department calculated a statewide private passenger developed pure pre-

mium for each of the five years of the experience period and for the five years combined. The ratio of the developed pure premium of the five years combined to the developed pure premium of the individual years produced a factor for each year, hereinafter called the projection factor. These factors, recalculated each year, have remained a stable part of the Commissioner's rating procedure over the years. The calculation of a set of projection factors used in the 1954 rates is set forth in Exhibit F. Application of the factors is illustrated in the section of this paper devoted to 1953 and 1954 rates.

TERRITORIAL FORMULAE AND THE ELIMINATION OF JUDGMENT

A preface to this subject is necessary, else the reader may gain the impression that the author is a strict advocate of the complete elimination of judgment in ratemaking with sole dependence on "actuarial science" to produce phenomenally accurate rates. Such is not the case because experience, being the best teacher, has long since discouraged even the mere harborage of such a thought.

However, experience has also taught that the uniform application of a tested formula in moving towns and cities between territories, without the application of any judgment factor which may or may not be termed arbitrary, has been well received by the public and the courts, if not with favor, at least as non-discriminatory. The "procedure used in assigning towns to territories for 1953 private passenger automobile rates," shown as Exhibit G, has been employed successfully with minor improvements since 1940.

The "Automobile Credibility Table" has also been used over the years in establishing the credibility of the experience of each city and town.[5] The subject of credibility is amply covered in the *Proceedings* and no elaboration will be attempted here. There are some inherent deficiencies in the present private passenger territory formula which are not serious, but are disturbing. For example a town may be suffering adverse experience due to lack of law enforcement, safety education or some other situation which can be corrected. During the unfavorable experience period, high claim frequency may produce enough credibility which combined with the other factors necessitates moving the town to a higher rated territory. After being shown the experience that caused the rate increase, the City Fathers launch a "speed drive", safety program, etc., and in a few years the experience has shown marked improvement. Claims have fallen way off. Exposure has remained relatively constant. What happened to credibility? It decreased with the decrease in claim frequency. The deviation necessary to warrant moving the town to a lower rated territory has however, increased. The town becomes more or less static in the higher rated territory.

Commercial car territories have been relatively stable over the

[5]P.C.A.S., Vol. XV, pgs. 219-222.

years, more for lack of a suitable territory formula than for a lack of indication that adjustments should have been made. Originally, and periodically since, commercial car territories were established on the basis of recommendations of a group of underwriters specializing in classifying and rating commercial cars. In 1950 it was quite obvious, from reviewing commercial car experience, that a number of cities and towns were out of line, territory-wise. Various formulae were suggested and tested, but the application of a formula to statistics lacking any semblance of homogeneity produced violent results. Meanwhile, as the studies were in process, the commercial car cities or towns showing the greatest variation from the territory were moved up or down as the experience warranted on a strictly judgment basis.

The formula or method producing the most logical results when applied to commercial vehicles was in effect a form of experience rating of the individual city or town. The credibility of the latest year's experience for each town was established from the credibility table, as was the five year credibility of each town. The developed pure premium on rate level of the latest year was weighted by the credibility of that year; the developed pure premium of the five years on rate level was weighted by the five-year credibility less the latest year credibility; the complement of the five-year credibility was then applied to the underlying pure premium on level. The sum of these components then gave a weighted pure premium on level for the town. Various methods could then be applied to group the towns into territories.

This formula or procedure appeared to have merit. All of the minor differences of the private passenger territory formula seemed to have been overcome. The new formula was more responsive to recent developments and it did not result in the freezing of a town within a territory. However, exhaustive tests over a period of years indicated that a small credibility town might be subject to undue fluctuation by use of the latest year's experience, even to the limited extent of its credibility. Statewide, the experience indicates that slightly in excess of 40% of the amount of claims has been paid by the first reporting. In the aggregate, the development factors offset any over valuation of outstanding losses, but in rare instances it has been found that due to several serious accidents charged against a small town, there may be occasions when the losses charged against the town vary considerably between the first and second reporting of losses. Under such circumstances a town might be prematurely moved to another territory.

Consequently, the procedure was modified to establish credibility of the latest two years and the latest five years. The two year credibility was then applied to the two year developed pure premium on level; the five year credibility less the two year credibility was applied to the five year developed pure premium on level; and the complement of the five year credibility applied to the underlying pure

premium on level. The sum of these components then gave a weighted pure premium on level for each town.

Various methods of moving towns into territories were tried and the following selected after tests.

A weighted pure premium was computed for each of the present rating territories in the same manner as for each town. Each town was then reassigned to the rating territory, the weighted pure premium of which was nearest to the weighted pure premium of the town, except that no town was moved more than one territory from its present position and no town was moved from one territory to another in opposite directions in two successive years. A pure premium for each new territory was then calculated by the weighting of the credibility weighted pure premiums of the towns assigned to the new territory.

To determine if this method of rating produced reasonable results, the experience of prior years was tested by the application of the rating formula to commercial car experience. The objection outlined above had been overcome by the use of the experience of the latest two years in lieu of the experience of the latest year. The test produced territorial alignment which was a substantial improvement over any previous method. Consequently, the Commissioner in establishing commercial car rates for 1954 adopted the method outlined. No towns were shifted within the private passenger classification in 1954 because of the adoption of the "age and use" classification plan. It is contemplated that in future years, this method, or a modification thereof, will be used for private passenger cars.

It has been observed in Massachusetts where territorial changes in commercial cars was indeed infrequent, that some fleet owners and individuals took advantage of this weakness to legally relocate their base of operations, or place of garaging, to take advantage of lower rates. It is contemplated that the adoption of a reasonably responsive rating formula will discourage such practices by making them economically infeasible.

In the section of this paper devoted to 1954 rates, the use of this formula is illustrated.

RATE LEVEL AND TREND FACTORS

A review of the history of rates over the years of the compulsory Act indicates a complete lack of use of trend factors until recent years. The majority of rates have been based on a three year rate level. In some instances a two-year rate level was employed. In 1942, with the advent of gas rationing and an expected decrease in exposure, rate levels were modified to reflect what might be expected under a war-time economy. A three year rate level was restored and continued in use through 1952. The reluctance of a Commissioner to adopt a trend factor in the face of the economic situation, stemmed more

from the desire not to deviate from an established and tested ratemaking procedure than from any other force.

However, it became quite apparent from mere observation, a tight market, a substantial increase in assigned risks, and underwriting results of the companies, that the customary ratemaking procedure needed modification. Consequently in the revision for 1953, since claim frequency was relatively stable, the Commissioner based his rates on a three year rate level adjusted to reflect the average developed claim cost of the latest year, 1951. Subsequently, in the revision for 1954, a similar adjustment was made and will be discussed in a subsequent section.

USE OF FACTORS AND FORMULAE AS APPLIED TO 1953 AND 1954 MASSACHUSETTS COMPULSORY RATES

PRIVATE PASSENGER CARDS

The calculation of development factors, the short rate-short term factor and projection factors has been illustrated in the preceding sections. In addition, the private passenger territory formula and the use of trend factors have been discussed. To simplify the rating process, a private passenger town card is prepared for each city or town with five year credibility in excess of 20%. Since no cities or towns were moved in 1954, the calculation of the rate and the application of the territorial formula is illustrated by an example from the 1953 Rate Revision.

The private passenger cards for Billerica, Brookline, Lynn and Medford are attached as Exhibit "H". Column (3) of the card represents a composite factor used solely for convenience and is obtained by multiplying the development factor by the short rate-short term factor by the 3 year rate level factor:

Year	*Dev. Factor*	*Short Rate-Short Term Offset*	*3 Yr. Rate Level Factor* *	*Comp. Factor*
1951	1.0061	.9605	1.0796	1.0433
1950	.9712			1.0071
1949	.9724			1.0083
1948	.9859			1.0223
1947	.9960			1.0328

*Ratio of Statewide 3 year Dev. Pure Premium to 5 year Dev. Pure Premium.

The projection factors, Column (6), for 1953 were calculated as for 1954 as shown in Exhibit "F". Column (7) shows the projected pure premiums referred to in the territorial formula. Column (5) shows the indicated pure premium by year and for the five years.

Considering Billerica, with 62% credibility, Exhibit G indicated a deviation of 15% which means that the five year indicated pure premium must exceed 30.30 before the town was considered for a move. In addition, in four of the five years including the latest, the projected pure premium exceeded the underlying pure premium. Therefore, Billerica was moved to the next higher territory.

In the case of Brookline, Lynn and Medford, all with 100% credibility, the five year indicated pure premium exceeded the underlying by more than 10% in each case, and the projected pure premium for each of the five years exceeded the underlying for each town. Consequently, the three cities were moved to the next higher territory along with Billerica. When the experience of these four municipalities was combined with that of the cities and towns remaining in the higher rated territory, a five year indicated pure premium of 30.24 resulted. This example demonstrates the use of the territorial formula.

Having obtained a five year indicated pure premium (developed and offset for short rate and short term, and on a 3 year rate level) for each territory it becomes a relatively simple operation to obtain rates. A review of claim frequency and claim cost statewide was made to determine if any trend existed. Claim frequency for private passenger cars had been static for the latest five years, and there was no indication to lead the Commissioner to believe that any change in frequency might be expected in 1953.

A review of average claim costs for the latest three years indicated a definite trend:

Year	*No. of Claims*	*Developed Losses*	*Average Claim Cost*	*Index to Previous Year*
1951	86,765	$33,493,372	$386	1.052
1950	80,184	30,310,244	367	1.052
1949	66,080	23,739,787	349	1.058
1949-51	233,029	$86,015,250	$369	

Since a three year rate level reflected a developed claim cost of $369 and the 1951 year indicated $386, the Commissioner decided to reflect the level of 1951 claim costs in the 1953 rates and consequently the territorial indicated pure premiums were multiplied by a factor of 1.0461 ($\frac{386}{369} = 1.0461$). To follow through the territory previously used as an example, the indicated pure premium of $30.24 when multiplied by 1.0461 produced a final pure premium of $31.63.

A study of the expense returns of non-participating Companies indicated that the expense and profit loading used in the prior year,

36.5%, was reasonable and the Commissioner continued that loading. The final pure premium ($31.63) when loaded produced an indicated rate of $49.81. It has been the practice of the Commissioner in recent years to round to the nearest half dollar. Consequently a rate of $50 was established for the territory used as the example. Rates for the other territories were similarly established for 1953. No classification plan was employed.

There exist today in Massachusetts sixteen territories. However, the first seven are single town territories. The majority of these seven territories were at one time or another included within another territory and were segregated in all except one instance at the request of the respective municipal officials. If single town territories were integrated with the multiple town territories, eleven territories would suffice for private passenger cars.

COMMERCIAL CARDS

Commercial motor vehicles in Massachusetts are classified according to the business occupation of the insured as Class 3 or Class 4 and are further subdivided into size type according to the maximum load to be carried as CA or CB.

As approximately 80% of the exposure is found in Class 4, Class 3 experience by territory is very thin. Therefore, territory alignment is based on Class 4 experience and pure premiums for Class 3, weight within class, are determined by use of differentials applied to Class 4 pure premiums. Classification differentials and load capacity differentials are based on five-year experience:

Classification Differentials Used in 1954 *Rates*

Territory	5 *Year* ('48-'52) *Pure Prem. Class* 4	*Class* 3	*Differential by Territory*
1	$60.09	$74.76	1.244
2	47.28	64.13	1.356
3	39.05	56.97	1.459
4	30.71	49.75	1.620
5	27.30	48.74	1.785
6	19.08	53.09	2.782
7	11.47	29.76	2.595

Calculation of Load Capacity Differentials

Territory	5 *Year* ('48-'52)	*Pure Prem.*	*Differential*
1	4CA	$58.30	.970
	4CB	66.60	1.108
	Total	60.09	
2	4CA	44.67	.945
	4CB	57.30	1.212
	Total	47.28	
3	4CA	35.63	.912
	4CB	53.44	1.369
	Total	39.05	
4	4CA	28.65	.933
	4CB	39.44	1.284
	Total	30.71	
5	4CA	25.40	.930
	4CB	36.48	1.336
	Total	27.30	
6	4CA	17.66	.926
	4CB	26.70	1.399
	Total	19.08	
7	4CA	10.39	.906
	4CB	18.20	1.587
	Total	11.47	

Similarly the Class 3 load capacity differentials were calculated to be:

Territory	*1*	*2*	*3*	*4*	*5*	*6*	*7*
3CA	.986	.885	.914	1.006	.873	.758	.790
3CB	1.015	1.105	1.138	.994	1.138	1.264	1.226

The following rate level factors for 1954 rates were calculated for use in the commercial territory formula:

		Rate Level Factor
1952 Class 4 Pure Premium / 1951-52 Class 4 Pure Premium	$\$31.67 / \$30.99 =$	1.022
1952 Class 4 Pure Premium / 1948-52 Class 4 Pure Premium	$\$31.67 / \$28.56 =$	1.109
1952 Class 4 Pure Premium / Pure Premium underlying Class 4 Rates	$\$31.67 / \$28.34 =$	1.118

Cards were then prepared for each city and town and assembled in 1953 territory order. To illustrate, cards for Dedham and Waltham, in 1953 Territory 3, are attached as Exhibits H-1 and H-2. The raw pure premium of the latest two years, 1951-52, was brought to level by the application of the factor 1.022 and this amount weighted by the credibility, Z_2, of the town for the two years. Similarly, the five year and underlying pure premiums on level were modified by the five years less the two year credibility ($Z_5 - Z_2$) and the complement of the five year credibility ($1 - Z_5$), respectively. The sum of these components produced a weighted average pure premium for each town. Expected losses were then obtained by multiplying the two year exposure by the weighted average pure premium.

A card was then prepared for each territory with towns in 1953 territory order. Exhibit H-3 shows the Territory 3 card and the weighted average pure premium, $44.82, for Territory 3 calculated in the same manner as for each town. To determine what towns should be moved, the mean of the territorial weighted average pure premium for consecutive territories was calculated to establish limits:

1953 *Territory*	*Avg. Wt. Pure Prem.*	*Mean*	*Limits*
1	$66.57	$59.87	over $59.87
2	53.17		
2	53.17	49.00	$49.00-59.87
3	44.82		
3	44.82	40.90	40.90-48.99
4	36.98		
4	36.98	32.99	32.99-40.89
5	29.00		
5	29.00	25.17	25.17-32.98
6	21.34		
6	21.34	17.21	17.21-25.16
7	13.07		under 17.21

Having established territory boundaries, it was a simple matter to compare the weighted average pure premiums of the towns within a territory with the limits so established and to move any town whose pure premium did not fall within the limits. For example, reference to Exhibit H-1 shows Dedham with a weighted average pure premium of $50.21 which exceeds the upper limit of $48.99 for Territory 3. Consequently, Dedham was moved to Territory 2. Conversely, Waltham, (Exhibit H-2) with a weighted average pure premium of $39.14 which is below the lower limit of $40.90 for Territory 3, was moved to Territory 4.

The application of the formula to all towns in the State resulted in seven towns moving to a higher rated territory and two to a lower rated territory. In the next revision seven towns were moved to a higher rated territory.

The town cards were then sorted in new territory order and a weighted pure premium calculated for each new territory. Class and weight differentials were then applied and a statewide weighted pure premium calculated for each class.

Rate level by class was based on three year average claim frequency and the latest developed average claim cost.

Class	(1) 1950-52 *Frequency*	(2) 1952 *Dev. Av. Cl. Cost*	(3) *Short Rate-Short Term Offset*	(4) *Rate Level P.P.* (1)x(2)x(3)
3	15.3	$431	.9826	$64.80
4	7.4	433	.9826	31.48

Wide variation by year within class and between classes indicated a broader base for frequency than for claim cost.

Comparison of the statewide weighted pure premiums with the rate level pure premiums by class produced the rate level factors.

$$\text{Class 3 } \frac{\text{Rate Level Pure Prem.}}{\text{Statewide Wt. Pure Prem.}} = \frac{\$64.80}{\$60.96} = 1.0630$$

$$\text{Class 4 } \frac{\text{Rate Level Pure Prem.}}{\text{Statewide Wt. Pure Prem.}} = \frac{\$31.48}{\$31.34} = 1.0045$$

In view of the insignificant factor for Class 4, weighted pure premiums were used without adjustment. Class 3 pure premiums were modified by the factor of 1.0630 to produce the desired rate level, loaded for expenses and profit at 36.5% and rates rounded to the nearest half-dollar.

To illustrate, the calculation of the rates for Territory 3 follows:

Class 4 Wt. Pure Prem. (1954 Terr. Order)	$43.66
Class 3 Territory Differential	× 1.459
Class 3 Indicated Pure Premium	$63.70

Class 4

Wt. Pure Prem.		*Wt. Differential*		*Final Pure Prem.*
$43.66	×	CA .912	=	CA $39.82
43.66	×	CB 1.369	=	CB 59.77

Class 3

Ind. Pure Prem.		*Wt. Differential*		*Final Pure Prem.*
$63.70	×	CA .914	=	CA $58.22
63.70	×	CB 1.138	=	CB 72.49

The application of the CA weight differential to the indicated pure premium for Class Three in Territory 4, produced an indicated pure premium for Class 3CA of $58.85. Consequently, Territories 3 and 4 were combined for Class 3CA to produce a pure premium of $58.63.

The loading factor, 1.5748 ($\frac{1}{.635} = 1.5748$) applied to these pure premiums produced the rates after adjustment for rate level.

Territory 3

Class 4

	Final Pure Prem.		*Rate Level Factor*		*Loading Factor*		*Rate*	*Rate Rounded*
CA	$39.82			×	1.5748	=	CA $ 62.71	$ 62.50
CB	59.77			×	1.5748	=	CB 94.13	94.00

Class 3

CA	$58.63	×	1.063	×	1.5748	=	CA $ 98.15	$ 98.00
CB	72.49	×	1.063	×	1.5748	=	CB 121.35	121.50

THE ADAPTABILITY OF METHODS TO PUNCH CARDS

Since all of the underlying data used in the rate making is collected and produced from punch cards, the possibility of carrying through

the process to completion on punch cards is attractive. With the advent of the "Point System" there has been established within the Insurance Department a modest machine section. With the addition of an electronic calculator it would indeed be a simple operation to convert to machine ratemaking.

OPERATING RESULTS UNDER THE COMPULSORY LAW

The attached exhibits I-1 and I-2 show by year the compulsory experience since inception through 1948 and include earned premium, incurred losses, loss ratio, provision for losses, excess or deficiency, expenses and profit or loss and totals for stock carriers and for non-stock carriers. Exhibit I-3 shows the experience for the years 1927-48 inclusive for stock and non-stock carriers combined.

The policy year losses are ultimate except for the latest five years which are as of the latest reporting, 5th report 1948, 6th, 1947, etc. As of the fifth report more than 95% of the losses are paid. The separation of losses between stock and non-stock carriers was accomplished by the application of the split at a first reporting to the latest reporting for the policy years 1932-48 by year. For prior years the division was obtained by applying the percentage split for the policy years 1932-36 in the aggregate.

The provision for losses was obtained by applying the permissible loss ratio to the earned premium for each group of carriers. The expenses were compiled from the company expense returns as reported to the Insurance Department annually.

THE DELAY IN THE ADOPTION OF THE AGE AND USE PLAN IN MASSACHUSETTS

CONFLICTING DATA AND REPORTS

It may seem odd that Massachusetts was the next to the last State in the United States to adopt the Age and Use Classification Plan in view of the pioneering in Massachusetts in the accumulation of data pertaining to the age of operators involved in accidents, and the accident experience of cars used in business. However, there were several good reasons for the delay.

In the paper by L. W. Scammon, there will be found results of early samplings within Massachusetts which appear to prove that young drivers are considerably worse as a class than older operators.[6] Meanwhile, a study conducted by the Center for Safety Education, Division of General Education, New York University, was released in August, 1949 which is quoted in part:

[6]P.C.A.S., Vol. XXXVII, pgs. 43-56.

"Massachusetts"

"Observations:

"1. The experience, on the whole, of drivers between the ages of 19 and 25 appears to be poorest."

"2. Drivers over 30 years of age appear to be the best risks."

"Conclusions:

"1. In no instance is the experience of the teen-age group any worse than that of the 20-24 year old group."

"2. In no instance is the experience of the 25-29 year old group *better* than their expected experience."

"3. On the basis of the combined totals of Connecticut, Massachusetts and Wisconsin, drivers between the ages of 20 and 24 have the poorest experience, with the teen-agers rating second, and the 25-29 year old group rating a close third."

Many officials concluded from this study that teen-age drivers in Massachusetts were neither better nor worse in their accident involvement experience than those in the 20-24 year and 25-29 year groups and therefore any classification plan with a breaking point at age 25 was then open to severe criticism.

In his report for the year 1952, the Massachusetts Registrar of Motor Vehicles included a table showing by age of operator the number of fatal and non-fatal accident involvements. When this distribution was compared with the distribution of licensees shown in the article by Mr. Scammon, it was apparent that the 25-29 group was substantially better than the younger operators. Similarly, the 1953 accident data reported to the Registrar when compared with the same distribution of licensees indicated that the breaking point was at about age 25. However, the 1953 data indicated the 16 and 17 year-olds were apparently getting worse.

However, the Commissioner of Insurance established the following "age and use" classification plan applicable to private passenger cars for 1954:

Class 1. No operator under 25. No business use.

2. Operator under 25.

2A. Operator under 25 accident free and possessing a certificate from a "Behind the Wheel" Driver Training Course approved by the Registrar of Motor Vehicles.

3. Business use.

The indicated relativities based on Massachusetts experience for the years 1950, 1951, and 1952 and the selected relativities for 1954 are shown below:

	Indicated	*Selected*
Class 1	1.00	1.00
2	1.97	1.60
2A	—	1.36*
3	1.29	1.275

*The class 2A relativity represented a 15% discount from class 2.

Immediately after the War, the Registrar of Motor Vehicles intensified his campaign to promote Driver Education in the high schools of the Commonwealth with emphasis on the "Behind the Wheel Training" phase and the results are tabulated below:

	Student Enrollment					
	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53
Classroom Instruction Only	28,147	35,814	36,328	35,900	34,513	31,741
Classroom & Behind the Wheel Training	1,250	4,435	6,809	7,912	8,538	8,946

Certificates are issued by the Registrar of Motor Vehicles upon recommendation of the Instructor to those students who have satisfactorily completed the entire course in Driver Education. Driver Education consists of classroom instruction, practice driving, examination by a Motor Vehicle Examiner, using the high school training car and receipt of a license. In January, 1950, the Registrar inaugurated a ten-year survey of the driving records of 1500 high school students selected at random throughout the Commonwealth. These students were divided into three groups of 500 each. The first group had no formal training whatever, the second group had classroom instruction only, while the third group had completed the entire course.

Detailed records, accident involvement, convictions, warnings, etc., have been maintained for each individual within the study. At the end of 30 months, the frequency of involvement, convictions and warnings was calculated for each group: no formal training, 7.8; classroom instruction only, 6.7; and classroom and behind-the-wheel training, 4.5. Although the sample lacks credibility, the wide variation in

frequency between the untrained and the behind-the-wheel trained groups warranted some recognition. Consequently, a 15% credit from Class 2 rates was allowed vehicles operated by certificate holders who were accident free.

Needless to say, the rate credit served as a stimulus to the Driver-training Program. In fact, many applicants were unable to take the course. Where 8,946 were enrolled in the 1952-53 year, in excess of 11,000 were certified in the 1953-54 year and the program is still expanding at an accelerated rate.

A special call for experience for the first five months of 1954 appears to justify the judgment of the Commissioner in erecting the behind-the-wheel trained driver class. The indicated relativities for this period are:

Class	*Indicated Relativity**
1	1.000
2	2.419
2A	1.313
3	1.329

*For supporting data see Exhibit "M".

It should be stated that the credibility of the 2A class is small and what the ultimate relativity should be will not be known for several years. It is interesting to note the distribution of amount of loss by age groups within class for the five months:

Amount of Losses by Age Group — January-May, 1954

Class	*Under* 25		25 *and Over*	
	Losses	*% of Class Losses*	*Losses*	*% of Class Losses*
1	$ 285,751*	5.53	$4,882,832	94.47
2	1,792,273	77.87	509,228	22.13
2A	36,773	64.27	20,441	35.73
3	107,330	10.15	950,364	89.85

*Losses caused by under 25 operators not resident in the household and persons in the Armed Forces of the U. S. who do not qualify as residents of the household if they do not regularly operate the vehicle, as well as persons learning to drive.

It was earlier stated that the experience of the 16 and 17 year olds appeared to be taking a turn for the worse in 1953 based on the accidents reported to the Registrar of Motor Vehicles and the dis-

tribution of licenses from the 1949 sampling. With the vast increase in number of trained drivers entering the exposure at ages 16 and 17, it was expected that there would be a substantial improvement in their experience. Assuming the distribution of personal injuries by age of operator to be reasonably accurate, since it compared favorably with similar distributions from other sources, it appeared that it would be desirable to obtain a new sample to test the distribution of licensees by age.

As of December 31, 1953, a new sample of licensees was taken by four individuals working independently and without duplication, of the 1,900,000 licensed operators in the Commonwealth. The four samples were tabulated separately and then combined to eliminate any distortion which might be due to the human element. Each of the four samples compared favorably with the combined and it was generally agreed that the results were indicative of a substantial change in distribution in the younger ages.

In Bests' Insurance News, September, 1953, Deputy Commissioner Veness of the New York State Bureau of Motor Vehicles reported experience of New York operators by age groups for the year 1952. Because of the restriction on drivers under 18 in New York City, Upstate New York was chosen for an age-accident involvement comparison with Massachusetts which follows.

	*% Drivers** (1)		*% Involvement*** (2)		*Age-Accident Invol. Index* (2)÷(1)	
Age of Driver	*Mass.*	*Up. N. Y.*	*Mass.*	*Up. N. Y.*	*Mass.*	*Up. N. Y.*
Under 18	2.5	1.2	4.0	2.3	1.60	1.92
18-20	5.1	4.3	8.7	7.9	1.71	1.84
21-24	8.3	7.7	11.2	10.5	1.35	1.36
25-29	12.5	12.4	16.6	16.4	1.33	1.32
30-39	25.3	25.5	24.8	26.3	.98	1.03
40-49	20.3	20.9	16.6	18.1	.82	.87
50-59	14.6	15.6	10.9	11.9	.75	.76
60-64	4.9	5.5	3.6	3.4	.73	.62
65 & over	6.5	6.9	3.6	3.2	.55	.46
	100.0	100.0	100.0	100.0		

*Mass. Sample as of 12/31/53, N. Y. as of 1952.
**Mass. — 20,850 Incurred Loss Reports — Jan.-May, incl., 1954, N. Y. — 1952 Reports to N. Y. Bureau of M. Vs.

It is interesting to note from the table above that although there exists some variation in the distributions between states, the Age-Accident Involvement Index, except for the under 18 and over 60 groups, is very similar. The comparison also questions the propriety of the break in the classification plan at age 25 and suggests further research into the possibility of three age differential groupings; 20 and under, 21-29, and 30 and over.

It appears at this time that there has been a substantial increase in the number of drivers under age 18, especially in Massachusetts. A number of things may contribute to this change, such as birth rate, war time economies, etc., but it would seem logical that the availability of driver training programs in the schools of Massachusetts has encouraged students, especially females, to obtain licenses at an earlier age. At present from 30 to 40% of the licensees at ages 16 and 17 have completed an approved Driver Training Program and at no direct cost to the parents.

Exhibit K shows the 1952 and 1953 distribution of personal injury involvements by age reported to the Registrar of Motor Vehicles plotted against the 1949 distribution of licensees by age included within Mr. Scammon's paper. In addition the same distribution of involvements for 1953 is plotted against the 1953 distribution of licensees by age.

The indicated improvement in the young ages is due to the shift in distribution of licensees as will be noted in the following table.

Percent of Total Licensees by Age

Age	1953 *Dist.**	1949 *Dist.***
16	1.0	0.45
17	1.5	0.96
18	1.6	1.06
19	1.8	1.41
20	1.7	1.75

*Based on sample of 138,782 licensees.

**Based on sample of 82,969 licensees.

Exhibit "L" shows a comparison of the Age-Accident Involvement Index curves for distributions of losses by age from four different sources. Three of the curves are based on the 1949 distribution of licensees; the N. Y. U. curve reflects an independent earlier sampling of licensees by age.

LEGISLATIVE INVESTIGATION OF COMPULSORY INSURANCE MERIT AND DEMERIT RATING PLANS

Since the enactment of the Law there have been several investigations of Compulsory Motor Vehicle Liability Insurance. The most comprehensive investigation is reported in the 288 pages of Senate Document 280, January, 1930. The index to this document covers 2½ pages and includes such subjects as Maximum Rates, Demerit rating, Fleet rating, Deductible Policies, Blanket Policies, Selecting Risks, Non-Resident cars, Rate Making in Massachusetts, "Fake" Claims and Court Procedure, Compensation regardless of negligence, State Fund and Initiative Fund Bills, Insure the Driver Plans, Safety Responsibility Laws and the Pedestrian Problem. Practically every modification of the Law proposed since that time has had its roots in Senate 280 which is interesting reading.

On the subject of Demerit Rating, the Special Commission recommended a plan whereby a risk would be classified as normal until he committed certain offenses or was involved in an accident whereupon the risk would be classified A, B or C depending on the nature of the offense or the severity of the accident. He would then pay a 10%, 25% or 50% increase in rate until such time as he completed twelve months of operation without any further record or accident involvement, whereupon he would revert to the next lower surcharge bracket.

In 1934 the Legislature directed the Commissioner of Insurance to study the Law "with a view to providing relief for careful operators of motor vehicles in the form of a reduction in the amount of insurance premiums paid by them under said law."

The report of the Commissioner is contained in House Document No. 1000 (1934). After 31 pages of the pros and cons of merit and demerit rating, the Commissioner concluded; "It requires no further discussion to demonstrate that the adoption of either the merit or the demerit rating plan in any form would serve only to increase the costs payable by motor vehicle owners for or in connection with their compulsory liability insurance, and further to complicate the operation of that law for nearly a million persons affected by it." The Commissioner's principal objection to a demerit rating plan was administrative cost.

Again in 1938 the Commissioner of Insurance was directed to make a similar study. His report is to be found in House Document No. 2147 (1939). This Commissioner devoted his report to the advantages and disadvantages of a merit rating plan since his instructions did not contemplate a study of demerit rating. His conclusion was that "We have given considerable thought to the possible effect of a merit rating plan as a medium of increasing safety on the highways, and we cannot believe that the possibility of saving a small amount on automobile insurance premiums will be an inducement which would materially affect the habits or reactions of car owners, particularly

when we consider that many accidents are caused by operators of automobiles who do not own cars and, therefore, do not pay premiums."

From 1938 to date there have been countless numbers of bills proposing various forms of relief for so-called careful drivers. None appeared to have merit without some tie-in with law enforcement and licensing of operators. Consequently, the 1953 proposal of the Governor to combine a demerit rating plan with a point system for evaluating operators and owners of automobiles on the basis of driving performance was received with mixed emotion in different circles. In general, everyone approved of the highway safety provisions in the proposed law, but those from the higher rated territories insisted that any demerit rating plan must be based on a statewide flat rate. The proponents of the flat rate were in the minority and after many hearings and rewrites the "Highway Safety Act" was enacted.

PROBABLE EFFECT OF POINT SYSTEM AND DEMERIT RATING LAWS ON CLAIM FREQUENCY AND RATES

Under the provisions of the legislation the Highway Safety Committee is charged with giving appropriate publicity to the point system and the schedules of penalties. The Registrar of Motor Vehicles and his committee started to publicize the system early in 1954 and succeeded in alerting the driving population of the advent of a new era in law enforcement and its potentials. Of course the publicity attendant upon the enactment of the law in the summer of 1953 first stimulated thinking about Highway Safety. It is quite probable that such publicity had some effect on claim frequency during 1954 and that those who were assessed points in 1954 became disciples for or against the point system.

During 1954 in excess of 30,000 operators or owners were assessed points. Earlier it has been pointed out that the full effect of the Point System was not felt until September, 1954; however, in 1955, it is expected that the number assessed will approximate 60,000, very few of whom will be repeaters. Not all of those assessed will be eligible for surcharges in 1956. The worst offenders will be off the highways and some of the operators are not owners of private passenger cars or motorcycles. The amount of the offset in the rates depends on the number of eligibles assessed and the value attached to the points by the Commissioner of Insurance.

At this writing it appears that the decrease in frequency noted in 1953 has continued in 1954 both in bodily injury and property damage claims. Some part of the decline is without doubt due to the Point System and the Demerit Rating Plan. Whether the increase in claim cost indicated in 1954 will offset the reduced frequency is a matter for the future.

EXHIBIT A

Ratio of Allocated Claim Expense Pure Premium to Incurred Pure Premium

Territory	*Private Passenger*		*Commercial*		*Taxicabs*	
	1946	1947	1946	1947	1946	1947
*1	.064	.036	.060	.032	.060	.030
*2	.060	.034	.053	.033	.069	.034
*3	.057	.039	.043	.028	.043	.024
4	.043	.038	.065	.048	.059	.041
5	.043	.033	.056	.030	.020	.028
6	.046	.036	.055	.036	.034	.058
7	.054	.037	.060	.038	.064	.026
8	.047	.031			.064	.026
*9	.046	.046				
*10	.039	.025				
11	.039	.037				
12	.045	.035				
*13	.060	.061				
14	.048	.035				
15	.058	.039				
16	.048	.037				
17	.047	.041				
Total	.049	.037	.056	.034	.051	.030

*Single Town Territories for Private Passenger Classification.

Note: 1946 Policy Year through a 4th Reporting
1947 Policy Year through a 3rd Reporting

Territories arranged from highest rate, Territory 1, to lowest rate, Territory 17.

EXHIBIT B

PRIVATE PASSENGER CLAIMS BY MONTH OF ACCIDENT

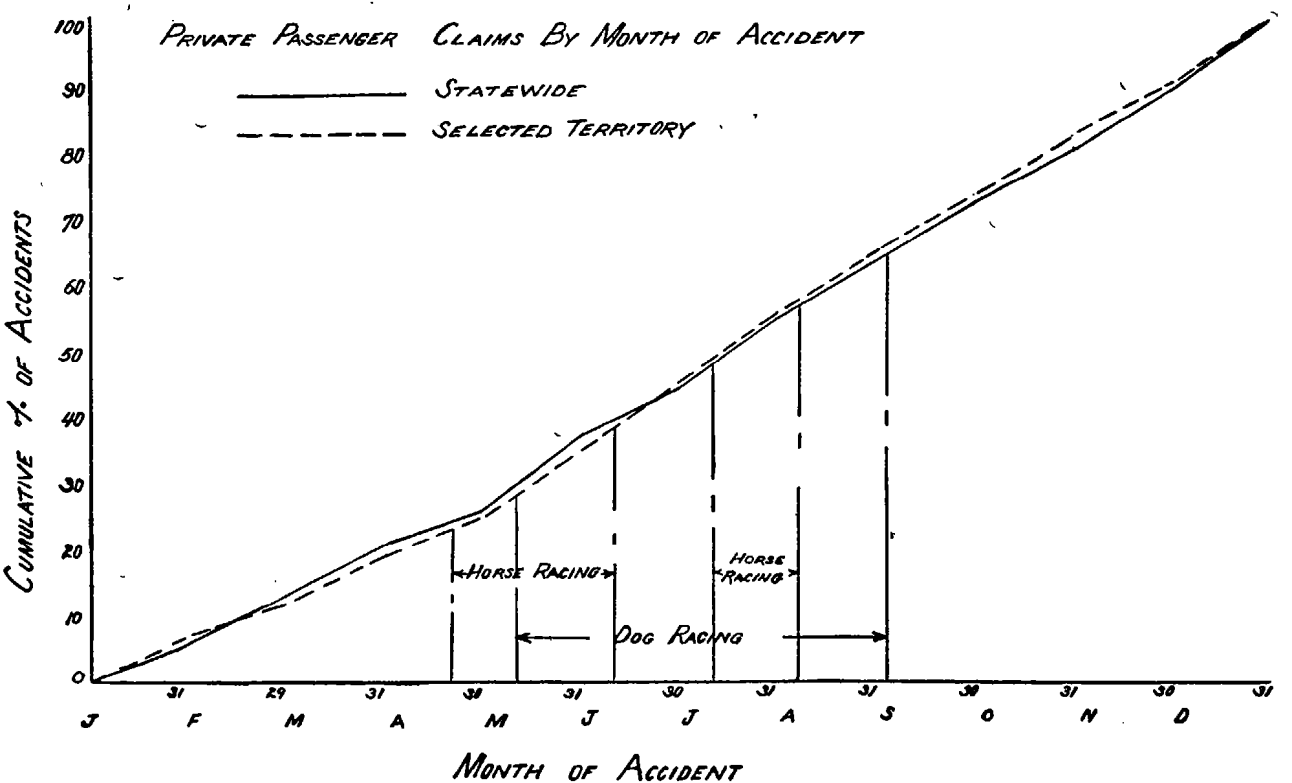


EXHIBIT C

TEST OF DEVELOPMENT FACTORS

The latest year for which a tenth Reporting of Losses is available is 1941. Rates for 1943 were based on the experience of the five years 1937-41, the latest 5 year period for which ten years of development is available. There follows a comparison by year of the raw losses, column (2) reported to the Department by the Companies; the tenth reporting of these losses, column (4) representing all paid losses; and the losses used by the Department, column (5) by the application of development factors to the raw losses, in the computation of the 1943 Rates:

(1) *Policy Year*	(2) *Raw Losses*	(3) *Reporting*	(4) *Tenth Reporting*	(5) *Developed Losses Used in Rates*
1937	$17,638,338	5th	$17,610,924	$17,578,368
1938	14,998,720	4th	14,925,493	14,913,227
1939	16,882,739	3rd	16,598,621	16,656,510
1940	17,626,691	2nd	16,896,723	17,078,501
1941	18,955,862	1st	17,781,879	17,500,052
	$86,102,350		$83,813,640	$83,726,658

The total developed losses used in the 1943 rates by the Department are $86,982, or about one tenth of one percent less than the losses as actually paid several years later.

EXHIBIT D

Calculation of Development Factors for 1954 Rates

Year	(1) *1st Report*	(2) *2nd Report*	(3) *Development*	(4) *Development Factor*
1950	28,846,221	30,310,244	(2)÷(1)	1st to 10th Report
1951	33,290,301	34,570,131		
	62,136,522	64,880,375	1.0442	1.0137
	2nd Report	*3rd Report*		
1949	23,821,494	23,739,787		2nd to 10th Report
1950	30,310,244	30,212,961		
	54,131,738	53,952,748	.9967	.9708

	3rd Report	*4th Report*		
1948	20,821,455	20,542,253		3rd to 10th Report
1949	23,739,787	23,448,432		
	44,561,242	43,990,685	.9872	.9740
	4th Report	*5th Report*		
1947	19,020,991	18,813,323		4th to 10th Report
1948	20,542,253	20,298,072		
	39,563,244	39,111,395	.9886	.9866
	5th Report	*6th Report*		
1946	17,003,629	16,962,032		5th to 10th Report
1947	18,813,323	18,802,845		
	35,816,952	35,764,877	.9985	.9980
	6th Report	*7th Report*		
1945	13,347,658	13,341,844		6th to 10th Report
1946	16,962,032	16,960,856		
	30,309,690	30,302,700	.9998	.9995
	7th Report	*8th Report*		
1944	10,895,494	10,894,121		7th to 10th Report
1945	13,341,844	13,338,969		
	24,237,338	24,233,090	.9998	.9997
	8th Report	*9th Report*		
1943	9,497,103	9,500,060		8th to 10th Report
1944	10,894,121	10,889,501		
	20,391,224	20,389,561	.9999	
	9th Report	10th *Report*		
1942	11,611,361	11,614,094		9th to 10th Report
1943	9,500,060	9,498,173		
	21,111,421	21,112,267	1.0000	

EXHIBIT E

PRIVATE PASSENGER CAR EXPERIENCE — POLICY YEARS 1946-1949

BY MONTH OF ISSUE

Month of Issue	*Earned Car Years*	*Compulsory Premium*	*Losses Incurred*	*No. of Claims*	*Claim Frequency*	*Pure Premium*	*Loss Ratio*	**Pro-Rata Loss Ratio*
January	2,705,843.80	77,941,887	50,028,281	151,523	5.6	18.49	64.2	64.2
February	53,749.20	1,716,315	1,590,723	4,820	9.0	29.60	92.7	95.8
March	75,766.80	2,576,567	2,024,409	6,177	8.2	26.72	78.6	82.1
April	100,293.40	3,507,903	2,612,719	8,045	8.0	26.05	74.5	79.8
May	46,953.80	1,753,843	1,547,560	4,792	10.2	32.96	88.2	100.9
June	34,476.20	1,431,239	1,295,322	3,764	10.9	37.57	90.5	115.9
July	27,750.10	1,242,084	992,477	2,970	10.7	35.76	79.9	111.5
August	19,852.70	911,352	780,379	2,140	10.8	39.31	85.6	123.4
September	13,879.10	663,018	580,040	1,566	11.3	41.79	87.5	132.4
October	9,364.50	512,268	400,266	1,211	12.9	42.74	78.1	129.6
November	4,326.50	285,928	232,757	652	15.1	53.80	81.4	157.8
December	1,102.20	70,738	40,826	114	10.3	37.04	57.7	150.9
TOTAL	3,093,358.30	92,613,142	62,125,759	187,774	6.1	20.08	67.1	68.7

*Obtained by dividing compulsory premium by present short term influence factors by month which are the difference between present short term percentages and pro rata.

EXHIBIT F

Projection Factors — Private Passenger — 1954 Rates

Pol. Yr.	*Exposure*	*Incurred Losses*	*Dev. Factors*	*Developed Losses*	*Dev. Pure Premium*	*Projection Factor*
1952	1,051,185.8	28,957,157	1.0137	29,353,870	27.92	.8693
1951	1,020,702.4	27,788,590	.9708	26,977,163	26.43	.9183
1950	946,873.8	24,080,527	.9740	23,454,433	24.77	.9798
1949	860,069.5	18,574,375	.9866	18,325,478	21.31	1.1389
1948	801,696.6	15,531,036	.9980	15,499,974	19.33	1.2556
Statewide	4,680,528.1			113,610,918	24.27	

EXHIBIT G

THE PROCEDURE USED IN ASSIGNING TOWNS TO TERRITORIES FOR 1953 PRIVATE PASSENGER AUTOMOBILE RATES

1. The average indicated pure premium for policy years 1947, 1948, 1949, 1950, 1951 (as of the latest reporting for each policy year), the underlying pure premium and the projected pure premiums for each of the aforementioned policy years were calculated for each city and town.

2. Where the indicated pure premium of any city or town showed a deviation from the pure premium underlying its 1952 rate greater than the appropriate one taken from the following schedule, the city or town was considered for a change. The schedule is as follows:

City or Town Credibility	*Deviation*
76% — 100%	10%
51% — 75%	15%
26% — 50%	20%
0% — 25%	25%

3. Any city or town considered for a change was moved to the next higher or next lower territory (not counting single town territories) provided —

(a) that the projected pure premiums for each of the five individual years (1947, 1948, 1949, 1950, 1951) or for four of the five individual years (1947, 1948, 1949, 1950, 1951) including the latest year were greater or less than the underlying pure premium, or

(b) that the projected pure premiums for three individual years, including the two latest years of the five individual years (1947, 1948, 1949, 1950, 1951) were greater or less than the underlying pure premium, and in addition, that in each of the two latest years (1950, 1951), the difference between the city or town indicated pure premium and the underlying pure premium was greater than the percentage indicated in the schedule given above.

4. In the remainder of state territory only those towns whose indicated pure premium exceeded the underlying pure premium by the percentage given in the schedule above and whose projected pure premiums were higher than the underlying in at least four, including the two latest of the five individual years (1947, 1948, 1949, 1950, 1951), were moved to the next higher territory and then only if the projected pure premiums in each of the two latest years (1950, 1951) exceeded the underlying pure premium by the percentages shown in the schedule above. In this territory no town "shall be" raised with a credibility of less than 20%.

5. No town shall be changed from one territory to another in an opposite direction from a change made in the revision of rates for the year 1952.

EXHIBIT H

PRIVATE PASSENGER EXPERIENCE

1952 Territory_____

Town Billerica

5 Year Credibility as of 1947-1951 62%

Underlying Pure Premium 26.35

Pol. Yr.	(1) *Exposure*	(2) *Losses Incurred*	(3) *Comp. Factor*	(4) (2) × (3)	(5) (4) ÷ (1)	(6) *Proj. Factor*	(7) (6) × (5)
1951	2,744.3	91,837	1.0433	95,814	34.91	.8516	29.73
1950	2,520.2	95,923	1.0071	96,604	38.33	.9098	34.87
1949	2,267.5	72,941	1.0083	73,546	32.43	1.0578	34.30
1948	2,046.9	37,972	1.0223	38,819	18.96	1.1646	22.08
1947	1,927.0	47,553	1.0328	49,113	25.49	1.1768	30.00
Total	11,505.9	xxxx	xxxx	353,896	30.76	xxxx	xxxx

EXHIBIT H

PRIVATE PASSENGER EXPERIENCE

1952 Territory_____

Town Brookline

5 Year Credibility as of 1947-1951 100%

Underlying Pure Premium 26.35

Pol. Yr.	(1) *Exposure*	(2) *Losses Incurred*	(3) *Comp. Factor*	(4) (2) × (3)	(5) (4) ÷ (1)	(6) *Proj. Factor*	(7) (6) × (5)
1951	15,833.9	511,335	1.0433	533,476	33.69	.8516	28.69
1950	15,039.0	490,732	1.0071	494,216	32.86	.9098	29.90
1949	13,960.2	386,758	1.0083	389,968	27.93	1.0578	29.54
1948	13,136.6	350,382	1.0223	358,196	27.27	1.1646	31.76
1947	12,456.6	280,600	1.0328	289,804	23.27	1.1768	27.38
Total	70,426.3	xxxx	xxxx	2,065,660	29.33	xxxx	xxxx

EXHIBIT H

PRIVATE PASSENGER EXPERIENCE

1952 Territory_____

Town Lynn

5 Year Credibility as of 1947-1951 100%

Underlying Pure Premium 26.35

Pol. Yr.	(1) *Exposure*	(2) *Losses Incurred*	(3) *Comp. Factor*	(4) (2) × (3)	(5) (4) ÷ (1)	(6) *Proj. Factor*	(7) (6) × (5)
1951	19,024.3	619,800	1.0433	646,637	33.99	.8516	28.95
1950	17,827.1	542,255	1.0071	546,105	30.63	.9098	27.87
1949	16,207.5	491,988	1.0083	496,072	30.61	1.0578	32.38
1948	15,141.2	342,066	1.0223	349,694	23.10	1.1646	26.90
1947	14,125.4	380,085	1.0328	392,552	27.79	1.1768	32.70
Total	82,325.5	xxxx	xxxx	2,431,060	29.53	xxxx	xxxx

EXHIBIT H

PRIVATE PASSENGER EXPERIENCE

1952 Territory_____

Town Medford

5 Year Credibility as of 1947-1951 100%

Underlying Pure Premium 26.35

Pol. Yr.	(1) *Exposure*	(2) *Losses Incurred*	(3) *Comp. Factor*	(4) (2) × (3)	(5) (4) ÷ (1)	(6) *Proj. Factor*	(7) (6) × (5)
1951	14,304.7	578,487	1.0433	603,535	42.19	.8516	35.93
1950	13,430.1	453,645	1.0071	456,866	34.02	.9098	30.95
1949	12,281.5	381,046	1.0083	384,209	31.28	1.0578	33.09
1948	11,486.6	268,476	1.0223	274,463	23.89	1.1646	27.82
1947	10,789.0	236,410	1.0328	244,164	22.63	1.1768	26.63
Total	62,291.9	xxxx	xxxx	1,963,237	31.52	xxxx	xxxx

DEDHAM—'53 Terr. 3 EXHIBIT H-1

				Comm'l Cl. 4 only
1. 51-52 Exposure			791.3	
2. 51-52 P.P.	70.61	× 1.022 =	72.16	
3. Z_2		.19		
4. (2) × (3)				13.71
5. 48-52 P.P.	56.38	× 1.109 =	62.53	
6. $Z_5 - Z_2$		.08		
7. (5) × (6)				5.00
8. Underlying	38.60	× 1.118 =	43.15	
9. $1 - Z_5$		.73		
10. (8) × (9)				31.50
11. Weighted Av. P.P. (4) + (7) + (10)				50.21
12. (1) × (11)				39,731

WALTHAM—'53 Terr. 3 EXHIBIT H-2

				Comm'l Cl. 4 only
1. 51-52 Exposure			1850.2	
2. 51-52 P.P.	31.29	× 1.022 =	31.98	
3. Z_2		.29		
4. (2) × (3)				9.27
5. 48-52 P.P.	33.58	× 1.109 =	37.24	
6. $Z_5 - Z_2$		.13		
7. (5) × (6)				4.84
8. Underlying	38.60	× 1.118 =	43.15	
9. $1 - Z_5$		.58		
10. (8) × (9)				25.03
11. Weighted Av. P.P. (4) + (7) + (10)				39.14
12. (1) × (11)				72,417

ALL TOWNS—Terr. 3 ('53 Order) EXHIBIT H-3

				Comm'l Cl. 4 only
1. 51-52 Exposure			13097.0	
2. 51-52 P.P.	44.41	× 1.022 =	45.39	
3. Z_2		.78		
4. (2) × (3)				35.40
5. 48-52 P.P.	38.59	× 1.109 =	42.80	
6. $Z_5 - Z_2$		.22		
7. (5) × (6)				9.42
8. Underlying	38.60	× 1.118 =	43.15	
9. $1 - Z_5$		0		
10. (8) × (9)				
11. Weighted Av. P.P. (4) + (7) + (10)				44.82
12. (1) × (11)				587,008

Exhibit I-1

MASSACHUSETTS STATUTORY AUTOMOBILE LIABILITY EXPERIENCE
1927-1948 INCLUSIVE
ALL STOCK COMPANIES COMBINED

Year	Earned Premium	Incurred Losses	Loss Ratio	Provision for Losses Amount	%	Excess or Deficiency (-) Amount	%	Expenses Amount	%	Profit or Loss Amount	%
1927	11 070 754	8 817 793	79.6	6 620 311	59.8	-2 197 482	-19.8	4 720 854	42.6	-2 467 893	-22.2
1928	12 657 417	9 597 866	75.8	7 569 135	59.8	-2 028 731	-16.0	5 323 586	42.1	-2 264 035	-17.9
1929	15 759 146	10 752 255	68.2	10 322 241	65.5	-430 014	-2.7	6 132 960	38.9	-1 126 069	-7.1
1930	16 056 731	12 360 606	77.0	10 356 591	62.5	-2 004 015	-14.5	6 265 654	39.0	-2 569 529	-16.0
1931	17 930 849	11 910 561	66.4	11 565 398	64.5	-345 163	-1.9	6 798 496	37.9	-778 208	-4.3
1932	17 668 158	11 285 735	63.9	11 395 962	64.5	110 227	.6	6 456 303	36.5	-73 880	-.4
1933	16 367 978	11 286 842	69.0	10 475 506	64.0	-811 336	-5.0	6 085 037	37.2	-1 003 901	-6.2
1934	16 302 592	12 679 918	77.7	10 433 659	64.0	-2 246 259	-13.7	6 014 118	36.9	-2 391 444	-14.6
1935	16 607 481	11 386 359	68.6	10 628 788	64.0	-757 571	-4.6	6 100 157	36.7	-879 035	-5.3
1936	17 662 047	10 805 970	61.2	11 303 710	64.0	497 740	2.8	6 311 094	35.7	544 983	3.1
1937	17 175 123	12 345 258	71.9	11 077 954	64.5	-1 267 304	-7.4	6 286 961	36.6	-1 457 096	-8.5
1938	16 048 309	10 223 963	63.7	10 351 159	64.5	127 196	.8	6 036 616	37.6	-212 270	-1.3
1939	17 194 341	11 403 253	66.3	11 090 350	64.5	-312 903	-1.8	6 374 755	37.1	-583 667	-3.4
1940	18 038 905	11 692 532	64.8	11 635 094	64.5	-57 438	-.3	6 642 134	36.8	-295 761	-1.6
1941	19 371 887	12 589 570	65.0	12 494 867	64.5	-94 703	-.5	7 142 560	36.9	-360 243	-1.9
1942	16 384 747	8 060 181	49.2	10 568 162	64.5	2 507 981	15.3	6 234 239	38.0	2 090 327	12.8
1943	11 195 837	6 648 721	59.4	7 221 315	64.5	572 594	5.1	4 493 361	40.1	53 755	.5
1944	11 708 030	7 470 198	63.8	7 551 679	64.5	81 481	.7	4 487 060	38.3	-249 228	-2.1
1945	12 297 900	9 417 312	76.6	7 932 146	64.5	-1 485 166	-12.1	4 676 193	38.0	-1 795 605	-14.6
1946	16 916 882	12 143 973	71.8	10 911 389	64.5	-1 232 584	-7.3	6 418 508	37.9	-1 645 599	-9.7
1947	19 571 237	13 500 443	69.0	12 427 735	63.5	-1 072 708	-5.5	7 158 458	36.6	-1 087 664	-5.6
1948	21 455 814	14 594 314	68.0	13 624 442	63.5	-969 872	-4.5	7 582 822	35.3	-721 322	-3.4
Total	355 442 165	240 973 623	67.8	227 557 593	64.0	-13 416 030	-3.8	133 741 926	37.6	-19 273 384	-5.4

Exhibit I-2

MASSACHUSETTS STATUTORY AUTOMOBILE LIABILITY EXPERIENCE
1927-1948 INCLUSIVE
ALL NON-STOCK COMPANIES COMBINED

Year	Earned Premium	Incurred Losses	Loss Ratio	Provision for Losses Amount	%	Excess or Deficiency (-) Amount	%	Expenses Amount	%	Profit or Loss Amount	%
1927	5 495 537	3 114 268	56.7	3 286 331	59.8	172 063	3.1	2 180 980	39.7	200 289	3.6
1928	6 106 392	3 389 774	55.5	3 651 622	59.8	261 848	4.3	2 161 976	35.4	554 642	9.1
1929	5 953 630	3 797 481	63.8	3 899 628	65.5	102 147	1.7	2 151 045	36.1	5 104	.1
1930	5 648 092	4 365 519	77.3	3 643 019	64.5	-722 500	-12.8	1 808 643	32.0	-526 070	-9.3
1931	5 273 544	4 206 572	79.8	3 401 436	64.5	-805 136	-15.3	1 810 295	34.3	-743 323	-14.1
1932	6 277 013	3 447 601	54.9	4 048 673	64.5	601 072	9.6	1 833 270	29.2	996 142	15.9
1933	6 518 050	3 883 645	59.6	4 171 552	64.0	287 907	4.4	1 791 831	27.5	842 574	12.9
1934	7 346 091	4 761 510	64.8	4 701 498	64.0	-60 012	-.8	1 945 492	26.5	639 089	8.7
1935	7 749 896	4 318 964	55.7	4 959 933	64.0	640 969	8.3	2 043 853	26.4	1 387 079	17.9
1936	8 003 315	3 896 030	48.7	5 122 122	64.0	1 226 092	15.3	2 010 772	25.1	2 096 513	26.2
1937	8 680 050	5 265 666	60.7	5 598 632	64.5	332 966	3.8	2 324 395	26.8	1 089 989	12.5
1938	8 458 316	4 701 530	55.6	5 455 614	64.5	754 084	8.9	2 275 320	26.9	1 481 466	17.5
1939	9 171 555	5 195 368	56.6	5 915 653	64.5	720 285	7.9	2 442 439	26.6	1 533 748	16.8
1940	9 631 971	5 204 191	54.0	6 212 621	64.5	100 843	10.5	2 552 359	26.5	1 875 421	19.5
1941	10 160 257	5 192 309	51.1	6 553 366	64.5	1 361 057	13.4	2 616 518	25.8	2 351 430	23.1
1942	8 681 312	3 553 913	40.9	5 599 446	64.5	2 045 533	23.6	2 247 719	25.9	2 879 680	33.2
1943	6 131 534	2 849 452	46.5	3 954 839	64.5	1 105 387	18.0	1 830 817	29.9	1 451 265	23.7
1944	6 355 634	3 419 303	53.8	4 099 384	64.5	680 081	10.7	1 909 949	30.1	1 026 382	16.1
1945	6 539 780	3 921 657	60.0	4 218 158	64.5	296 501	4.5	1 980 271	30.3	637 852	9.8
1946	8 537 161	4 816 883	56.4	5 506 469	64.5	689 586	8.1	2 518 256	29.5	1 202 022	14.1
1947	9 711 819	5 302 402	54.6	6 167 005	63.5	864 603	8.9	2 817 413	29.0	1 592 004	16.4
1948	11 055 613	5 703 758	51.6	7 020 314	63.5	1 316 556	11.9	3 341 607	30.2	2 010 248	18.2
Total	167 486 562	94 307 796	56.3	107 187 315	64.0	12 879 519	7.7	48 595 220	29.0	24 583 546	14.7

EXHIBIT I-3

MASSACHUSETTS STATUTORY AUTOMOBILE LIABILITY EXPERIENCE

1927 - 1948 *Inclusive*

Stock and Non-Stock Companies Combined

Earned Premium	$522,928,727
Incurred Losses	$335,281,419
Loss Ratio	64.1
Provision for Losses	$334,744,908
Per Cent of Premium	64.0
Deficiency	– $536,511
Per Cent of Premium	– .1
Expenses	$182,337,146
Per Cent of Premium	34.9
Profit	$5,310,162
Per Cent of Premium	1.0

EXHIBIT J

Method of determining subdivisions of exposure in Traffic-Congestions-Hazard discussion:

From tabulations of actual experience it was found that:

Exposure in Area 1 = 62,196 car years = E_1

Exposure in Area 2 = 576,071 car years = E_2

Losses in Area 1 by Cars Garaged in Area 1 = \$1,990,981 = L_1^1

Losses in Area 1 by Cars Garaged in Area 2 = 1,772,445 = L_2^1

Losses in Area 2 by Cars Garaged in Area 1 = 652,664 = L_1^2

Losses in Area 2 by Cars Garaged in Area 2 = 9,169,868 = L_2^2

$$\text{Then: } E_1 = \frac{L_1^1}{Q_1} + \frac{L_1^2}{Q_2} = 62{,}196 = \frac{1{,}990{,}981}{Q_1} + \frac{652{,}664}{Q_2}$$

$$E_2 = \frac{L_2^1}{Q_1} + \frac{L_2^2}{Q_2} = 576{,}071 = \frac{1{,}772{,}445}{Q_1} + \frac{9{,}169{,}868}{Q_2}$$

Whence the Area Pure Premiums rounded are: $Q_1 = 87.92$ and $Q_2 = 16.49$. Then, the exposure in Area 1 for cars garaged in Area 1, E_1^1, the exposure in Area 1 for cars garaged in Area 2, E_1^2, the exposure in Area 2 for cars garaged in Area 1, E_2^1, and the exposure in Area 2 for cars garaged in Area 2, E_2^2, were determined as follows:

$$E_1^1 = \frac{L_1^1}{Q_1},\ E_1^2 = E_1 - E_1^1,\ E_2^1 = \frac{L_2^1}{Q_1} \text{ and } E_2^2 = E_2 - E_2^1$$

$$E_1^1 = \frac{1{,}990{,}981}{87.92} = 22{,}645 \quad E_1^2 = 62{,}196 - 22{,}645 = 39{,}551$$

$$E_2^1 = \frac{1{,}772{,}445}{87.92} = 20{,}160 \quad E_2^2 = E_2 - E_2^1 = 576{,}071 - 20{,}160 = 555{,}911$$

$$\frac{E_1^1 + E_2^1}{E_1 + E} = \frac{42{,}805}{638{,}267} = 6.7\% \text{ vs. } \frac{62{,}196}{638{,}267} = 9.7\%$$

EXHIBIT K

MASSACHUSETTS AUTO BODILY INJURY LIABILITY

DIFFERENTIAL (Y AXIS) = AGE INVOLVEMENT INDEX =

$$\frac{\text{PERCENTAGE OF TOTAL NO. OF ACCIDENT INVOLVEMENTS OF A GIVEN AGE}}{\text{PERCENTAGE OF TOTAL NO. OF LICENSED DRIVERS REPRESENTED BY SAME AGE}}$$

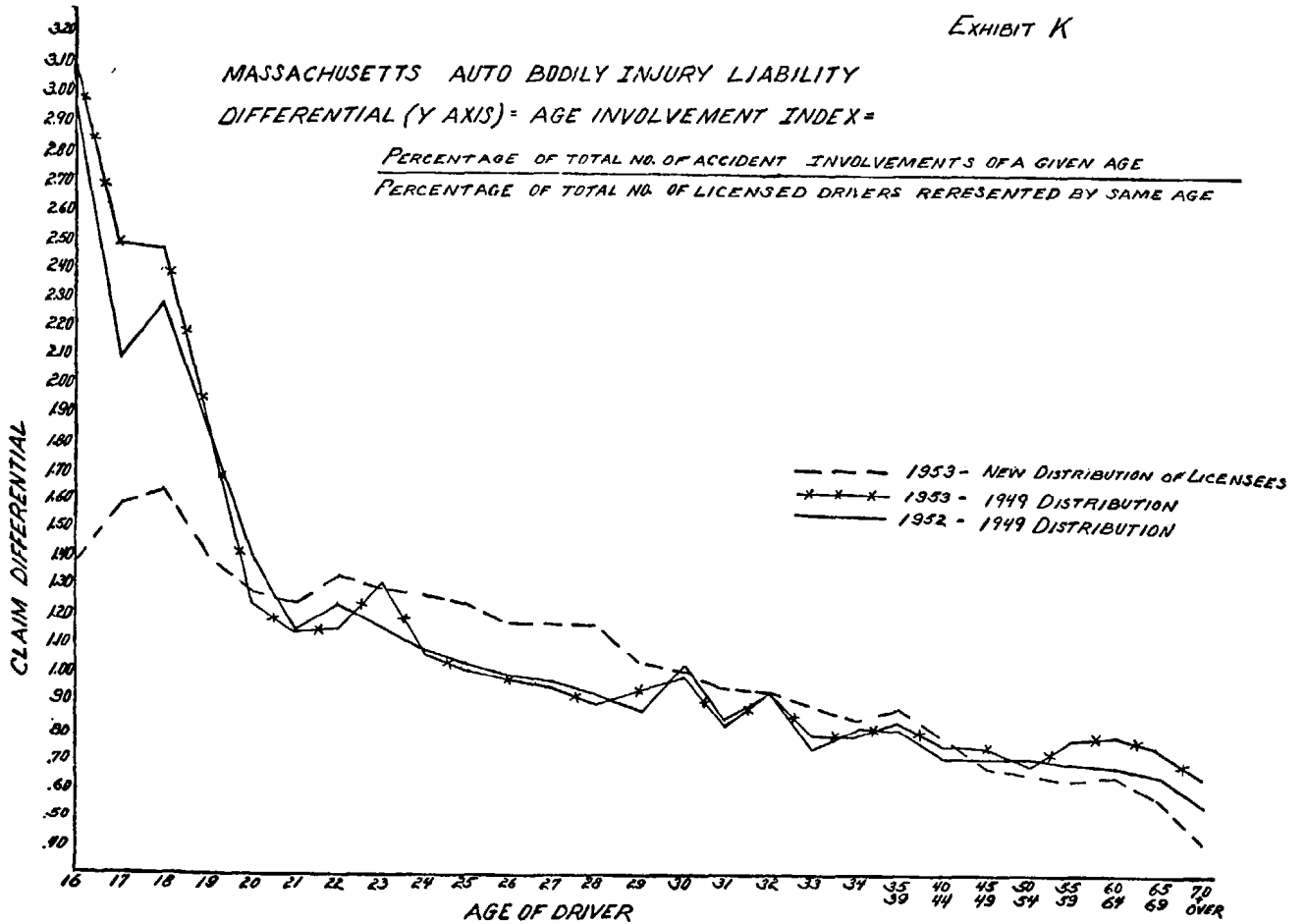


EXHIBIT L

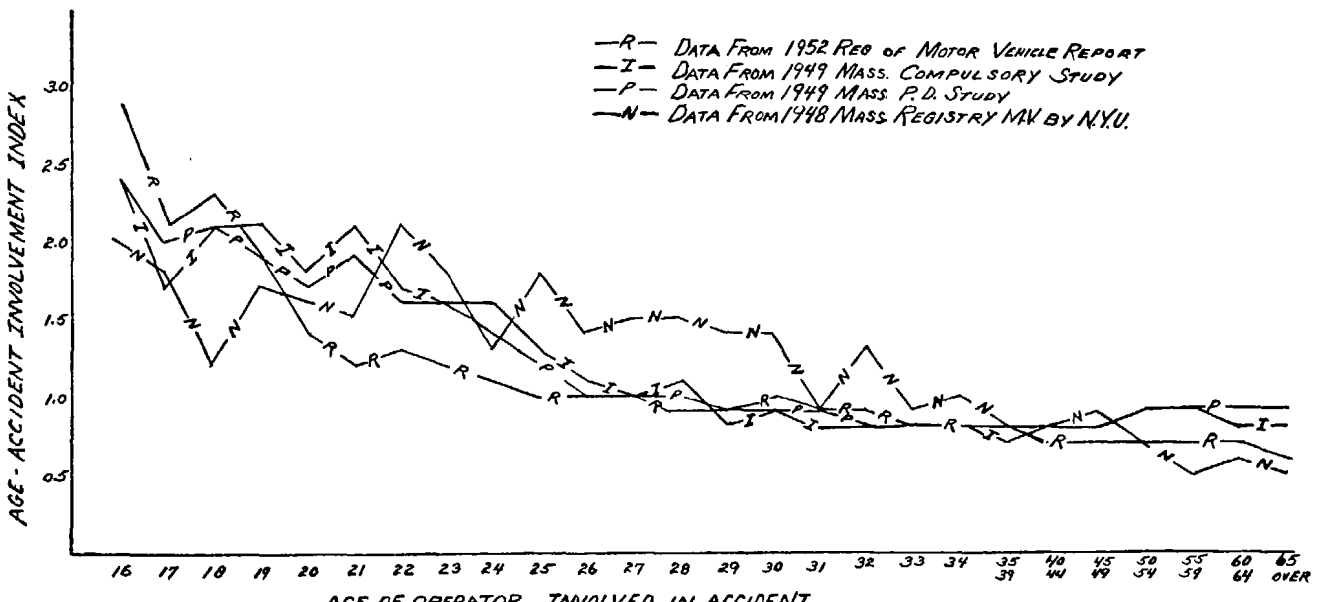

—R— DATA FROM 1952 REG OF MOTOR VEHICLE REPORT
—I— DATA FROM 1949 MASS. COMPULSORY STUDY
—P— DATA FROM 1949 MASS. P.D. STUDY
—N— DATA FROM 1948 MASS. REGISTRY M.V. BY N.Y.U.
AGE - ACCIDENT INVOLVEMENT INDEX
3.0
2.5
2.0
1.5
1.0
0.5
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35-39 40-44 45-49 50-54 55-59 60-64 65 OVER
AGE OF OPERATOR INVOLVED IN ACCIDENT

EXHIBIT M

Calculation of Indicated Relativities of Private Passenger Experience for January through May 1954.

(1) *Class*	(2) *Exposure Car Months*	(3) *% of Exposure*	(4) *Losses**	(5) *% of Losses*	(6)=(5)÷(3) *Differential*	(7) *Indicated Relativities*
1	9,171,376	74.30	5,227,099	60.27	0.811	1.000
2	1,681,322	13.62	2,317,307	26.72	1.962	2.419
2A	76,294	0.62	57,300	0.66	1.078	1.329
3	1,415,055	11.46	1,071,459	12.35	1.065	1.313
Total	12,344,047	100.00	8,673,165	100.00		

*Raw Losses as of June 30, 1954.

PROCEEDINGS

November 17-18, 1955

THE CONTRIBUTION OF OUR SOCIETY

PRESIDENTIAL ADDRESS BY SEYMOUR E. SMITH

In most fields of human endeavor the passing of the years shows a growth and development that is the natural result of the normal striving for better things or improved conditions. This development is seldom uniformly smooth and orderly from year to year. It is usually very spasmodic. There are short periods of intense activity or change, followed by longer periods that are devoted either to consolidating the gains of wisdom or licking the wounds of folly. The field of insurance does not appear to deviate substantially from this pattern, although happily the accumulated scar tissue is small.

At the moment a period of intense activity is getting underway in the casualty and fire insurance business. It would appear as if substantial changes and developments were potentially in the making, many of which may have an effect for years to come. The long term results, good, bad or indifferent, will depend to an overwhelming degree upon the clarity of thought which is exercised collectively and individually by all segments of the business. Some of the current problems are new. They must be approached with little or nothing in the past as a guide. Others involve developments concerning which there is a substantial amount of accumulated experience, which may be used either as a springboard or as an anchor.

Any attempt to analyze all of the major current developments in the business which are now underway, or which appear to be likely in the near future, would take far too much time for an occasion such as this, even if I were capable of such a task — which I greatly doubt. However, a brief recitation of just a few of the more outstanding situations may not be amiss.

I am confident that you are all most keenly aware of the tremendous increase in the recent past of the intensity of competition in certain lines of insurance. With the passing of time this intensity seems to be increasing at an ever greater rate, and it would appear as if this would continue into at least the immediate future. It exists in all of the several major fields of pricing, coverage, marketing and packaging. I do not mean to imply that strong competition is anything new to the insurance business or that it is not a good thing and a healthy

indication of sound and progressive private enterprise. The accelerating degree of the intensity of this competition, however, is substantially more extensive than anything that we have seen for many years.

It appears to be a natural development of forces both within and outside of our business. Internally, the problems of capacity and high loss ratios caused by inflation have been brought under control to a large degree, thus releasing the pent up normal competitive forces which had been under unusual restraint. On the external side, the growth and changing pattern of the American economy is affecting all business, including that of insurance. Changes in income distribution, population trends, buying habits and insurance needs have been substantial. In varying degrees they are bound to have an effect on normal pricing practices, coverage forms and marketing techniques. This cannot help but have a tremendous impact upon competitive forces. In a changing economic climate, the penalties are severe for failure or undue tardiness in making sound adjustments. They are equally severe for making adjustments which do not closely conform to basic economic realities.

This situation poses some very difficult problems for all segments of our business. The problems themselves and the solutions thereto are not definite and clear cut, nor are they the same for different lines of insurance or different companies or groups of companies. In most instances they are questions of degree rather than of preciseness. When to advocate change and when to hold the line, when to meet the competition and when not to, the weighing of volume changes and operating costs with pricing changes and profitability, the gauging of market acceptability and demand, the relative strength of various selling practices, the gauging of the effects of coverage changes, and the judging of the relative strengths and weaknesses of the individual organization so as to take the most advantage of the former and to bolster the latter — these are some of the problems involved. For the business as a whole they call for a considerable volume of wisdom.

Developments in regard to multiple line underwriting present another field of growing activity and change in our business. In part, the increasing activity in this area is due to the normally increased momentum that would follow from an initial period of necessary ground work preparation. To an appreciable extent it is also due to the impact of the competitive situation previously mentioned. The growth of package policies has been very substantial in the recent past. It would appear likely to be even more so in the near future.

This increase in the packaging of separate coverages into single individual policy contracts poses two distinct problems. The first is, of course, the matter of price. There is the question of the relationship between rates for individual coverages written separately, and the rates for these same coverages when included as a part of a contract combining additional forms of protection. There is also the question of what price reductions, if any, are warranted by expense savings

that may be realized in processing single contracts rather than multiple contracts, or by savings in loss provisions that may be expected from a broader spread of risk, reductions in adverse selection or increases in insurance to value. The second problem arises from the differences between the individual lines of insurance themselves. This is a more nebulous question than that of price, and much more difficult to evaluate properly. In some ways it may contain potentialities greater in their impact than those involved in the more readily adjustable one of price. The frequently mentioned historical compartmentation of individual lines has naturally built up a large amount of experience for each of the various major coverages. This experience and the passage of time have resulted in quite different ways of doing things between one line and another. As would be expected, the packaging process and these differences between lines result in conflicts. On one side is the argument that the importance of package contract developments is paramount. Conflicts must be resolved by adjusting the differences so that all lines in the contract conform to the way of doing things that is followed by the major coverage contained therein. On the other side is the argument that these differences are the result of years of experience, and that any appreciable changes in the method of handling individual lines would be folly that leads to ruination. As is usually the case in such opposite and strongly held poles of opinion, neither side is either completely right or completely wrong. The real problem is to assess correctly those differences between lines which are of fundamental importance and those which are merely ones of preference or tradition and which could be readily changed without serious consequences. If this is done, orderly and desirable progress may be made in developing multiple line contracts by the unit packaging of those coverages which are readily combinable and which may be handled in a uniform manner, and by the separate treatment of those lines which involve fundamental differences.

Another area of growing activity is in the automobile and accident and health lines where social and political developments are creating pressures for change in the previously accepted methods of dealing with certain problems. The problem of the uninsured and financially irresponsible motorist is certainly not a new one. Neither is there anything new about the insurance problem of individuals whose health has seriously deteriorated. However, the public attitude in regard to these questions has become quite different than it used to be as a result of the substantial changes which have occurred in attitudes of social consciousness and in political responses thereto. Very few types of business, that of private insurance least of all, can afford not to keep pace with changes in public attitudes and demand. If there is a definite and growing demand that certain situations be improved, there is little doubt that changes will be made. However, these are very apt to be far reaching in their application and to have substantial effects for years to come. In situations such as this embarking upon

the wrong type of change may be as serious a blunder, or even more so, than doing nothing. It calls for a keen sense of awareness of social and political trends and a thorough understanding of the realities of the insurance business.

There are two more fields of recent activity which involve matters of substantial importance. The first concerns the peacetime industrial use of atomic energy. The second is the growing demand for some system of financial protection against natural disasters which have not lent themselves to the application of traditional insurance procedures. These two subjects certainly do not call for any further elaboration on my part since you are all so vividly aware of both the tremendous potentialities involved in nuclear fission, and of the terrible destruction which has recently been visited upon us by storm and flood. Both of these problems are of exceedingly wide scope. No one company or even group of companies can cope with them single-handedly. They are industrywide. They call for an outstanding degree of keenness of thought and understanding.

The purpose in reciting the foregoing problems and areas of activity which are of such great potential import is not to dampen an otherwise pleasant occasion, but is to sketch a background for a few brief comments concerning the role of the Casualty Actuarial Society.

As you all know, the object of our Society is "the promotion of actuarial and statistical science as applied to the problems of insurance, other than life insurance." It is further provided that "the Society shall take no partisan attitude, by resolution or otherwise, upon any question relating to insurance." The furtherance of the object of the Society has been undertaken by a number of means — the personal contacts and exchange of ideas at meetings, the presentation of papers, formal and informal discussions of matters of current interest, the maintenance of a library, and an examination procedure for admission to develop technically competent and trained members. I firmly believe that all of these things have served admirably in their purpose. Over the years an increasing fund of knowledge has been built up in regard to statistical and actuarial techniques. By the process of trial and development, exchange of ideas and the building upon successive blocks of accomplishment we, as a Society, have seen very substantial gains and improvement in rating and reserve procedures, in statistical compilation and analysis and in the general understanding of the basic fundamentals of the business. In addition, and by no means of secondary importance, the Society as such can take credit for the development of a body of professionally competent trained actuaries. I trust there will be many more in the near future.

These accomplishments are, of course, as they should be. The same sort of thing is to be expected of most successful professional organizations. What I should like to hold before you, however, is an aspect of the Casualty Actuarial Society that goes beyond the realm of technical growth and accomplishment. It is not a concrete thing that can be measured or seen, nor can there even be any proof of its very

existence. Nevertheless, I am most firmly of the conviction that it constitutes the major donation which the Society can give to our business. It consists of the contribution that is made to a kind of thinking — to the development of minds that are inquiring and unprejudiced, that can separate fundamental problems from a welter of confusion and detail, that can couple a lively imagination with a grasp of hard reality — minds that are incapable of self-delusion or rigidity, and which are firmly anchored in rigorous mental honesty.

I do not mean to imply that actuaries are necessarily any more happily endowed than any other group of people in this regard. I do feel, however, that our Society is making a most outstanding contribution toward this clarity of thought which is so absolutely essential to the sound progress of all phases of our business. In large part this is due to the Society being rather unique among casualty and fire insurance organizations. The fact that it is completely non-partisan and that no attempt is made to take sides on any question brings forth the fullest possible expression and exchange of ideas — ideas that are advanced for their own sake rather than proposals to be sold or voted upon. In addition the Society has been most fortunate indeed in receiving the generous interest and active participation of men of outstanding ability and stature in the business. I will not embarrass them by mentioning their names — nor is this at all necessary since they are so well known to us all. These men have been quick to share their keenness of mind and their broad knowledge with all of our members, thereby spreading to a sizeable group the bright spark of their kind of thinking.

In times such as these, with their potentialities of rapid change and the abundance of major problems such as those previously mentioned, the long term welfare of our business requires a high degree of performance by all segments. Insofar as the Casualty Actuarial Society is concerned, the maintenance of high standards of technical ability are, of course, of exceeding importance. It is beyond this, however, where I believe the most valuable contribution of all can be made. That is, in the continuance of our group activity in such a manner as to most effectively nurture increasing clarity of thought to the widest possible degree. No greater accomplishment can be made. I am sure that it will be done.

THE MULTIPLE-LINE PRINCIPLE

BY

G. F. MICHELBACHER

This is the story of a revolutionary development. It has a beginning but, at the moment, it has no end. It will profoundly alter the business of fire, marine, casualty and surety insurance in many ways some of which we can only dimly perceive. Because it inaugurates a period of fundamental change, it offers a challenge to everyone who is interested in the technical phases of the insurance business and is so situated that he can participate in and give direction to the construction of the bright, new insurance structure of tomorrow.

"Once upon a time" in this story may be any convenient date of reference: 1940 will do nicely. It is not necessary to select a location "in a remote country": The State of New York will serve the purpose adequately because, while New York does not control, absolutely, the practices of other states in this country for a reason which will be disclosed later, it does set the national pattern for the majority of insurers. Let us begin, therefore, by examining the New York Insurance Law as it existed in 1940 to ascertain the permissible scope of operations of an insurer organized to cultivate that area of the field of insurance not specifically reserved for life insurers.

The New York Law, in 1940, (Section 46) specified the kinds of insurance which might be authorized for insurers of the type in which we are interested as follows:

*
*

3. Accident and health insurance
4. Fire insurance
5. Miscellaneous property insurance
6. Water damage insurance
7. Burglary and theft insurance
8. Glass insurance
9. Boiler and machinery insurance
10. Elevator insurance
11. Animal insurance
12. Collision insurance
13. Personal injury liability insurance
14. Property damage liability insurance
15. Workmen's compensation and employers' liability insurance
16. Fidelity and surety insurance
17. Credit insurance

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*Omitted classes of insurance:
1. Life insurance
2. Annuities

*

19. Motor vehicle and aircraft insurance
20. Marine insurance
21. Marine protection and indemnity insurance

*

In each instance the kind of insurance was defined in some detail. For example:

> Fire insurance (paragraph 4) was defined as ". . . insurance against loss of or damage to any property resulting from fire, including loss or damage incident to the extinguishment of a fire or to the salvaging of property in connection therewith, and including loss or damage occurring in a public service light, power or traction property resulting from an electrical disturbance causing or concomitant with a fire."
>
> Personal injury liability insurance (paragraph 13) was defined as ". . . insurance against legal liability of the insured, and against loss, damage or expense incident to a claim of such liability, arising out of the death or injury of any person, or arising out of injury to the economic interests of any person as the result of negligence in rendering expert, fiduciary or professional service, but not including any kind of insurance specified in paragraph fifteen.**"

The entire eighteen authorized types of cover were not, however, available to a single insurer. Individual insurers desiring to qualify for the broadest possible authority were required to select a specified part of the available field as the area in which to conduct their operations. The field in its entirety was subdivided as follows:

1. **Casualty and surety insurers** were permitted to qualify to write the kinds of insurance described in paragraphs three, six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen and seventeen.
2. **Fire and marine insurers** were permitted to qualify to write the kinds of insurance described in paragraphs four, five, six, twelve, nineteen, twenty and twenty-one.

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*18. Title insurance
22. Insurance of life of property

Life insurance (paragraph 1) and annuities (paragraph 2) were and continue to be reserved exclusively for life insurers. Title insurance (paragraph 18) and insurance of the life of property (paragraph 22) are ignored for the purposes of this dissertation. Title insurance is written only by specialty insurers. Insurance of the life of property, likewise, requires a special type of insurer. It is a foreign importation dealing with depreciation of property which never has "caught on" in this country.

**Workmen's compensation and employers' liability insurance.

There were certain classes of insurance which both types of insurers might write. Both were permitted to write automobile and aircraft property damage liability and collision insurance although automobile and aircraft personal injury liability insurance was reserved to casualty and surety insurers and automobile and aircraft material damage insurance (covering damage to the insured motor vehicle or aircraft and its equipment) was reserved to fire and marine insurers. Water damage insurance and collision insurance also were areas of overlapping jurisdiction. But, generally speaking, the law intended that the underwriting powers of the two types of insurer were to be separate and distinct.

While the field was thus partitioned, each insurer was permitted to select the classes of insurance in its general area which it chose to write. The majority elected to exercise the broadest underwriting power available; but there were some that indulged in specialization. Thus, an individual insurer might qualify to write exclusively accident and health insurance, or glass insurance, or workmen's compensation and employers' liability insurance, or fidelity and surety insurance, or credit insurance, or animal insurance, or steam boiler and machinery insurance, or any combination of the permissible kinds of insurance. The point to be emphasized is that an individual insurer by statute was confined to a certain well-defined area of underwriting authority and could not under any circumstances cross over the line of demarcation which separated the field of insurance outside life insurance into two parts.

It was for this reason, among others, that insurance groups with two distinct types of insurers were organized by those interests that desired to operate generally in the field of insurance outside life insurance.

THE AMERICAN SYSTEM

This "compartmentalization" of insurers was unique to the United States. It did not exist anywhere else in the world and was known as "The American System." While the charter of a British insurer might confer upon it authority to conduct the business of insurance of all kinds anywhere in the world, the charter of an American insurer organized in New York State severely restricted the scope of its underwriting powers.

Two objectives, apparently, were in the minds of those who founded this system.

It was designed, first, to permit individual insurers to specialize in the extremely technical problems of particular kinds of insurance and thus to develop proficiency and safety in the treatment of specified hazards. This, undoubtedly, was presumed, at the time, to be in the best interests of the insuring public.

Second, it was felt desirable to segregate the classes of insurance so that a more accurate appraisal could be made of the financial

qualifications to be demanded of insurers to the end that regulatory requirements could be specifically established by state supervisory officials which would fit the peculiar conditions prevailing in different phases of the insurance business.

Differences exist in the reserve requirements of the two types of insurer. For example, in the days of separation, assuming an annual premium volume of $50,000,000 and a condition of maturity attained after years of operation, financial statements might disclose the following reserve liabilities:

	Casualty and Surety Insurer	*Fire and Marine Insurer*
Loss & loss expense reserve.....	$40,000,000	$10,000,000
Unearned premium reserve.....	22,500,000	45,000,000

The American System was based on the theory that these reserves could be better managed and supervised if a rigid separation was maintained as between the two types of insurers.

LEGAL SITUATION IN STATES OTHER THAN NEW YORK

The laws and practices of some of the other states were not so restrictive as to underwriting powers. In Connecticut, for example, insurers always have received their charters direct from the state legislature, and these charters, usually, were considerably broader in scope than the New York insurance law would allow.

In some other states the rigid line of demarcation between insurers was breached at one point or another. The most common deviation was one which permitted an individual insurer to write all classes of automobile insurance in a single policy whereas New York insurers could accomplish the same result only by issuing a "combination policy." This, in effect, was nothing more than a device for bringing into a single package for the convenience of the insured two complete and separate policies, one issued by a casualty and surety insurer, the other by a fire and marine insurer—a practice referred to by a well-known critic* as "an attempt to use a 19th century kind of insurance to meet the complicated requirements of the 20th century needs of individuals and of commerce and industry."

THE APPLETON RULE

These variations of law and practice in states outside New York did not, however, have a material influence on the national operation of the insurance business because of a requirement imposed by New York upon the insurers of other states ("foreign insurers"). Originally, this requirement was in the form of the "Appleton Rule",** an

*William D. Winter, Chairman of the Board, Atlantic Mutual Insurance Company.
**After H. D. Appleton, Deputy Superintendent of Insurance.

official edict of the New York Insurance Department. Later (1939) this rule was written into the insurance law. (Section 42)

The Appleton Rule operated in this manner: A foreign insurer desiring to transact business in New York State (the largest single insurance market in the USA) required a license from the New York Insurance Department. This license was refused unless the foreign insurer agreed to accept the underwriting limitations imposed upon New York domestic insurers wherever it might operate in the USA. Thus, even if the foreign insurer had the power under its own charter to write a comprehensive policy embracing all the automobile covers, it was required, as the price of operating in the New York market, to forego this privilege not only in New York but also in every other state, including the state of its domicile. The right of the New York Superintendent of Insurance to regulate the operations of foreign insurers outside the state, has been upheld by the courts*. That is the reason why New York always has held the key to a solution of the problem of underwriting powers.

CLASSIFICATION OF KINDS OF INSURANCE

Before proceeding with the development of multiple-line insurance it will be useful to discuss the New York plan of listing and defining in the insurance law all the kinds of insurance which insurers may write. Such a plan has advantages and disadvantages.

There would appear to be at least three principal advantages:

1. A classification of insurance covers provides state supervisory officials with a basis for regulating the insurance business more effectively because it enables them to fix requirements (financial and otherwise) with some regard for the individual peculiarities of the various classes of insurance which may require a wide range of treatment. For example, under the New York Insurance Law as it stood in 1940, a stock corporation was required to have and to maintain minimum capital and surplus as follows (Section 311):

	Minimum	
	Capital	*Surplus*
to transact glass insurance (paragraph 8) exclusively	$100,000	$ 50,000
" " burglary & theft insurance (paragraph 2) exclusively	200,000	100,000
" " workmen's compensation & employers' liability insurance (paragraph 15) exclusively	300,000	150,000
" " fidelity & surety insurance (paragraph 16) exclusively	500,000	250,000

*Firemen's Insurance Co. of Newark, N. J. v. Beha, State Superintendent 30 F.2d 539. (1928)

Where an insurer desired to qualify to write more than a single class of insurance, the minimum capital and surplus requirements were not merely added together but were subject to adjustment. The point to be emphasized is that the law provided a flexible method of establishing a requirement which was intended to be consistent always with the hazards and peculiar problems presented by the portfolio of business which the individual insurer proposed to accumulate.

2. It restrains corporations outside the insurance business from invading a province specifically reserved for insurers. For example: A manufacturer of television sets proposes to offer installation and maintenance service but goes further and agrees to guarantee the purchaser against damage to his set. The latter guarantee has been held to be insurance, thus forcing the manufacturer to bring a properly qualified insurer into the transaction. Similarly, a glazier was prevented from agreeing with building owners to keep their plate-glass windows in good order and repair, on the ground that the power to keep glass in repair included insurance against glass breakage.

   The purpose is to make certain that every insurance transaction complies with insurance law and is subject to supervision by the State Insurance Department, which definitely is in the public interest.

3. It prevents an individual insurer from conducting a reckless and ill-advised experiment in a new field of coverage by forcing thorough consideration of each new class of insurance during which an orderly method of dealing with the problems of the new class can be developed.

   Or the situation may be reversed. With the sanction of existing law, insurers may ill-advisedly undertake to write a hazardous form of cover with disastrous consequences. In that event the law can be revised to prohibit the future writing of the dangerous kind of insurance. A case in point is that of guaranteeing mortgages upon real estate. Surety insurers were writing these guarantees at the time of the great depression and serious difficulties were encountered which caused insolvency in a few instances. Today insurers are specifically prevented from writing this cover.

Disadvantages are created by writing into the insurance law what is presumed to be a complete and comprehensive statement of all the authorized classes of insurance. This necessarily creates a certain inflexibility which frequently inhibits, temporarily at least, insurers from providing protection against legitimate hazards. Certainly this method of delineating the permissible field of insurance does not encourage the development of a free market for unusual insurance

covers such as exists in London, England where insurance may be arranged against such diverse hazards as the unexpected arrival of twins or injury to the shapely lower extremities of an actress widely advertised as "the finest pair of legs in the world."

A few examples taken from the history of insurance in New York will illustrate this point:

1. At one time it was impossible for an insurer to insure physicians and surgeons against liability for damages suffered or claimed to have been suffered by reason of malpractice.

2. At another time, no insurer was permitted to insure a property owner against damage to his property caused by falling aircraft, by motor vehicles or street cars, by rocks thrown from blasting operations, and similar hazards.

3. At a time when kidnaping was prevalent an insurer was prevented from guaranteeing that a certain amount of ransom money would be forthcoming if the insured or a member of his family were kidnaped.

Of course, sooner or later, where insurance was found to be practicable and desirable the insurance law was amended to permit insurers to write the new form of cover. This has been accomplished in the first two cases described above.

Then there are instances where new insurable hazards are created by law or otherwise and it becomes necessary to amend the insurance law to make provision for new forms of cover. In this process the allocation of the new cover to the list of permissible classes of insurance may determine not only whether the cover may be written but also how it will be supervised, how rates will be established and regulated, and the general conditions which will govern the transaction in all its phases. To illustrate: When the New York Workmen's Compensation Law was amended in 1949 to extend the principle of indemnification to nonoccupational injuries and private insurers were admitted to this field, question arose where this new cover should be placed in the classification schedule. Should it be classified as "workmen's compensation insurance" (a natural question since the subject of insurance was an obligation written into the workmen's compensation law) or should it be placed elsewhere in the list? Actually, it was placed in the classification "accident and health insurance" because of the analogy to group accident and health insurance. This simple decision had far reaching consequences as it immediately determined that this new cover would be subject to all the legal requirements and practical procedures of group accident & health insurance which are quite different from those that govern workmen's compensation insurance. This is an important point to which later reference will be made.

AGITATION FOR MULTIPLE-LINE UNDERWRITING POWERS

While the American System as exemplified by the requirements of the New York Insurance Law was generally accepted, opposition to this principle has existed for a long time. As early as 1914 the Hon. Burton Mansfield, then Insurance Commissioner of Connecticut, at a meeting of the National Convention of Insurance Commissioners (now National Association of Insurance Commissioners) presented a paper entitled "Shall we abandon the American restrictions upon the classes of insurance written by (a) a company doing direct writing and (b) a company doing reinsurance" in which he deprecated the extent to which such legal requirements hampered and restricted "the immense insurance activity in this country . . ." Gradually, the insurance laws of a number of states began to depart from the New York practice, but the Appleton Rule prevented the application of these departures to the business of insurers organized under these laws which desired to operate in New York State—and most of them did wish so to operate. However, pressure was building up for a broadening of underwriting powers. This movement was stimulated by another development: the expansion of inland marine insurance.

INLAND MARINE INSURANCE

Originally intended to provide broad coverage for movable goods and merchandise while in transit, inland marine insurance, following the traditional procedure of ocean marine insurance, has developed with a remarkable degree of freedom from legal inhibitions such as those which have circumscribed fire, casualty, and surety insurance.

In the early 1920s this freedom was utilized to give expression to the desire to expand the coverage of individual policies, and inland marine contracts were designed which provided protection for risks where not only was there little or no transportation hazard, but the coverage was so broad that it encroached upon the underwriting powers allocated to fire and casualty insurance.

Upon the theory that merchandise is in transit until it reaches the ultimate consumer, coverage was provided at fixed locations, first in warehouses and later in certain classes of mercantile establishments operated by furriers, jewelers, musical instrument dealers, and others. Eventually even personal property in residences was made the subject of "floater policies". Furthermore, it became the practice to include as proper subjects for "all-risk" coverage instrumentalities of transportation and communication: bridges, tunnels, piers, wharfs, docks, slips, pipe lines, power transmission, telephone and telegraph lines, radio and television equipment, and many other subjects of insurance.

An attempt was made in 1922 by the National Convention of Insurance Commissioners* to control this situation by the adoption of a

*Now the National Association of Insurance Commissioners.

"Definition of Marine Underwriting Powers" which has had a stormy career but which still persists and is subject to interpretation by an industry committee representing all types of insurers and the several classes of insurance which are affected.

The present "Committee on Interpretation of the Nation-wide Marine Definition" consists of fifteen members representing stock and mutual insurers who reflect the views of fire, marine and casualty insurance underwriters. The Definition itself has no validity in a given state unless it has been approved and promulgated by the local insurance commissioner, and the decisions of the Committee on Interpretation likewise are of no effect until so approved in which event they become binding upon all insurers in the local jurisdiction. Today the committee's decisions determine whether an individual form of cover will be subject to the strict regulation and supervision applicable to fire and casualty insurance, or whether it will be developed with the substantial freedom that always has existed in the marine-insurance field.

DIEMAND COMMITTEE

The uneasy situation created by the lack of agreement among the states with regard to underwriting powers and the gradual extension of inland marine insurance led in 1943 to the appointment by the National Association of Insurance Commissioners of a "Multiple Line Underwriting Committee" which became known as the Diemand Committee after its Chairman, John A. Diemand, President of the Insurance Company of North America.*

The Diemand Committee, charged with the responsibility of determining "whether in the public interest it was advisable to make multiple line underwriting powers universally available to insurance companies," after thorough deliberation and consultation with diverse interests in the insurance business, concluded that it would be a mistake to make a "sudden departure from the classified system of operation. . . . " It recommended therefore a gradual approach to the solution of the problem.

In 1944 it submitted to the National Association of Insurance Commissioners five specific recommendations as follows:

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*Other members of the committee were
Kenneth C. Bell — Chase National Bank.
S. Bruce Black — Liberty Mutual Insurance Company.
William H. LaBoyteaux — Johnson & Higgins (brokers).
Arthur F. Lafrentz — American Surety Company of New York.
J. Arthur Nelson — New Amsterdam Casualty Company of New York.
William D. O'Gorman — O'Gorman & Young (agents).
William D. Winter — Atlantic Mutual Insurance Company.

I. Underwriting Powers of United States Companies in Foreign Countries

Any domestic fire, marine, casualty or surety company should be empowered to write any and all kinds of insurance or reinsurance, other than life insurance or annuities, on risks outside of the United States, its territories and possessions, provided it maintains a minimum policyholders' surplus (capital and surplus) of $1,500,000.

II. Reinsuring Powers

Any fire, marine, casualty or surety company should be empowered to accept any and all kinds of reinsurance, other than life insurance and annuities, provided it maintains a minimum policyholders' surplus of $1,500,000.

III. Automobile Insurance

Any fire or marine insurance company, or any casualty or surety company licensed to write liability insurance, should be empowered to write insurance against any and all of the hazards of loss from damage to automobiles, or from liability arising out of ownership, maintenance or use of automobiles, provided such company meets the financial requirements which must be met by a company qualified to write automobile physical damage or automobile liability hazards, whichever requirement is the higher.

IV. Aircraft Insurance

Any fire or marine insurance company, or any casualty or surety company licensed to write liability insurance, should be empowered to write insurance against any and all of the hazards of loss from damage to aircraft, or from liability arising out of the ownership, maintenance or use of aircraft, provided such company meets the financial requirement which must be met by a company qualified to write aircraft physical damage or aircraft liability hazards, whichever requirement is the higher.

V. Personal Property Floater Policies

Any fire, marine, casualty or surety company should be empowered to insure individuals against all risks of loss of, or damage to, personal property other than: (a) motor vehicles, aircraft, or watercraft (excepting canoes, rowboats, sailboats less than twenty-one feet in length, and outboard motorboats); or (b) personal property pertaining to the business, trade or profession of the insured (excepting professional books, instruments and other professional equipment owned by the insured).

In addition, the committee suggested

> "that an attempt be made to standardize the definitions of the various kinds of insurance; also that the numerous regulations and filing requirements now in effect be critically reviewed, so that those which no longer serve a useful purpose may be eliminated."

The report of the Diemand Committee was adopted by the Association and referred to the individual states for consideration.

In 1945 the program was presented to the New York State legislature and, in spite of spirited opposition from many insurance executives who expected that any breach in the American System would lead, inevitably, to its entire abandonment, two of the recommendations were adopted, namely, the reinsurance provision (II) and the personal property floater provision (V). In 1946 the remainder of the program was adopted.

COMMITTEE ON CLASSIFICATION OF INSURANCE

The recommendation that an attempt should be made to standardize the definitions of the various kinds of insurance was implemented in 1949 by the appointment by the National Association of Insurance Commissioners of a "Committee on Classifications of Insurance." Representing all types of insurer and fire, marine, casualty and surety insurance, this committee is still in existence but has not as yet formulated any definite recommendations, although it did in a report to the Association emphasize the importance of the task assigned to it in the following language:

> "If statutes, which are consistent in their language, are interpreted in an inconsistent manner, inextricable confusion could result. Without a Plan, experience compiled for ratemaking purposes could become meaningless. The Plan can assist in basing experience upon a reasonably uniform system of classification by placing kinds of insurance in broad categories and thus aiding in the administration and observance of rate regulatory laws. Such a system of classification could also aid in reconciling and minimizing unnecessary over-lapping in the scope of activities undertaken by rating and statistical bureaus, and, it is hoped, will point the way to solution of problems which arise when different tax laws or other laws apply to various kinds of insurance or combinations thereof."

FINAL LEGISLATIVE BREAK-THROUGH

The demand for broader underwriting powers was not to be satisfied by half-way measures. By 1948 the movement to abandon com-

pletely the American System had spread to over two-thirds of the states, and it was obvious that the New York Insurance Department would face increasing objection to the Appleton Rule. New York domestic insurers discovered also that they were subjected to annoying competition in "multiple-line" states because their restricted underwriting powers made it impossible for them to offer the broad coverages of foreign insurers which were willing to forego the privilege of operating in New York State. Furthermore, American insurers were encountering difficulties in foreign countries where they came into contact, particularly, with British insurers operating with complete multiple-line underwriting powers.

A bill was introduced in the New York State legislature in 1948 to confer full underwriting authority upon both fire and marine and casualty and surety insurers. This measure, although rejected at first, eventually was passed and became effective in New York State in 1949. This ended the long campaign to dissolve the barriers established by the American System. Today all states recognize the new principle of multiple-line underwriting which enables a single insurer to operate in the entire field of insurance outside life insurance.

PROBLEMS CREATED BY MULTIPLE-LINE LEGISLATION

Once the barriers were removed it might have been expected that the multiple-line concept would develop rapidly in such fields as automobile and residence insurance where the principle has its most logical application. However, just at this juncture mounting inflation produced a terrific impact upon the casualty insurance business. The experience of important classes of insurance rapidly deteriorated, and casualty and surety insurers were occupied so completely with the problem of weathering the storm that they ceased temporarily to promote the expansion of business. Fire and marine insurers, noting the adverse experience in casualty insurance, were equally reluctant to experiment with the new idea — a reluctance which was heightened by the scarcity of trained technicians then available. Multiple-line underwriting, therefore, did not suddenly transform the insurance business. Rather it has had a gradual development which is still in progress. This is fortunate because it became apparent at the very outset that there were deep differences of opinion regarding the proper application of the new principle.

A fundamental argument arose with regard to the treatment of covers and rates in multiple-line policies which could now be written. Should the several perils be included separately in a schedule each with its own premium charge or should the process be streamlined with a single integrated statement of coverage afforded by the policy and a single indivisible all-inclusive premium for the policy?

On the surface this difference between "divisible" and "indivisible"

premium treatment might seem to be a matter of small moment, but the fact is that it has ramifications affecting many phases of the insurance transaction. Fundamentally, the problem is one affecting the classification of insurance covers.

The "divisible" premium method produces the least disturbance to traditional practices. Covers, rates, rate-making organizations, commissions, service, the mechanics of the insurance transaction, accounting, statistics, etc. need be changed but little to accommodate the multiple-line policy which in effect is merely a combination in a single package of covers formerly written separately in a multiplicity of policies.

The "indivisible" premium method on the contrary raises many new and complex problems. A new statement of coverage is required, the organization which makes the rates must be competent to represent and to think in terms of the enlarged coverage, the rates themselves must be obtained by a new approach to the problems of rating, a single rate of commission must be established for the entire package of protection, the insurance transaction will necessarily involve new procedures requiring adjustments in accounting, statistics and service functions.

Other phases of multiple-line underwriting will affect the organization of insurers. Under the American System a separate insurer was required to write fire and marine or casualty and surety insurance as the case might be. Now a single insurer can qualify to occupy the entire field. Whereas at one time an insurance group required two types of insurer, this is no longer a *legal* necessity. Are there *practical* reasons why the two types of insurers should be maintained? In any event can the structure of a particular insurance group now be simplified and to what extent can the operations of the group be integrated and streamlined?

For producers of insurance, multiple-line underwriting will mean many new kinds of protection necessitating changed merchandising methods, a different approach to the servicing of clients, revised procedures affecting internal office operation and relationships with insurers, and possibly also (since the average premium unit will be increased) additional methods of premium financing.

Finally, insurance laws and state supervisory practices will have to be overhauled. The differences in treatment as between fire and marine and casualty and surety insurance must be reconciled or eliminated. For example, formerly it was the practice for state insurance officials to examine fire and marine insurers once every five years and casualty and surety insurers once every three years. How often should a single insurer occupying the entire field be examined? Many phases of state supervision are affected, from the requirements for organizing insurers to the regulation of reserves, investments, rate-making practices, licensing of producers, and a multiplicity of other activities.

CONCLUSION

The ultimate pattern of multiple-line underwriting will emerge gradually, and it will require a long period of trial and error to establish the new system in all its ramifications. This is desirable. The American System developed over a long period of time, and if it were discarded too quickly and before adequate and thoughtful provision has been made for its successor, the results might be most unfortunate. The theoretical blue-print for the future has been fashioned; we know it will be an entirely new system of insurance; it remains now to construct a well-organized and properly integrated structure which will function efficiently in the best interest of insurers, insureds, producers, and the public generally.

NOTES ON NONCANCELLABLE HEALTH AND ACCIDENT RATEMAKING

BY
ALFRED V. FAIRBANKS

Many of the problems connected with noncancellable ratemaking arise from the indisputable fact that the existence of disability is very often a relative matter not readily susceptible to objective determination. For this reason the insured has a degree of control over the policy that he does not possess in other lines of insurance. Since even a very short period of malingering appreciably increases the cost, particularly for policies with short elimination periods and consequently high claim frequencies, it is imperative that the amount of indemnity payable in event of disability be fixed at a level reasonably below earned income so as to eliminate any temptation to prolong disability. It has been shown, in fact, that loss experience is better on policies with a low absolute benefit as well as on policies with a low benefit in relation to earned income.

At the present time noncancellable health and accident premiums are generally based upon the experience of each individual company writing such business. The lack of morbidity tables suitable for ratemaking purposes, based upon the combined experience of many companies, is due to the fact that benefits, underwriting rules, claim practices, and selling methods are not standardized. Therefore, the pooling of statistics necessary to obtain such a table has not been possible.

The actuary who undertakes noncancellable health and accident ratemaking must supply himself with suitable experience tables. In a company without previous experience on which to base such tables, this is no simple task. First the foundation upon which the rating structure will rest must be laid. The policy benefits to be granted by the proposed forms must be decided upon. The wording of the insuring clause and the definition of disability must be drafted and their possible interpretation by the courts and even by the claim department must be studied. Underwriting rules must be determined. The available agency force must be evaluated as to the caliber of the men, the quality of their supervision, and the adequacy of their training program. Poor risks, including those with pre-existing disabilities, will be only too eager to obtain this coverage. Agents must therefore be trained and continuously exhorted to actively solicit the more desirable risks; otherwise, conflict will develop between the agency force and the underwriting department which will be obliged to turn down a high percentage of applicants. Even then the experience developed in the future will reflect the class of business submitted by the agents. When all these factors have been considered, an appropriate existing table or suitable modification thereof is adopted.

The net annual cost of disability may be obtained from company

statistics in various ways. For policies with uniform benefits the net annual cost can be obtained as the product of the claim frequency and the average cost per claim. When benefits are provided for an indemnity limit of one year or less, interest on claim payments may reasonably be ignored and the net annual cost per $1 of daily indemnity may be determined by dividing the total number of days for which disability is paid on losses incurred during the experience period by the number of policies exposed.

Pension fund methods are sometimes employed to obtain net premiums for policies providing benefits for long periods of time in a manner similar to that employed by life companies for waiver of premium and income disability benefits.

Morbidity experience is often summarized in the form of a continuance table which displays the amount of disability in days, weeks, or months to the end of various periods of time based on a definite number of active lives exposed at selected ages. The net annual cost of disability may be obtained from such a table by dividing the amount of disability by the number of active lives exposed at the age for which disability is incurred.

Since only disabilities incurred after the issuance of the policy are to be covered, the net annual cost should include only disabilities originating at age x subject to the limit placed on the number of weeks or months for which payment will be made on any one claim with appropriate adjustment for the elimination period. Based upon a continuance table, the net annual cost of disability at age x for a policy providing a benefit of $1 per week with an indemnity limit of m years and a k week elimination period is

$$S_{(x)}^{\frac{k}{52}/m} = S_{(x)}^{\frac{k}{52}/1\frac{k}{52}} + v\,S_{(x)}^{1/1} + v^2 S_{(x)}^{2/1} + v^3 S_{(x)}^{3/1} + \cdots + v^{m-1} S_{(x)}^{m-1/1} + v^m S_{(x)}^{/\frac{k}{52}}$$

where $S_{(x)}^{n/1}$ is defined as the amount of disability incurred at age x by an active life exposed at age x and experienced in the one-year period following an excluded period of n years.

Then $H_x^{\frac{k}{52}/m} = v^{x+\frac{1}{2}}\, l_{x+\frac{1}{2}} S_{(x)}^{\frac{k}{52}/m}$ and the one-year term premium for the benefit can be expressed as $\dfrac{H_x^{\frac{k}{52}/m}}{D_{x\ \overline{m}|}}$. Since computation of the net annual cost is often a lengthy procedure, it is frequently derived for quinquennial or decennial ages only and an interpolation made for intermediate ages.

If it is found that the cost of disability does not vary substantially with age, the one-year term premiums may be averaged and used for a uniform pure premium. However, the cost of disability for accident and sickness combined generally has been found to increase with age.

If this increase is substantial, several methods are available for determining premiums. Since noncancellable disability insurance is guaranteed renewable to some age, such as 60 or 65, it is not desirable to have a premium increasing from year to year over the duration of the policy. A flat rate may be achieved by reducing the benefit at the higher ages so that the net one-year term premium will remain comparatively level at all ages. Another method, the step-rate plan, increases the premium at a stipulated age for all new entrants and also for all policyholders on attainment of this age.

The net level annual premium method is used frequently for obtaining noncancellable rates. Derivation of the net single premium equivalent to the present value of future annual term premiums requires definition of another commutation function $K_x^{\frac{k}{52}}/m$ where

$$K_x^{\frac{k}{52}}/m = \sum_{i=x}^{z-1} H_i^{\frac{k}{52}}/m = v^{x+\frac{1}{2}} l_{x+\frac{1}{2}} S_{(x)}^{\frac{k}{52}}/m + v^{x+\frac{3}{2}} l_{x+\frac{3}{2}} S_{(x+1)}^{\frac{k}{52}}/m + \cdots + v^{z-\frac{1}{2}} l_{z-\frac{1}{2}} S_{(z-1)}^{\frac{k}{52}}/m$$

Then the net level annual premium with benefits payable only for disabilities incurred prior to age z and based on the assumptions previously used to determine the one-year term premium, is obtained from the equation $P_x^{\frac{k}{52}}/m = \dfrac{K_x^{\frac{k}{52}}/m}{N_x - N_z}$.

It would seem logical to consider the persistency of the business as well as morbidity and mortality when computing gross premiums. When the first-year expense is higher than the renewal, as is almost always the case, the effect of lapsation is to increase the average expense over the life of the policy. Consequently, the effect of lapsation is to increase the expense element of the premium. On the other hand, if the age incidence of claim cost increases, as it usually does, the effect of lapsation is to lower the level pure premium. The net result of the interaction of these two factors may either increase or decrease the gross premiums. In any event, the effect of lapsation should not be ignored in determining premium levels.

A practical approach to the development of commutation symbols might assume a total termination rate combining the lapse and mortality rates. Commutation symbols based on this approach and the assumption that premium payments are made annually could be worked out as follows. From a table giving the number of new business policies paid for by age with the resulting number of policies in force each year from the first to the sixth or eighth policy year when persistency can be assumed ultimate, $D^{\prime}_{[x]+n-1}$ can be computed based on the product of the number of policies in force in the nth policy year and v^{x+n-1}. The product of the number of new business policies paid for and v^x will therefore be denoted by $D^{\prime}_{[x]}$. In the usual

fashion $N^{l}_{[x]+n}$ is equal to $\sum_{i=0}^{z-x-n-1} D^{l}_{[x]+n+i}$. The indications as to the selection in the rate of disability are such that it is advisable to ignore any possible saving from this source and use ultimate rates or net annual costs of disability. Therefore, the next step would be the determination of $H^{\frac{k}{ss}/m}_{[x]+n}$ by the relationship $D^{l}_{[x]+n}\, v^{\frac{1}{2}}\, S^{\frac{k}{ss}/m}_{(x+n)}$ and $K^{\frac{k}{ss}/m}_{[x]+n}$ equal to $\sum_{i=0}^{z-x-n-1} H^{\frac{k}{ss}/m}_{[x]+n+i}$. The formula for the net level annual premium for a policy providing a benefit of $1 per week would be

$$P^{\frac{k}{ss}/m}_{[x]} = \frac{K^{\frac{k}{ss}/m}_{[x]}}{N^{l}_{[x]}}.$$

In order that the assumptions regarding expenses may later be verified, it is important that the expense rates be computed with care. Certain expenses, such as commissions and taxes, are functions of the gross premium. Other expenses may be related to the first-year premium, the number of policies issued, or the number of policies in force during the year. Where expense factors are based upon the number of policies, it is necessary to make assumptions as to the average size of the policy. If it is found that the average policy varies in size by age, this fact should be taken into consideration.

The following hypothetical expense rates will be used to show how gross premiums may be obtained, taking into consideration morbidity, mortality, persistency, and interest.

Commissions:

1st year	50%
2nd through 5th years	25
6th and later years	7½

Other compensation for obtaining new business—7½% of first-year premium.

Taxes—2½% of premiums received.

Other Expenses:

(1) $7.50 per policy issued
(2) 50% of first-year premium
(3) $3.00 per year per policy in force
(4) 7½% of total premiums received.

Since (1) and (3) above are based on number of policies, it is necessary to obtain an average size policy. The chart below shows for quinquennial ages the average size policy and the expenses per $1 of weekly indemnity.

Age at Issue	*Average Wkly. Ind. Per Policy*	*Expense per $1 of Wkly. Ind. $7.50 Initial* (a)	*$3.00 Annual* (b)
20	$23.70	$.316	$.127
25	30.10	.249	.100
30	36.10	.208	.083
35	38.00	.197	.079
40	39.20	.191	.077
45	37.60	.199	.080
50	36.00	.208	.083
55	33.00	.227	.091
Average	$36.10	$.208	$.083

Based upon above expense rates and combined morbidity table commutation columns, gross annual premiums denoted by $\pi^{\frac{k}{52}}_{[x]}/m$ may be derived for a full benefit policy providing a benefit of $1 per week for m years with a k week elimination period subject to a limiting age z.

$$\pi^{\frac{k}{52}}_{[x]}/m\Big[N^t_{[x]}-.5D^t_{[x]}-.25(N^t_{[x]+1}-N^t_{[x]+5})-.075N^t_{[x]+5}-.075D^t_{[x]}-.025N^t_{[x]}-.5D^t_{[x]}-.075N^t_{[x]}\Big]=K^{\frac{k}{52}}_{[x]}/m+aD^t_{[x]}+bN^t_{[x]}$$

$$\pi^{\frac{k}{52}}_{[x]}/m=\frac{K^{\frac{k}{52}}_{[x]}/m+aD^t_{[x]}+bN^t_{[x]}}{.65N^t_{[x]}-.825D^t_{[x]}+.175N^t_{[x]+5}}$$

where "*a*" equals the $7.50 initial expense and "b" equals the $3.00 annual expense, both per $1 of weekly indemnity.

This gross premium, of course, does not contain provision for profit or contingencies.

The basic premiums at the younger ages, taking into consideration disability, interest, persistency, and expenses, may not appreciably increase or they may even decrease somewhat. It probably would not be satisfactory to have premiums which decrease with age over a period. However, in both cases it may be desirable to have a flat premium for the younger ages or one which will be constant for age groups. In order to arrive at the average premium for such groups, the premiums for the individual ages should be weighted by the age distribution of new business.

The final element in the premium is a margin for profit and contingencies. All of the assumptions made in the premium structure are subject to change in the future. Although rates for new policies issued may be changed, the premium for existing policies is guaranteed and therefore cannot be increased if conditions should warrant. The business is subject to epidemics and catastrophe to a varying degree if business is concentrated in geographic locations or occupation groups. During periods of depressed business, coupled with high un-

employment, benefit payments will increase. The ratio of the contingency margin to the premium should be higher where the claim frequency is low and the average claim value is large, such as would be experienced under forms with a long limit and large elimination period, than for forms with a high claim frequency and small average claim.

Thus far premiums have been graded by age only. There are two other factors which influence the premium, probably to a greater extent than age. These are sex and occupation. The cost of disability on females is considerably higher than that on males and rates should probably be worked out independently. Although the risk of occupational injury has materially lessened over the years, occupation is still an important factor. The economic level and resulting living habits associated with an occupation have an important bearing on health. The occupational classification differential may be based on the aggregate experience for all ages.

Elimination period differentials are not appreciably affected by age, but may vary somewhat by occupational classification. The inclusion of an elimination period will not only reduce the cost by the amount which would be paid over the period eliminated but tends also to reduce the cost over the period immediately following such elimination period.

Optional benefits providing reimbursement to the insured for medical expenses, such as hospital or nurse expense for a fixed maximum daily benefit or surgical expense according to a schedule are subject to not only the control as exercised by the insured over claim costs but to the additional effect of third party control; namely, the hospital, nurse, or doctor.

Since there is a maximum limit on the amount of hospital daily benefit, the price level will have little effect on the cost. However, the average number of days spent in the hospital is subject to fluctuation. For example, the average stay in a hospital was eight days in 1953 whereas a decade and a half ago it was thirteen days. This change has been brought about by the use of new drugs and a shorter convalescent period prescribed by doctors. This is a very marked change and the reduction in the average period of hospital confinement should be watched carefully since it has taken place during a period in which there has been a shortage of nurses and other trained technicians to staff our hospitals.

Benefits providing blanket reimbursement up to a specified limit are affected also by the general price level. Therefore, since rates are guaranteed renewable for noncancellable coverage, this type of benefit has been restricted to low maximum amounts or to expenses for accidental injury.

One solution to the problem of maintaining equitable rates for policies providing primarily reimbursement for hospital, surgical, and other medical expenses is to include a clause in such policies giving the company the right to change the premium. Such a premium

change would be effective for all policies, not selectively for individual policies.

Once a rating system has been put into effect, it is important to maintain a continuous check on the resulting experience. This can be done by means of loss ratios based upon earned premiums and incurred losses or a study of the basic assumptions underlying the rating structure. The "Health and Accident Experience Exhibit," which is now a requisite part of the Annual Statement for companies writing health and accident business, is of doubtful value to the companies as an internal check since outstanding losses at the year-end are shown for an estimated amount rather than the amounts actually developed.

Since a paper on noncancellable health and accident ratemaking would not be complete without at least touching upon the subject of reserves, a few brief notes on this subject are included.

At one time the convention statement blank called for an unearned premium reserve equal to one-half of the gross premiums in force as of the statement date for all unexpired policies running one year or less from the policy date and a pro-rata part of the gross premiums for all unexpired policies running more than one year from the policy date. Most states now take a more realistic approach to the unearned premium reserve on policies running one year or less by requiring the pro-rata portion of the unexpired gross premium. For a policy issued on the one-year renewable term basis, the unearned portion of the net premium is just sufficient to pay claims incurred during the period covered by such unearned premium, and since most of the expenses are paid when such premium is received, the setting up of a reserve equal to the pro-rata portion of the gross premium creates a reserve which is somewhat larger than theoretically necessary.

Policies issued on the net level or full preliminary term basis require an additional reserve due to the fact that the net premium in the early years of the policy is more than sufficient to pay the losses incurred; therefore, this excess must be set up as a reserve for the later years when the net premium is not sufficient to meet the losses. As the unearned premium has already been set up as a reserve, the mid-terminal reserve is used for this additional reserve rather than a mean reserve. This additional reserve is required by most states on all noncancellable business providing benefits for loss of time due to sickness, the minimum standard usually being the Conference Modification of Class III Disability Table, although a table based upon a company's own experience may be used if the aggregate results are at least as high as the minimum prescribed.

In addition, reserves must be set up for disabilities incurred prior to the statement date and which are still outstanding. These disabilities fall into two categories—(a) disabilities which have been reported and (b) those which have not been reported. A further separation is required of those companies reporting on the Life and Accident and Health Convention Blank. This is the separation between the amount set up as a liability and the amount considered to be a reserve. The

liability portion includes the amount of liability applicable to assumed accrued payments, that is, the amount which would be immediately payable if disability were approved. The Life and Accident and Health Blank also segregates the liability for due and unpaid claims comprising claim payments which have been approved but are unpaid at statement date.

If maternity benefits are provided, a reserve for deferred maternity benefits must be maintained since such claims are not due until approximately nine months after they are incurred. This reserve is considered a claim reserve if based on the assumption that the claim has been incurred but will not be due until some time in the future, a premium reserve if considered the portion of the net premium for the benefit not yet earned.

The statutes of the various states provide in essence that the reserves for reported claims with a duration of one year or more and life indemnity claims shall be valued on the basis of the Conference Modification of the Class III experience or shall be an amount equal to the indemnity payable for a period of three and one-half times the elapsed duration of disability, whichever is less, with a minimum reserve on each life indemnity claim of seven weeks' indemnity. The experience of the individual company may be used to value claims with less than one year's disablement and for unreported and resisted claims.

For more detailed development of commutation symbols and formulae for net premiums and reserves, reference is made to papers previously presented to this Society.[1]

[1] P.C.A.S., Vol. XVII, p. 51
P.C.A.S., Vol. XXVII, p. 18
P.C.A.S., Vol. XXXII, p. 27

OBSERVATIONS ON STATE TAXATION OF CASUALTY AND FIRE INSURANCE COMPANIES[1]

BY

EDWARD C. ANDREWS

Although the public has been kept very well informed on the subject of the many services performed by insurance companies, there is one about which, although it is of major importance, surprisingly little has been published. This service, performed by every insurance carrier for each state to which it is admitted, is the collection of taxes from the policyholders and the accounting for and return of these taxes to the various state and local taxing authorities. This most important function is performed for the states, counties, and municipalities at practically no cost to the taxing bodies, provision for such taxes and the expenses incidental to collection, accounting for and returning them being included in the rates charged to policyholders.

Everyone pays for insurance, whether directly to an insurance company as premiums, to a landlord as part of his rent, or to every individual or corporation from whom he buys anything. The states, therefore, receive taxes from every resident (and many non-residents) collected for them by the insurance carriers. Premium taxes are, then, actually indirect taxes on the policyholders and their customers, originally assessed to provide for the maintenance of the Insurance Departments for the protection of the policyholders, but now a major source of income for the general funds of all states. It has been estimated that in 1953 the total taxes and fees collected by the 48 states and the District of Columbia from the insurance business including the Life Insurance industry) exceeded $328 million, of which only about $13.5 million, or 4.1%, went for State supervision of the business.[2]

In general, excise taxes, whether state or federal, are imposed on the cost of so-called luxury items. State sales taxes often exempt such items as food and children's clothing as essentials. Insurance can hardly be called a luxury — and the premium paid for a compulsory line such as Workmen's Compensation can, by no stretch of the imagination, be deemed such. In effect, a state says to each employer of labor, "You must buy insurance to protect your employees. The company from which you purchase this protection must, in addition to the premium required for the coverage, also collect from you a sum

[1]For historical background of the taxation of Casualty and Fire insurance companies, see Chapter VII, "TAXES, LICENSES AND FEES (Excluding Federal Income and Real Estate Taxes)" *INSURANCE ACCOUNTING, FIRE & CASUALTY*, the Insurance Accounting and Statistical Association textbook published in 1954 by The Spectator.

[2]Elmer Miller, Insurance Editor, in the June 4, 1954, issue of the *JOURNAL OF COMMERCE*.

which will enable it to pay to us $2 (or $3, or $4.50) for each $100 of gross premium it receives from you."

Fire and Casualty carriers are subject to a great many *types* of taxes imposed by States and political subdivisions thereof. A copy of the "COMPOSITION OF OPERATING EXPENSE CLASSIFICATIONS" of the "INSTRUCTIONS FOR UNIFORM CLASSIFICATIONS OF EXPENSES of Fire and Marine and Casualty and Surety Insurers" for operating Expense Classification numbers 18 and 20 (taxes) is attached (Exhibit A).

"State, county and municipal taxes, licenses and fees based upon premiums" (18(a)) include such taxes as Fire Department, Fire Marshal, Firemen's Relief Funds, N. Y. City Receipts, Chicago Personal Property, Policemen's Retirement Pension Funds, etc.

Although no state imposes *all* these types of taxes, most states impose several and some impose many of them.

Premium taxes assessed to help maintain improved Fire protection may be considered as money well spent by the insurance companies for value received, but, for the most part, other taxes are imposed as a purely revenue-producing measure by the taxing authorities.

The most lucrative source of revenue from Insurance Company taxation is the state tax based upon premiums. Whether designated by the taxing state as "State Premium Tax," "Company License Tax," or "Privilege Tax," it is a tax, varying from 1¾% to 4½%, usually based on direct premiums written by the Company during the tax period on risks located or resident within the state.

At the present time domestic (home-state) companies are not subject to the premium tax in eleven states.[3] In ten states[4] the premium tax rate for domestic companies is lower than that for foreign companies. Thirty-eight states[5] (including 17 of the previously noted 21) tax insurance companies of other states under retaliatory laws. Such laws provide that if the tax rate of State A applicable to foreign (other state) companies, is higher than that of State B applicable to foreign companies, the State A rate will be applied by State B to companies domiciled in State A. An example of such a law is taken from the Minnesota Statutes, Section 71.23, and reads as follows:

> "When by the laws of any other state or country any taxes, fines, deposits, penalties, licenses, or fees, in addition to or in excess of those imposed by the laws of this state upon foreign insurance companies and their agents doing business in this state, are imposed on insurance companies of this state and their agents doing business in that state or country, or when any conditions prece-

[3]Arkansas, Florida, Illinois, Indiana, Kansas, Michigan, No. Dakota, Ohio, Oklahoma, Oregon, and Pennsylvania.

[4]Alabama, Arizona, Maine, Mississippi, Nebraska, No. Carolina, So. Carolina, So. Dakota, and Washington; also Texas on Accident and Health premiums.

[5]All states except Alabama, California, District of Columbia, Georgia, Idaho, Mississippi, Nevada, New Mexico, No. Carolina, Texas and West Virginia.

dent to the right to do business in that state are imposed by the laws thereof, beyond those imposed upon these foreign companies by the laws of this state, the same taxes, fines, deposits, penalties, licenses, fees, and conditions precedent shall be imposed upon every similar insurance company of that state or country and their agents doing or applying to do business in this state so long as these foreign laws remain in force."

While some states retaliate on the basis of total taxes, licenses, and fees, others retaliate tax for tax, license for license, and fee for fee. A company which might not be liable for a retaliatory tax under the former basis might, under the latter, be forced to pay in retaliation for one or more fees charged by its home state in excess of those charged by the taxing state, although the total home state taxes might be the same as, or lower than, those of the taxing state.

Thus it is evident that in many states foreign companies are subjected to discriminatory taxation which results in unfair competition, especially in the case of a company domiciled in a state which taxes companies of other states at a high rate. The retaliatory statute of the state where a workmen's compensation risk is located may result in a tax rate of as high as 4½%, while a domestic company might pay no tax at all. Such tax discrimination may prove to be particularly frustrating in competing for a large retrorated Group Accident and Health risk where the competition depends to a great extent on the carrier's retention, of which the premium tax is an appreciable portion.

It would seem, then, that such discrimination would be unlawful in view of the Supreme Court decision in the South Eastern Underwriters Association case which held that insurance was commerce.

However, following the enactment of the McCarran Act, a decision of the Supreme Court upheld the validity of such discriminatory taxation in *Prudential Insurance Company v. Benjamin*, the Prudential having protested the three percent South Carolina premium tax on foreign insurers (but not on domestic companies). Prudential claimed that the tax "discriminates against interstate commerce and in favor of local business, since it is laid only on foreign corporations and is measured by their gross receipts from premiums derived from business done in the state, regardless of its interstate or local character."[6]

The Court stated:

"Two conclusions, corollary in character and important for this case, must be drawn from Congress' action[7] and the circumstances in which it was taken. One is that Congress intended to declare, and in effect declared, that uniformity of regulation, and of state taxation, are not required in reference to the business of insurance, by the national public interest, except in the specific re-

[6]Opinion of the Court, delivered by Mr. Justice Rutledge.

[7]The passage of Public Law 15, 19th Congress, known as The McCarran-Ferguson Act.

spects otherwise expressly provided for. This necessarily was a determination by Congress that state taxes, which in its silence might be held invalid as discriminatory, do not place on interstate insurance business a burden which it is unable generally to bear or should not bear in the competition with local business. Such taxes were not uncommon among the states, and the statute clearly included South Carolina's tax now in issue.

"That judgment was one of policy and reflected long and clear experience. For, notwithstanding the long incidence of the tax and its payment by Prudential without question prior to the South-Eastern decision, the record of Prudential's continuous success in South Carolina over decades refutes any idea that payment of the tax handicapped it in any way tending to exclude it from competition with local business or with domestic insurance companies."

And

"No conceivable violation of the commerce clause, in letter or spirit, is presented."[8]

Since the South Carolina "free ride" for domestic companies does not violate the commerce clause, certainly retaliatory taxation, by the same reasoning, must not constitute a handicap in competition, at least from a legal standpoint.

Therefore it is interesting to consider the effect of such retaliation on a hypothetical South Carolina company presumed to be doing a large volume of business outside the state. Its home state has granted it a distinct tax advange on business (other than workmen's compensation) it may write in South Carolina. A foreign company holding no investments in South Carolina securities and with no bank balances in the state pays 3% of its premiums on South Carolina business, compared to the average premium tax rate of about 2% applicable to foreign companies. But, with most states having retaliatory laws in effect, the South Carolina company might find itself forced to pay 3% on most of its out of state premiums, so the "free ride" at the expense of foreign companies could prove to be a boomerang.[9]

Connecticut companies find themselves in the exact opposite situation from South Carolina carriers. They pay a tax on total investment income (less certain exempt interest and dividends) which is *not* levied against *foreign* companies. They also bear the expense of company examinations by the Connecticut Insurance Department. However, these extra taxes to the home state enable the premium tax rate to remain at 2% (retaliatory) on foreign companies, thus virtually

[8]See "The New Era of Casualty Rate Making" by James B. Donovan — *Proceedings, Casualty Actuarial Society*, Vol. XXXIV.

[9]Act 234 of 1955 imposes premium tax of 2%, but not exceeding 5% of "actual net income," on Domestic Companies. (Workmen's compensation, 4½%, same as for Foreign Companies).

exempting Connecticut companies from retaliatory taxes. Unquestionably the many Connecticut companies with large premium writings in other states — most of which are retaliatory — find it much more economical to pay the extra taxes to Connecticut than to be faced with paying higher-than-average premium taxes to other states in retaliation for a higher-than-average tax assessed by Connecticut on foreign companies which would be required to raise the revenue now secured from the local carriers based on their investment income. (This, of course, is based on the questionable premise that the revenue realized from these extra taxes must be levied against the insurance business.)

Incidentally, the Connecticut tax on investment income is a unique tax. It replaced the Connecticut Franchise Tax and the Connecticut Capital Stock Tax, both based on the market value of the outstanding capital stock of domestic companies on an annual assessment date. As a result of the inflation of the late twenties and the subsequent depression, the market valuations fluctuated violently and this tax base failed to produce the degree of consistency desirable from a revenue standpoint. Consequently these taxes were repealed and legislation enacted levying a tax on the total investment income received during each calendar year, less certain exempt income such as interest from U.S. securities and dividends from other Connecticut insurance companies subject to the tax. Although some companies classify this tax as an investment expense since it is based on investment income, most consider it a franchise tax which is based on investment income only for the purpose of stabilizing the revenue therefrom.

Tax advantages offered by some states to domestic companies help small carriers which confine their underwriting for the most part to local business to remain in competition with the larger foreign corporations which can usually conduct business with a lower expense ratio than the smaller companies. As for the larger domestic companies which write a large volume of premiums in other states, they will enjoy the home-state tax advantage on business done within the state and can suffer no appreciable retaliatory penalty *if* its home state does not tax foreign companies at a rate in excess of 2%.

In addition to relieving domestic companies of paying the premium tax on business written in the home state, or paying at a lower rate than is charged foreign companies, there are other methods employed by several states to lighten the tax burden of companies which either write a high percentage of their total business in the taxing state or have a large portion of total investments in certain securities of the state. Presumably, tax relief would be available to any carrier, but practically, relief under such provisions usually accrues to domestic companies only.

The 3% South Carolina tax on foreign companies, previously discussed, may be reduced to as low as 2% by investing in certain South Carolina securities or maintaining bank balances within the state

equal to the amount of taxable premiums written during the year. This is one tax advantage which any foreign company might well consider, and the investment department or banking division should be furnished with an estimate of the amount of investment or bank balance necessary to accomplish the maximum tax reduction before the beginning of each year, as the tax may be reduced only on those premiums written while the investments are held, and only those bank balances held continuously throughout the year may be used in determining the ratio of bank balances to taxable premiums.

There is a provision in the New Jersey law which assesses state premium taxes on the total direct writings within the state *or* on 12½% of the company's *total* direct writings, whichever is less. This, in effect, offers a tremendous advantage to small companies which confine their operations largely to the state of New Jersey. However, the retaliatory provision effectively limits the advantage to domestic companies.

Is it too whimsical to suggest that a large stock company with ample capital funds, doing a very substantial volume of business in New Jersey, might conceivably organize a New Jersey subsidiary to write all its business within the state (ceding it all to the parent company), with the result that only one-eighth of the direct writings would be subject to premium tax? Or that a subsidiary be incorporated with more than 90% of its assets invested in tax-free Texas securities to write the Texas business, and cede it to the parent company, reducing the occupation (premium) tax from 3.85% to 1.1%?

Perhaps it is. But with multiple-line underwriting and the resulting tendency to merge the business of affiliated fire and casualty companies, it is conceivable that several subsidiaries of a large fleet might be reorganized in such a manner as not only to overcome some of the state tax discriminatory provisions but to make them work to the advantage of the parent company. Meanwhile, since the decision in *Prudential v. Benjamin,* carriers must content themselves with conceding that the cost of tax inequities is the price of state as opposed to federal regulation of the insurance business.

Since the Supreme Court decision in *Connecticut General Life Insurance Company v. Johnson,*[10] state premium taxes have, as a rule, been based on the direct writings of insurance companies. Several states tax on direct premiums plus reinsurance premiums received from companies not authorized to transact business in the state and therefore are presumed to have made no return of taxes on the direct business. California, Massachusetts, New York, Rhode Island and Vermont impose premium taxes on their domestic companies based on

[10]Connecticut General Life Ins. Co. v. Johnson, 1938, 303 U.S. 77, 58 S. Ct. 436, 82 L.Ed. 673. In this case the United States Supreme Court held invalid a California constitutional and statutory provision which attempted to impose a tax on the insurance company on account of reinsurance business done elsewhere where the original policy was issued in California.

premiums not taxed elsewhere. Let us consider a situation which might consequently develop.

Assume that California Company A is authorized by the United States Treasury Department to issue Surety bonds in its favor in connection with construction work, wherever located, undertaken for the United States Government. It issues such a bond for a project in, let us say, New Mexico, in which state it is *not* licensed, and cedes half the risk to Company B, which *is* licensed in New Mexico, as well as authorized by the Treasury Department to participate in such contracts. The customary allowance is included in the reinsurance commission to reimburse the direct writing company for premium taxes payable on the direct premium. However, at the time of preparing the tax return on New Mexico premiums, Company B finds that Company A is not licensed there, and, since New Mexico taxes on "direct plus unauthorized accepted" premiums, Company B asks Company A for an adjustment, since Company A pays no tax to New Mexico, and Company B has paid both to the state and to Company A in the form of commission allowance. Company A replies that it has had to pay the tax on the entire premium to California, and, therefore, cannot agree that it is not entitled to reimbursement from Company B for the tax on that portion of the premium ceded to it. So California collects the tax on the total premium from the direct writing company because it returned it to no other state, and New Mexico collects the tax on that half of the premium accepted by the authorized carrier; and the accepting company ends up paying taxes on the whole premium, although it has received but half. Confusing, but double taxation can hardly be called amusing!

If this hypothetical situation seems far-fetched, be assured that similar conditions have actually arisen, and that they *are* confusing! Reinsurance underwriters and accountants should have easy access to all state tax rates and bases as a help in determining proper tax allowance in the commission rates for reinsurance assumed. Some company trade organizations, such as the Association of Casualty and Surety Companies and the National Board of Fire Underwriters, issue tax manuals which are most valuable to the tax units of Casualty and Fire companies in the preparation of state tax returns, and copies of these manuals, as well as of any of the publications which list the states in which each company is admitted, should be made available to the reinsurance departments.

When reinsurance on a risk located in several states is assumed by a company licensed in all states from a company which is not authorized to write in one or more of the state locations of the risk, the assuming company may find that it has paid double premium taxes on that part of the premium derived from states in which the ceding company is not licensed if such states tax on direct plus unauthorized assumed premiums — first to the ceding insurer as a tax allowance in the reinsurance commission rate and subsequently to the state concerned. If the amount involved is large enough to warrant it, a tax adjustment

can usually be made with the direct writer — unless, as in the example above, the direct writer is required to pay the tax on such business to its home state. Therefore, the person responsible for the preparation of state premium tax returns should immediately inform the proper underwriting authorities if and when he finds that the company is required to pay taxes on any appreciable amount of unauthorized reinsurance accepted, so that the reinsurance official may, in his discretion, have the accounting department seek reimbursement from the ceding company.

It would seem, from the foregoing, that, for the purpose of returning premiums for taxation to the various states, it should be necessary to record only net direct premiums written by state location of risk, and reinsurance premiums received by state and by ceding company in order to satisfy all requirements and to make proper tax payments. Such records, in most cases, should provide sufficient data to satisfy the legal requirements. However, the Insurance Departments and/or the Tax Commissions of many states have devised forms for reporting taxable premiums, the completion of which necessitates the keeping of numerous sub-accounts, all more or less expensive to maintain, and which call for information of no conceivable value to anybody. Because a state law may define taxable premiums as total direct premiums less premiums returned on policies cancelled, we may find that the tax blank calls for the reporting of direct premiums gross, with a separate line on which must be entered the amount of return premiums so that it may be deducted to produce the net taxable premiums.

Needless to say, the net taxable amount is readily available, but a special tabulation of return premiums must be made for such a state to determine a figure to be entered and *added* to the net in order to produce a gross. Some states have even asked for this information by line of insurance; and if unauthorized accepted premiums are taxed, companies are asked by some states to report all this needless information for each company from whom they have assumed reinsurance premiums, whether authorized or not.

During the latter part of 1942 and early 1943 a concerted effort on the part of the industry was made to reduce the number of special state requirements. The plea for simplification was made in the interest of war time economies, and was made by the National Board of Fire Underwriters for the Fire companies and by the Association of Casualty and Surety Executives for the Casualty companies. Both associations performed yeoman service in their attempts to lighten the burden during those trying times.

There is appended a copy of the circular letter written by the Special Representative of the Association of Casualty and Surety Executives and addressed to the insurance commissioners of all states (Exhibit B).

To each copy was attached a list of proposals to either waive certain requirements or to grant official approval of suggested simplifications

in the completion of various forms required by the state whose commissioner was addressed. Note that the circular recommends that all states accept "a simple reporting of direct premiums less return premiums and cancellations on same, as one item, plus a separate item of any reinsurance assumed from unauthorized carriers."

These letters were tactfully but persistently followed up with additional correspondence when and where necessary, the operation culminating in an extended trip on the part of the Special Representative to visit the insurance departments of those states whose requirements still presented problems which, it was felt, a personal interview might solve where correspondence had failed.

As a result of this campaign many states agreed to accept simplified filings during the war years. Some have subsequently revised their premium tax blanks to conform to the accepted war time procedure, thus making the economies permanent; some continue to accept simplified filings of more detailed blanks, completed as allowed by special permission during the war years; others, whose commissioners granted permission for simplified filings "for the duration," now request the reporting of all information called for in the blanks provided; while still others, having seen fit to grant little or no relief as war time economies, continue to expect companies to maintain costly and time-consuming records to enable them to report in tax blanks information of no practical value.

It has become common practice in recent years for Fire companies to keep no records of return premiums as such, and to report only the net direct premiums, and, if taxable, the net unauthorized reinsurance premiums assumed, amending the tax blanks when necessary to indicate that separate data on return premiums are not available. Such filings have evidently been acceptable with little or no unfavorable criticism. Personal inquiry has elicited the information that some Casualty companies with Fire "running-mates" have been following this same practice, at least in most states, and that they have also been successful in their attempt to satisfy the authorities with such simplified reportings. It seems safe to assume that those fleets which have merged their fire and casualty lines, as permitted by "Multiple-Line Underwriting" legislation, are not recording return premiums, in accordance with what has become commonly accepted practice for Fire companies.

The distinction between Fire and Casualty companies by those states which now permit multiple line underwriting is anachronistic. Two different premium tax blanks, one designed for Fire companies and the other for Miscellaneous companies, may be furnished by such a state with the request that *each* be completed and filed, the presumption being that a company would report its premiums on those lines of business formerly permitted to be written by Fire companies on the Fire form, and the balance of its premiums on the form for Miscellaneous companies.

This pseudo-distinction between Fire and Casualty companies may

result in further confusion to multiple-line underwriting companies in connection with additional taxes assessed against Fire companies but not against Casualty companies. For instance, West Virginia, in addition to the 2% premium tax, imposes on *Fire* companies *only* a state Fire Marshal tax of ½% of premium income from *all* classes of business.

Wherever statutes and/or insurance department regulations of any state which permits multiple line underwriting distinguish in any way, and especially as respects taxes, licenses, and fees, between Fire companies and Casualty or Miscellaneous companies, such statutes and regulations should, of course, be amended and made consistent with the more recently enacted Multiple Line Underwriting legislation.

Mr. James B. Donovan, General Counsel of the National Bureau of Casualty Underwriters, in his article "Regulation of Insurance Under the McCarran Act"[11] made the following statement: "We are an industry which today is probably more free of unethical conduct than any other of comparable size; yet we are subjected to more public regulation and are the victims of more discriminatory legislation." Much of this regulation and legislation has to do with taxes, licenses, and fees, and any effort to effect economies through legitimate simplification of their reporting which would obviate the necessity of maintaining useless, though costly, records would seem to be justified as a worthwhile service to the policyholders.

EXHIBIT A

18. TAXES, LICENSES AND FEES

a) State and Local Insurance Taxes
Include:

State, county and municipal taxes, licenses and fees based upon premiums.

Fire patrol assessments.

Payments to State Industrial (or other) Commissions for administration of Workmen's Compensation or other State Benefit Acts (including assessments for administering Financial Responsibility Laws) regardless of basis of assessment.

Net payments to State Security Funds, Reopened Case Funds, Second Injury Funds and other State Funds, when construed by the company as operating expenses regardless of basis of assessment.

Exclude:

Allowances for taxes under reinsurance contracts.

b) Insurance Department Licenses and Fees
Include:

[11] *LAW and CONTEMPORARY PROBLEMS*, School of Law, Duke University, Vol. 15, No. 4.

Agents' licenses.
Certificates of authority, compliance, deposit, etc.
Filing fees.
Fees and expenses of examination by insurance departments or other governmental agencies.

Exclude:

Items includible in Claim Adjustment Services.

c) Payroll Taxes
Include:

Old age benefit taxes.
Unemployment insurance taxes.

Exclude:

Payroll taxes includible in Real Estate Taxes.

d) All other (excluding Federal and Foreign Income and Real Estate)
Include:

Qualifying bond premiums.
Statement publication fees.
Advertising required by law.
Personal property taxes.
State income taxes.
Capital stock taxes.
Business or corporation licenses or fees (not includible under (a) or (b).
Marine profits taxes.
Documentary stamps on reinsurance.
Any other taxes not assignable under (a), (b), and (c) and not otherwise excluded.

Exclude:

Cost of advertising required by law where more than minimum space required to comply with the law is taken.
Such expense shall be included in Advertising.
Real estate taxes, licenses and fees (see Real Estate Taxes).
Items includible in Claim Adjustment services.
Fees for automobile license plates.
Federal and Foreign income tax.
Sales taxes, etc. included on invoices of vendors.
Such taxes are to follow allocation of cost of items purchased.

20. REAL ESTATE TAXES
Include:

Taxes, licenses and fees on owned real estate.

EXHIBIT B

"SUPPLEMENTARY STATE SCHEDULES, TAX STATEMENTS AND REINSURANCE SCHEDULES

"Because of the impact of the war upon the personnel and equipment in casualty company offices, on behalf of our member companies, we respectfully submit for your consideration the attached proposal(s) to simplify some of the detailed data in connection with casualty companies' filings with your state for calendar year 1942.

"These proposals are based upon our understanding of the resolution adopted by the Executive Committee of the National Association of Insurance Commissioners of which you were advised on October 16, 1942, by the Chairman of that Committee. The intent of this resolution appears to be that, wherever possible, without lessening the necessary requirements of supervision within a given jurisdiction, the Commissioners, for the duration of the war, require fire and casualty insurance companies to file only the uniform blank approved by the National Association of Insurance Commissioners and such additional blanks as are required by the laws of the several states, eliminating so far as can be done for the period of the war, the individual special filings required by the various departments.

"Furthermore, we believe that these proposals conform to the recommendations included in the special report of the Committee on Blanks of the National Association of Insurance Commissioners adopted and approved by the Executive Committee of the Convention as a whole on December 2nd in New York City, reading as follows:

> 'Recommended that the sixty day extension for filing schedules approved by the Executive Committee as to life insurance companies, be made applicable to all types of companies.
>
> 'Recommended that the respective states should review their insurance tax blanks in the light of the present emergency and the shift by most states to the direct basis, for the purpose of eliminating therefrom all data not bearing directly on the computation of the tax or the proper audit of such tax returns.'

"During the past war year the companies have sought every possible means of freeing manpower for service and releasing equipment by the simplification of systems, redistribution of work, and otherwise. Despite these efforts the present requirements for all states combined are almost terrifying in the light of available staff and equipment and indications strongly suggest the physical impossibility of carriers carrying on in 1943 without permission to curtail drastically the tabulation of all detailed data which is not absolutely essential.

"The Federal Government has already requisitioned typewriters and during the coming year in any installation where more than a single unit of electrical accounting machine equipment is operated, insurance carriers are expected to release up to 50% of such equip-

ment for use by the Federal Government or its Departments or by War industries.

"Perhaps one of the most burdensome tasks facing the companies is the determination of the data required in supplementary schedules and special forms for the various states, calling for itemizations in respect to assumed and ceded reinsurance. In regard to such schedules, we respectfully suggest that the great amount of labor and machine work involved in their compilation is not in these times justified by their value — particularly so since taxation has been largely shifted from the net to the direct premium basis.

"Likewise, it would be most helpful if any state still requiring a complete breakdown of state premiums by line of business on tax blanks or supplementary schedules would consider omitting such a required breakdown (this is already available on page 10 of the Convention Blank*).

"The actual taxable premiums for most states are direct premiums less return premiums and cancelations but the tax blanks still require the return premiums to be shown separately. In other states, where tax is based on gross premiums less return premiums and reinsurance assumed from authorized companies, each such item must be cited in detail although actually, the tax is based on direct premiums. It would seem that a simple reporting of direct premiums less return premiums and cancelations on same, as one item, plus a separate item of any reinsurance assumed from unauthorized carriers, would simplify the work and produce the same tax. For these reasons it is hoped that, if not this year, tax blanks for 1943 and future years may be materially simplified in this regard.

"On behalf of all our member companies we wish to express to the Executive Committee our appreciation for the resolution adopted and distributed to all Commissioners last October; to the Insurance Commissioners as a group for their adoption of the report of the Committee on Blanks amending the Convention Blank Statement for 1942; and lastly to the many individual commissioners who, both before and after the above actions, have already instituted deletions and simplifications in supplementary schedules and tax statements of their states, or have agreed to give maximum aid in this regard.

"The proposal(s) attached to this letter is(are) respectfully submitted for your review and consideration, and it is our hope that after such review your Department may take steps to notify all carriers, that, when filing the supplementary schedules and other statements with your Department for 1942, they may make their filings in the simplified manner described.

Yours very truly,

Special Representative of the Association of Cas. & Sur. Exec."

*Page 10 of the Convention Blank for Miscellaneous Companies at that time was the State Business page.

THE "WORKMEN'S COMPENSATION INJURY TABLE" AND "STANDARD WAGE DISTRIBUTION TABLE"— THEIR DEVELOPMENT AND USE IN WORKMEN'S COMPENSATION INSURANCE RATEMAKING*

BY

BARNEY FRATELLO

INTRODUCTION

Workmen's Compensation Insurance Ratemaking is, in its broad aspects, similar to ratemaking in the other fields of casualty insurance. It is known, for example, that the various casualty lines are engaged in a common search for rates that are "adequate" but "not excessive" or "discriminatory"; that in order to attain this common objective, it generally involves the accumulation and analysis of a large volume of loss experience which is adjusted to reflect current conditions through the application of experience modification factors. The manner in which adjustment factors are determined, however, usually proceeds along specialized lines that are singularly appropriate to a particular line of insurance. In Workmen's Compensation Insurance, for instance, the so-called "Law Amendment Factor" is unique in the manner of determination but, as with other experience factors, it is essentially designed to adjust loss experience to reflect current conditions. In this respect "current conditions" signifies the latest revision of benefit provisions contained in the Workmen's Compensation Insurance Act of a particular state.

Underlying the workmen's compensation loss experience of a given state is the Workmen's Compensation Insurance Act of that particular state. When the "Act" is amended by the state legislature in a manner that affects the future payment of compensation benefits, it is obviously important to determine a "Law Amendment Factor" which serves to express the loss experience, under examination for the purpose of revising rates, in terms of the revised benefit provisions. If this revision is of such a nature that "accident distributions" are essential to its determination, this factor may be calculated for the most part in two ways.

The first method involves the revaluation of a representative sample of the compensable accidents underlying the loss experience under consideration in terms of the revised benefit provisions and comparing the resulting cost to the actual cost. Although this may appear to be a commendable procedure, experience reveals that it is wholly impracticable for routine procedure. Besides, the notion of "representative sample" hinges on the immediate availability of an

*This paper presented by invitation.

adequate volume of cases and on the assumption that complete details regarding every compensable accident is made available to the rating organization which, in fact, is not the case. The other method, adopted by the National Association of Insurance Commissioners, provides for the valuation of benefit provisions based on a single distribution of countrywide compensable accidents, which once established, serves as a relatively permanent base. This latter method furnishes an equally satisfactory but much simpler device for determining the benefit effect of certain types of law amendments.

It is recognized that recourse to an "accident distribution" table is not always essential for determining benefit differentials. As a matter of fact, a review of workmen's compensation legislation which became effective during 1951 and 1953, the heaviest legislative years prior to this writing, reveals that it was necessary in less than fifty percent of the valuations to resort to the "accident distribution" tables. For the most part, the remainder of the valuations was based on a table of "Standard Wage Distributions."

When revision of the compensation act involves a revised weekly benefit scale, it is at times sufficient to merely resort to a table of "wage distributions," disregarding "accident distributions," in order to determine the benefit differential. Since the various state "Acts" provide for payment of compensation benefits at a percentage of the injured employee's average wage, but subject to certain specified minimum and maximum weekly amounts, it follows that wages have a limited effect on loss experience.

Consider the employee whose weekly benefit award, at the specified rate of compensation provided in the "Act," amounts to less than the statutory minimum weekly benefit. Application of the minimum condition will result, in effect, in the payment of benefits based on a higher wage than is actually earned by the injured employee. Conversely, the employee whose weekly benefit award is subjected to the maximum limitation will receive, in effect, an award based on a lower wage scale. Although more will be said on this particular subject in Parts II and III of this paper, it may be stated at this point that with a change in the statutory benefit scale of the Compensation Act there is involved a corresponding change in effective benefit wages. In order to measure the effect of the change, it is essential to resort to some standard wage distribution (unless the compensable cases underlying the loss experience are to be revalued which, for the reasons previously mentioned, is not feasible).

Thus the determination of the "Law Amendment Factor" may require the employment of an accident and/or wage distribution table, depending on the nature of the law amendment. The development of Workmen's Compensation accident and wage distributions will constitute the subject matter of this paper. Part I will treat with accident distributions, Part II with wage distributions and Part III will illustrate the combined use of these distributions in valuing the effect of a hypothetical law amendment.

PART I — DEVELOPMENT OF THE "WORKMEN'S COMPENSATION INJURY TABLE."

A. **Historical and Statistical Background:** This paper would be incomplete, we believe, if we neglected to comment on the "American Accident Table" published in Volume VII, P.C.A.S. 1920-21* and the "Standard Wage Distribution Table," described in Volume IX, P.C.A.S. 1922-23.† The development of these tables precede the newly created "Workmen's Compensation Injury Table" and "Standard Wage Distribution Table" by approximately thirty years. During the course of this period, there have been many instances where the calculated effect of a law amendment based on these earlier tables had been rechecked by actual revaluation of accidents and the two results were found to be in rather close agreement. Preliminary tests indicate that the new "Workmen's Compensation Injury Table" and "Standard Wage Distribution Table" will produce results that are similar to their older counterpart.

However, subsequent tests indicate an appreciable difference in the results produced by the old and new tables where the amendment provides for increased benefits for the so-called "healing period," that is, benefits for temporary total disability in addition to benefits for permanent partial disability. In this connection it is to be noted that the limitations of the old table with respect to a valuation of a change in the healing period is clearly set forth in the following quotation from Page 61, Volume VII, Proceedings of Casualty Actuarial Society:

> "Very little material was available for a distribution of temporary total disability in permanent partial cases, only two states, California and Oregon, having presented such statistics and these for only one year each. However, the results followed very closely those obtained by Dr. Rubinow in the Standard Accident Table and it was felt that the data when smoothed was sufficiently reliable for the present purpose. The comparison with Dr. Rubinow's results obtained by the use of Russian statistics which is presented on the preceding page is interesting."

The new table incorporates, for the first time, accurate statistics, based on American data, with respect to the healing period. The new data are found to have considerably more effect on compensation costs than that derived from the sketchy data available when the old American Accident Table was compiled.

Considering the limited amount of workmen's compensation statistics available thirty years ago and the many changes in compensation benefit provisions, working and social conditions since that time, it is a tribute to the capabilities of the original authors that

*See "An Amer. Acc. Table" by Olive E. Outwater.

†See "Legal Limits of Weekly Compensation in Their Bearing on Ratemaking for Workmen's Compensation Insurance" by A. H. Mowbray.

their tables have produced consistently satisfactory results. The "older" tables are not being replaced for functionary reasons but simply because of a desire to base law valuations on relatively more recent statistical data.

In 1950, the National Council on Compensation Insurance decided to undertake a statistical study aimed at reviewing, and, if necessary, to revise the "American Accident Table." At the December 1950 session of the National Association of Insurance Commissioners, the Chairman of the Workmen's Compensation Committee appointed a Subcommittee of Departmental Technicians "to study the valuation of law amendments separately and in conjunction with the National Council staff." During the spring of 1951, the National Council's Committee, after meetings with the Subcommittee of Departmental Technicians, circulated a special "Call for Accident Statistics" (reproduced as Appendix "A") among the insurance carriers. This "Call" visualized the accumulation of 10,000 Major Permanent Partial cases; 25,000 Minor Permanent Partial cases; and 40,000 Temporary Total injury cases. Supplementing the "Call" directed at the insurance carriers, another special "Call" (reproduced as Appendix "B") directed at the Independent Rating Organizations was expected to produce 25,000 additional Fatal and Permanent Total injury cases. These data were to be taken from Individual Case Reports filed by the carriers with the National Council or with the Independent Bureaus.

The response to both "Calls," although gratifying when considering the expense in man-hours, varied with some organizations reporting data almost immediately and a few reporting as long as one year after circulating the "Call." However, the time element was not significantly important inasmuch as it required more than a year to audit each reported case for inconsistencies with the instructions appended to the "Call" and to search out obvious conflicts with the jurisdictional Workmen's Compensation Act. In this respect, a voluminous amount of correspondence was carried on between the National Council and the participating organizations.

While the next phase of the study involving the transfer of data to punch cards was, in itself, an enormous task, designing suitable punch cards which would assure the necessary tabulations presented the major problem. Since the analysts engaged in the study could not anticipate the quantity or the nature of tabulations that would ultimately enter into the study, it was decided to punch as much of the descriptive and statistical data as reasonably possible. As a result, cards were set up for Fatal, Permanent Total, Major and Minor Permanent Partial and Temporary Total injuries that would produce the tabulations outlined in Exhibits A-I through A-IV. Before proceeding with the transfer of the bulk of the data to punch cards, however, a series of preliminary tabulations based on the reportings of a large carrier revealed that the cards as designed — except for a few minor changes — would produce a wide variety of tabulations. It is estimated that data on approximately 100,000 compensable cases,

after being carefully audited and coded, were transferred to punch cards prior to tabulation.

B. **Fatal Tabulations:** The total number of reports included in the study of Death cases numbered 24,282, of which, there were 10,762 National Council and 13,520 Independent Rating Organization Case Reports. Preliminary tabulations established the following relationships:

Type of Dependency	*Percent of Total Cases*		
	Council	*Independents*	*Combined*
No Dependents	9.9%	12.7%	11.4%
Completely Dependent	83.0	75.8	79.0
Partially Dependent	2.4	0.4	1.4
Dependency Undetermined	4.7	11.1	8.2
Total	100.0%	100.0%	100.0%

Compensation benefits to "Partial Dependents" are usually contingent upon a variable degree of dependency. In this respect, the information contained in the small number of individual case reports involving "Partial Dependents" was, for the most part, incomplete and entirely inadequate for the purpose of determining a reliable average. Besides, the typical Workmen's Compensation Act allows benefits to "Partial Dependents" only if maximum benefits provided in the "Act" have not been exhausted by "Completely Dependent" cases and the inclusion or exclusion of these few cases from the distribution would produce a very negligible — if any — effect on the ultimate cost of insurance. As a result, it was decided to include the cases in this category with the "No Dependent" cases.

With regard to the group marked "Dependency Undetermined" (cases for which a reserve had been set up but for which a dependency status "may" or "may not" materialize), it was decided to exclude these cases from the study which, in effect, is equivalent to redistributing them proportionately over the original distribution. On the basis of the forementioned observations and conclusions, the final Death tabulations indicated that "No Dependent" cases constitute 13.9% and "Dependent" cases 86.1% of the Fatal distribution. Exhibit B-I shows the actual distribution of 24,282 Death cases before adjustment.

Having established the accident frequency according to the nature of dependency, the next phase of the study involved the determination of average ages representing the various dependency classes. In this respect it was decided to calculate the "arithmetic average age" and, in addition, a so-called "pension age" from punch card data which contained complete age information for the designated dependency classes. For Fatal computations involving a Workmen's Compensation act wherein the benefit provisions are limited to a specified duration

and/or subject to a maximum amount payable in the aggregate, it was decided that the determination of present values would be based on the "arithmetic average age" in accordance with established procedure. However, in order to properly value a compensation act which provides for benefit awards that are the equivalent of life annuities or which revises temporary awards to awards involving life benefits, it was decided to base present values on the "pension age."

The determination of the "arithmetic average age" followed the procedure commonly associated with statistical distributions. The "pension age," however, was determined so that the product of the total number of cases (appearing in Exhibits B-II and B-III) and the present value of a life pension at the "pension age" is equal to the summation of the present values of similar life pensions at the different ages included in the age distribution. With regard to the "pension age" involving widows or parents, the present values were taken from Special Bulletin 222, 1948, New York Workmen's Compensation Tables.

Due to the effect of remarriage in the tabular values of the tables involving widows, it was discovered that two entirely different ages could represent the "pension age" and yet produce similar results for computational purposes.

Exhibit B-IV shows both "pension ages" as a matter of interest, although it has been decided that the younger of the ages will be used for determining the value of a life benefit.

As for the "pension age" involving dependent parents, it will be noted (Exhibit B-IV) that the "arithmetic average age" is identical to the "pension age." Of course, the determination of the "pension age" for dependent children is, in effect, without meaning since the various compensation acts generally provide benefit payments — except for the infrequent occurrence of mental or physical incapacitation — to children until age eighteen or, as in a few isolated compensation acts, until age twenty-one. For the purpose of routine computations it was decided to use a single average age to represent dependencies of the same genus. It was felt, however, that the detailed age breakdown of Exhibit B-IV should be made available for calculations of a special nature.

Although it is not too important, since it concerns but a minute portion of the fatal distribution, it might be interesting to mention that the average age for "brothers and/or sisters" presented a peculiar problem. The average of the "American Accident Table" for this particular status of dependency indicated age "11." The new tabulations indicated a radical departure from the generally accepted notion that dependent brothers or sisters were necessarily juvenile. It was observed that for these cases, the average age of the brother or sister was approximately "43" years. Since this was the most striking departure from the average ages of the "American Accident Table," the age data for this group were studied in detail and in

conjunction with the age details of the corresponding deceased employee:

BROTHERS and/or SISTERS

No. of Cases	*Dependents*	*No. of Dependents*	*Average Age* *Dependent*	*Deceased*
2	1 Brother or Sister	2	17	22
2	1 Brother or Sister	2	28	44
1	1 Brother or Sister	1	34	18
7	1 Brother or Sister	7	44	51
10	1 Brother or Sister	10	52	64
13	1 Brother or Sister	13	64	53
5	1 Brother or Sister	5	74	66
3	2 Brothers or Sisters	6	11	23
2	3 Brothers or Sisters	6	17	Not Given
1	4 Brothers or Sisters	4	51	48
1	4 Brothers or Sisters	4	12	19
	Total and Average	60	43	48

It will be noted that the average age of the deceased employee is approximately "48" and, therefore, unlikely that the average age of the brother or sister would deviate radically from that of the deceased. As a possible explanation, it was offered that the dependent may be an unmarried sister or sisters acting in the capacity of housekeeper. Whatever the true explanation, it was decided to use the statistical indications.

C. **Permanent Total Tabulations:** The procurement of tabulations for Permanent Total disability did not present any particular problems worthy of special mention. The requirements of an accident table for routine Permanent Total calculations are relatively simple involving, merely, the total number of Permanent Total disability cases and a single representative average age. Inasmuch as most Permanent Total calculations are independent of the accident distribution, the requirements of an accident table, in effect, are further reduced to the determination of a single average age. However, in order to take care of the few calculations that require special treatment, it was decided to make available (Exhibit C-I) a detailed and summarized breakdown of Permanent Total cases.

While on the subject of "special" Permanent Total calculations, it will be noted that a few state compensation acts provide for benefit awards based on the existence and nature of dependency. In the past, when a Permanent Total calculation required a knowledge of dependency, it was assumed that the dependency distribution of "Fatal" injury was also applicable to Permanent Total disability. Since individual case reports, the original source of Permanent Total data, did

not contain any information relative to "dependency," it was decided to continue with established procedure. As a result, the "Workmen's Compensation Injury Table" as finally assembled in Exhibit F-II indicates that 86% of the Permanent Total accident distribution consists of dependent cases and, by inference, that cases involving a dependent wife comprise 34.2%; a dependent wife with one child 15.5%; a dependent wife with two children 11.7%; etc.

With regard to average ages, it was decided to determine an "arithmetic average age" and, as in fatal injury, to investigate the feasibility of using a "pension age". In this respect, the method of determination followed the procedure outlined for Fatal injury with the exception that averages were based on the age distribution shown in Exhibit C-II. The "arithmetic average age" and corresponding "pension age" were determined to be "age 50" and "age 52" respectively. The employment of either age for computational purposes, however complex, would not produce a significant difference. As a result, it was decided to employ the younger age for all types of Permanent Total valuations.

D. **Permanent Partial Tabulations.** A study of the survey form appended to the "Call for Accident Statistics" will reveal that the insurance carriers were requested to report, separately for Major and Minor Permanent Partial disability, the "Principal Basis of Award or Settlement" as related to the "Dismemberment Schedule", to "Permanent Total" (the body as a whole), or by "Lump Sum Settlement." The committee requested preliminary tabulations according to this breakdown before combining the data into a unified whole. But before proceeding along these lines, it was decided to dispose of a sizeable number of "multiple injury" cases; so-called because the cases involved injury to more than one bodily member and/or functional impairment of the body.

These "multiple injury" cases were treated in the following manner:

(1) For cases involving amputation and/or loss of use of two or more members of the body, anyone of which could constitute Major Permanent Partial disability, the percentages corresponding to the loss were accumulated separately, counting total dismemberment as 100% and partial loss of use at the reported percentage. Each 100% of the accumulated total for each member was tabulated as one case. This assumes that the compensation for partial loss or loss of use of a member will be the same proportion of the compensation for total loss, as partial loss bears to total loss; and also, that the compensation for injury to two members (not producing Permanent Total disability) will equal the sum of the compensation that would be paid separately for each member.

(2) Cases reported as Major Permanent Partial disability and which involved injury only to "minor" members were converted to terms of a "major" member before tabulation. For example, injury to several "fingers" or "toes" were converted into the equivalent

percentage of "hand" or "foot." The accumulation outlined in Paragraph (1) then followed the conversion of data.

(3) For cases involving injury to both "major" and "minor" members in the same accident, as for example, a "hand" and "fingers of the other hand," the injury to the "minor" members were translated to terms of the corresponding major member before "summation." In both (2) and (3), whenever necessary, loss of hearing in one ear was converted to loss of hearing in both ears.

(4) In cases involving injury to "major" members and also "general partial" disability expressed as a percent of total disability, the "major" members were treated by the summation procedure of Paragraph (1) but average partial disability was determined by dividing the summation of percentages by the actual number of cases.

(5) Minor Permanent Partial "multiple injury" cases received the same treatment as Major Permanent Partial "multiple injury" cases.

In order to perform the conversions required under Paragraphs (2) and (3), a comparison was made, state by state, of the Permanent Partial Schedule Awards for the different members. These comparisons are shown in Exhibits D-I and D-II where it will be observed that the data indicates the folowing relationships:

Thumb	35% of a hand
Index Finger	20% of a hand
Middle Finger	20% of a hand
Ring Finger	15% of a hand
Little Finger	10% of a hand
Hearing (one ear)	30% Hearing of both ears
Great Toe	25% of a foot
Other Toe	33⅓% of a Great Toe

Under Paragraph (2), a case reported as Major Permanent Partial involving 100% loss of a thumb, 100% loss of an index finger, 75% loss of a ring finger and 100% loss of a great toe was converted to the equivalent loss of a hand and foot, before applying the summation procedure mentioned in Paragraph (1).

For example:

$(100\% \times .35) + (100\% \times .20) + (75\% \times .15) = 66\%$ Hand
$(100\% \times .25) = 25\%$ Foot

Under Paragraph (3), a case involving 100% loss of a hand and 50% loss of an index finger on the other hand was converted to the loss of a hand:

For example:

$(50\% \times .20) + 100\% = 110\%$ Hand

The "multiple injury" cases after being expressed in terms of a single injury were included with other single injury data. The study then proceeded in accordance with the plan outlined in the opening paragraph of this section. Exhibits D-III and D-IV show the detailed distribution of Permanent Partial disability cases by "Basis of the Award or Settlement" according to the nature and extent of the injury.

An appreciable difference between the "American Accident Table" and the tabulations that underlie the "Workmen's Compensation Injury Table" appears in the Permanent Partial distributions. The "Accident Table" shows approximately 60% of the Major Permanent Partial and 75% of Minor Permanent Partial are dismemberment or enucleation cases; whereas, the "Injury Table" indicates that approximately 20% of the "Major" and about 15% of the "Minor" distributions are dismemberment or enucleation cases. The "Accident Table" does not include Permanent Partial cases other than those cases that are related to dismemberment; the "Injury Table" indicates that about 40% of the "Major" and 30% of the "Minor" cases are not related to the dismemberment schedule. The "Accident Table" provides for taking loss of use at a uniform 90% of the dismemberment cases; the new tables indicate varying percentages according to the nature of the injury. The new tabulations also show varying "Healing Period" durations. With regard to the duration of "Healing Period," the averages indicated in Exhibits D-III and D-IV were based solely on accident cases for which "Healing Periods" were reported in the "Call" and involve only the periods for which compensation benefits were actually paid.

Exhibit D-V shows the only available data regarding Major Permanent Partial disfigurement awards.

E. **Temporary Total Disability Tabulations:** Under the preceding sections of this paper, the frequency distributions primarily involve the "number" of compensable accidents. While the distributions of this section similarly deal with accident frequency, a knowledge of Temporary Total disability durations is of equal importance. The Workmen's Compensation Acts of the various states, with the single exception of Oregon, contain a "waiting period" provision that is especially applicable to injury cases of a Temporary Total nature. Assuming, for the purpose of illustration, that the "waiting period" is changed by legislative activity from "7" to "3" days. It is fairly obvious that injury cases which last "4", "5", "6" and exactly "7" days would qualify for compensation benefits on the basis of the amended provision. In order to measure the effect on "Cost" produced by the additional expected cases, it is necessary to resort to a frequency distribution expressed in terms of the duration of disability.

A survey of compensation acts revealed that the various states (Exhibit E-I) fell into distinct "waiting period" groups. This suggested grouping of states with similar "waiting periods" as shown in

Exhibit E-II. A glance at this exhibit indicates the shortest period to be "3" days. There is no information regarding the number of injuries lasting "1", "2" or "3" days and, in certain instances, limited information with regard to injuries lasting from "4" to "7" days. It was decided to derive the unknown data before proceeding with the study.

The first step towards solving this particular problem indicated the determination of those injuries lasting from "4" to "7" days from the known distributions and after having obtained this information to derive the number of injuries lasting "1", "2" and "3" days. In this respect several proposed methods were tested and, except for the procedures demonstrated in Exhibits E-III and E-IV, generally produced unreasonable results. The total number of cases with a duration of "4" to "7" days were filled in from data for states with "waiting periods" of less than "7" days on the basis of the ratios shown by the state data. The number of cases for durations of "1", "2" and "3" days were filled in by comparison of the ratios of the number of cases during 10 ensuing days from the new tabulations to the corresponding number of cases from the "American Accident Table." For example, the number of cases with durations from "4" to "13" days inclusive is available for both the new tabulations (as filled in per Exhibit E-III) and the "American Accident Table." This ratio was applied to the number of cases in the "American Accident Table" with "3" day's duration in order to determine the corresponding cases for the new tabulations. Using this figure, ratios for cases with "3" to "12" day's duration were applied to the "American Accident Table" cases with "2" days' duration, etc. This latter calculation is shown in Exhibit E-IV. As a matter of interest, Exhibit E-V shows a comparison of the resulting distribution with data from other sources.

Since the advent of the first statistician, there has existed a strong desire to smooth a reasonable volume of tabulated data. After filling the voids several attempts were made along these lines but the statistics stubbornly refused to blend with the mold. As a result, it was decided to abandon the "smoothing" notion. On further analysis, this decision was not without merit since a graphical picture of the raw data showed a heavy concentration of cases occurring at weekly intervals, probably reflecting the natural inclination of injured employees to "kill" the week. By not smoothing the raw data, this phenomenon was retained in the distribution.

The next step involved setting up "commutation columns" as shown in Exhibit E-VI in order to establish a table which would readily lend itself to computation. The mechanical operations involved in setting up this particular exhibit are briefly explained, as follows:

Column (1)—represents a listing of days of disability.

Column (2)—shows the number of cases lasting exactly "1" day, "2" days, etc.

Column (3)—is an accumulation upward of the data shown in Column (2).

Column (4)—is an accumulation upward of the data shown in Column (3). This accumulation corresponds to summing the products of Columns (1) and (2).

For an act which does not contain a "waiting period" provision, Line (1), Column (4) supposedly represents the hypothetical total days of disability. For an act which contemplates a "1 day waiting period," Line (2), Column (4) represents the corresponding total days of disability, i.e., since the figures 1,578,486 supposedly represent the total days of disability where there is no "waiting period" then the subtraction of "1" day for each case in the distribution or 68,944 days results in 1,509,542 total days disability; subtraction of another day for each remaining case in the distribution or 62,990 days produces 1,446,552 total days of disability which corresponds to a "2 day waiting period."

The last half of this exhibit shows the data grouped according to weekly periods as a matter of convenience. The figures shown were taken from the original tabulations which were based on "1" day intervals. Thus, for a "waiting period" provision of "42" days, an overly exaggerated example, one might expect 520,543 total days of disability; for a "49 day waiting period," one might expect 460,484 total days of disability; etc.

F. **The Workmen's Compensation Injury Table:** This table, so named in order to distinguish it from the "American Accident Table," actually consists of five independent industrial accident distributions that are broken down according to the individual characteristics which affect benefit cost, such as, dependency and age in Fatal, dependency and age in Permanent Total, loss of function or dismemberment in Major and Minor Permanent Partial and duration of disability in Temporary Total.

It was suggested on completing this statistical study that the five tables be integrated into one table by proportionately distributing the accident frequencies according to countrywide accident relativity based on Unit Statistical Plan Data. It was decided that this would be unwise since the tables then, conceivably, might be used for a purpose for which they were not primarily intended.

At about the time the statistical study entered its final phase, Ralph Marshall, Assistant Actuary at the National Council (who incidentally may be largely credited with bringing this long study to a successful conclusion), completed a separate "Medical Loss' study based on tabulations of Unit Statistical Plan Data. The results of this study, as illustrated in Exhibit F-VI, show the total medical in excess of various amounts per medical claim for states where the medical benefits provided by the Compensation Act are, in effect, unlimited with respect to both duration and amount. This additional exhibit is published, merely for the sake of completeness. Although the use is explained in Part III, the development of this table is beyond the scope of this paper.

Thus, the following tables, supplemented by additional data furnished in this paper, constitute the "Workmen's Compensation Injury Table"; these tables will be used whenever necessary for law valuations in lieu of the "American Accident Table":

EXHIBIT F-I FATAL DISABILITY

EXHIBIT F-II PERMANENT TOTAL DISABILITY

EXHIBIT F-III MAJOR PERMANENT PARTIAL DISABLITY

EXHIBIT F-IV MINOR PERMANENT PARTIAL DISABILITY

EXHIBIT F-V TEMPORARY TOTAL DISABILITY

EXHIBIT F-VI MEDICAL

EXHIBIT A-I
SCHEMATIC OUTLINE - FATAL INJURY

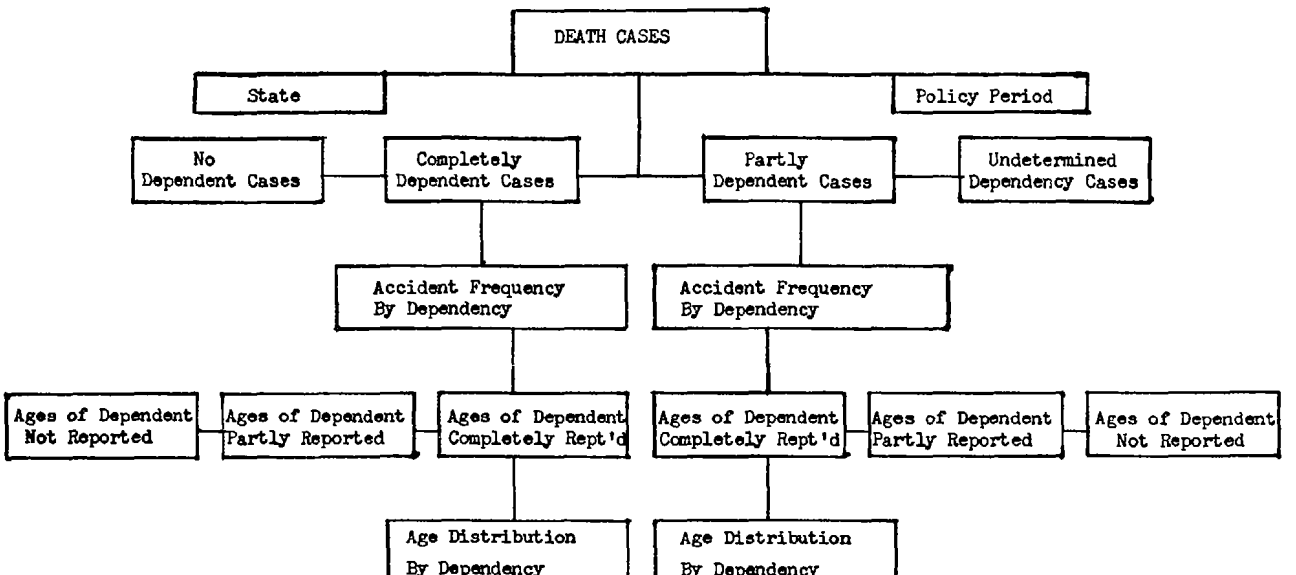

EXHIBIT A-II
SCHEMATIC OUTLINE - PERMANENT TOTAL INJURY

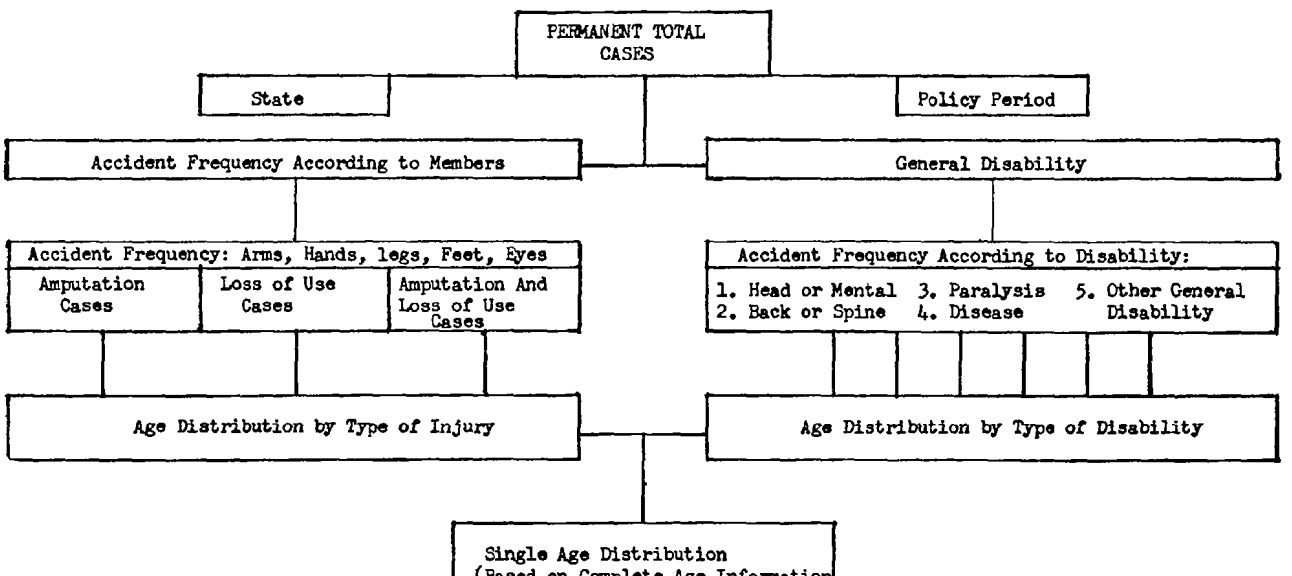

EXHIBIT A-III

SCHEMATIC OUTLINE - PERMANENT PARTIAL INJURY

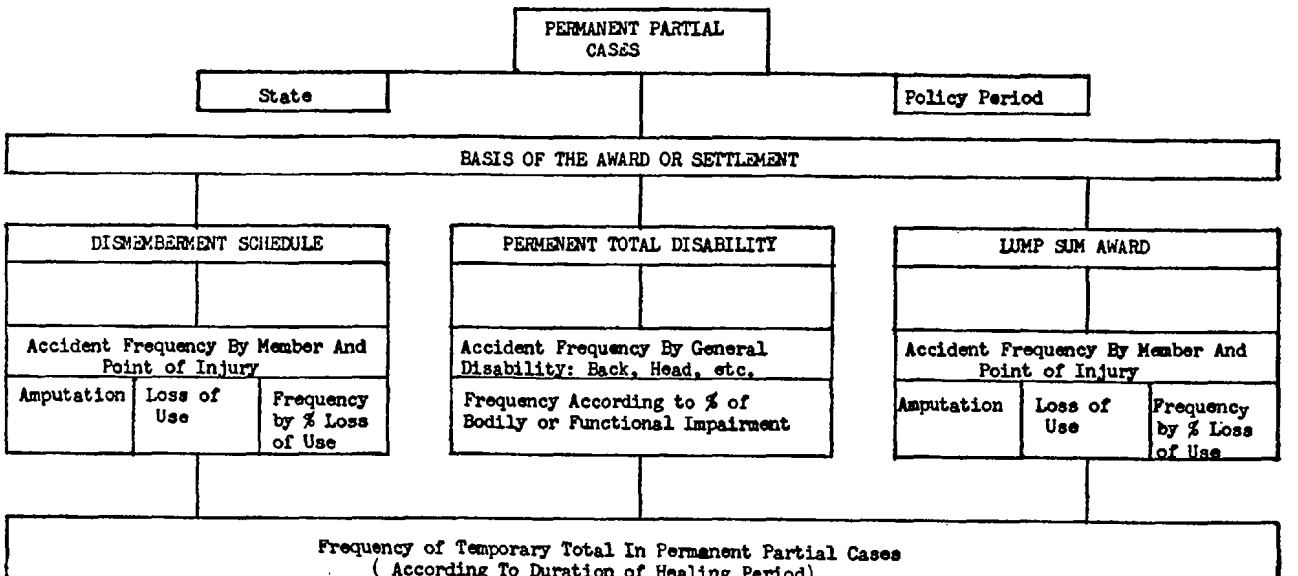

EXHIBIT A-IV

SCHEMATIC OUTLINE - TEMPORARY TOTAL INJURY

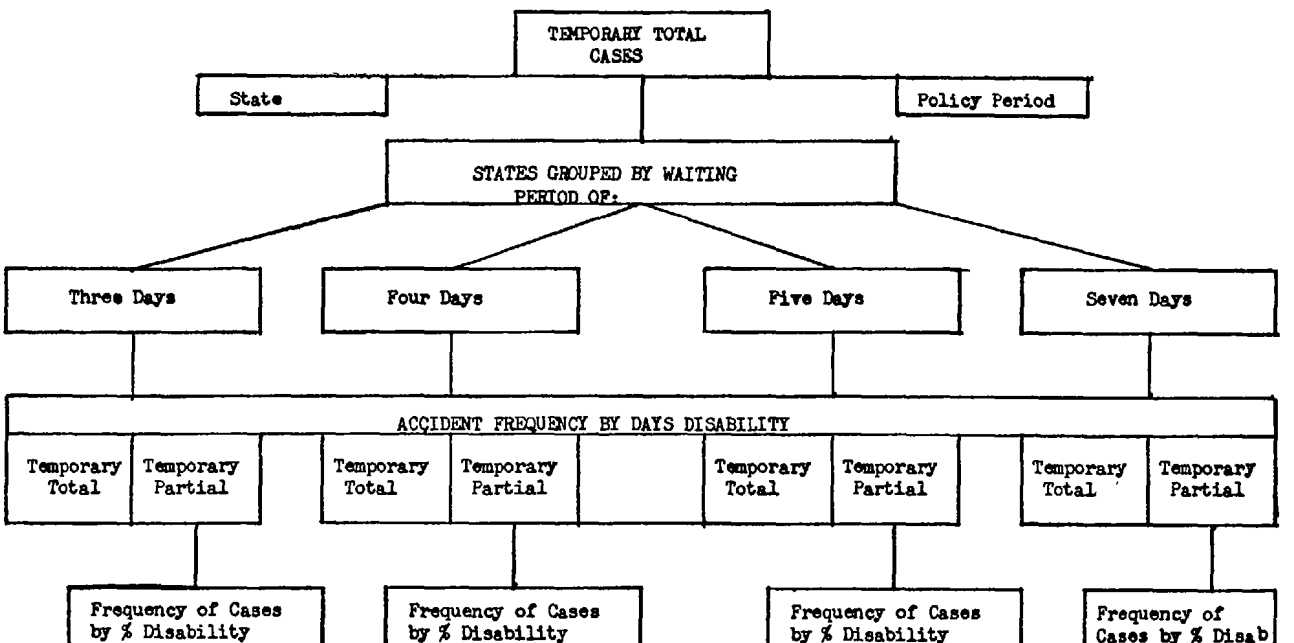

EXHIBIT B-I

Accident Frequency - Fatal Cases
(According to Dependency)

Actual Number Cases	Type of Dependency
320	Partial Dependents
2,777	No Dependents
7,620	Widow alone
3,453	Widow with one child
2,607	Widow with 2 children
1,426	Widow with 3 children
713	Widow with 4 children
290	Widow with 5 children
334	Widow with children (average 7)
401	One orphan
223	Two orphans
89	Three orphans
45	Four orphans
45	Orphans (average 5)
891	One parent
602	Two parents
89	One brother or sister
22	Two brothers or sisters
22	Brothers or sisters (average 4)
45	One parent and brother or sister
22	One parent and two brothers or sisters
45	One parent and brothers or sisters (average 4)
67	Two parents and brothers or sisters (average 2)
89	Widow and one parent
22	Widow and one other dependent
21	One other dependent
2,002	Undetermined Dependency
24,282	

NOTE: The above distribution excludes New Jersey and the monopolistic states where the Compensation business is written by "State Funds" i.e. Nevada, North Dakota, Ohio, Oregon, Washington, West Virginia and Wyoming. Included are Pennsylvania data obtained from P.C.A.S., Volume XXXII, page 157.

EXHIBIT B-II

Age Distributions of Widows - Fatal Disability

Age Group	(1) Widow Alone	(2) Widow With 1 Child	(3) Widow With 2 Children	(4) Widow With 3 Children	(5) Widow With 4 Children	(6) Widow With 5 Children	(7) Widow With More Than 5 Children	(8) Total Widow With Children
				Number of Cases				
15-19	84	101	19	2	xx	xx	xx	122
20-24	195	375	177	70	14	6	xx	642
25-29	225	319	342	180	86	31	25	983
30-34	216	271	360	217	94	53	49	1,044
35-39	254	259	285	185	112	48	58	947
40-44	416	273	201	118	62	37	43	734
45-49	544	231	135	53	36	9	14	478
50-54	777	166	79	33	6	5	xx	289
55-59	669	115	33	10	4	xx	xx	163
60-64	601	32	1	1	xx	xx	xx	34
65-69	347	8	1	xx	xx	xx	xx	9
70-74	137	2	xx	xx	xx	xx	xx	2
75-79	39	xx	xx	xx	xx	xx	xx	xx
80-84	6	xx	xx	xx	xx	xx	xx	xx
Total	4,510	2,152	1,633	869	414	189	189	5,446

As a matter of convenience, the above distributions have been grouped in five year intervals. However, the average ages shown in Exhibit B-IV were based on tabulations involving age intervals of one year.

EXHIBIT B-III

Age Distribution of Parent or Parents - Fatal Disability

Age Group	One Parent Case (Mother or Father)	Two Parent Cases		
		Mother	Father	Parents
30-34	3	2	1	3
35-39	11	10	4	14
40-44	32	27	23	50
45-49	52	27	19	46
50-54	46	28	30	58
55-59	74	33	34	67
60-64	65	25	29	54
65-69	65	19	13	32
70-74	53	8	14	22
75-79	33	3	11	14
80-84	30	2	6	8
Total	464	184	184	368

EXHIBIT B-IV

DISTRIBUTION OF AVERAGE AGES ACCORDING TO DEPENDENCY - FATAL DISABILITY

Dependency	No. Of Cases	Average Age Of Widow or Parent			AVERAGE AGE OF CHILDREN							
		Arith.	Pension		Oldest Child	2nd Child	3rd Child	4th Child	5th Child	6th Child	7th Child	8th Child	9th Child
WIDOW AND CHILDREN													
Widow alone	4,510	50	56	29									
Widow w/1 Child	2,152	36	55	30	9								
Widow w/2 children	1,633	35	54	31	10	6							
Widow w/3 children	869	35	53	32	11	8	5						
Widow w/4 children	414	35	52	33	12	10	7	4					
Widow w/5 children	189	35	51	33	13	11	9	6	3				
Widow w/6 children	95	35	51	33	14	12	10	8	5	2			
Widow w/7 children	61	37	50	34	15	13	11	9	7	4	1		
Widow w/8 children	23	38	48	36	16	14	12	10	8	6	3	0	
Widow w/9 children	10	37	48	37	17	15	13	11	9	7	6	2	0
ORPHANS													
1 orphan	272	-	-	-	12								
2 orphans	153	-	-	-	13	10							
3 orphans	73	-	-	-	14	11	8						
4 orphans	45	-	-	-	13	10	8	5					
5 orphans	-	-	-	-	-	-	-	-					
6 orphans	39	-	-	-	15	13	10	8	5	3			
PARENT OR PARENTS													
1 Parent	464	61	61										
2 Parents	368	56	56										
(a) Mother	184	55	55										
(b) Father	184	58	58										

EXHIBIT C-I

ACCIDENT DISTRIBUTION - PERMANENT TOTAL - DISABILITY
According to Injury

DETAILED BREAKDOWN

TYPE OF INJURY	NO. OF CASES
AMPUTATION CASES - AVE. AGE 40	
Arms	9
Hands	15
Legs	34
Feet	6
Eyes (enucleation)	6
Arm and Leg	9
Arm and Legs	1
Arm and Hand	2
Arm and Foot	2
Hand, Leg and Foot	1
Leg and Eye (enuleation)	1
TOTAL	86

TYPE OF INJURY	NO. OF CASES
LOSS OF USE CASES - AVE. AGE 45	
Arms	9
Hands	13
Legs	40
Feet	4
Eyes	58
Arm and Leg	14
Arm, Leg and Foot	1
Hand and Foot	3
Hand and Leg	3
Hand and Eye	2
Leg and Foot	5
Leg and Eye	1
Foot and Eye	1
Arm and Legs	1
Arm and Foot	1
Arm and Eyes	1
Arm and Legs	1
Total	158

AMPUTATION & LOSS OF USE - AVE. AGE 47	
Eye (enucleation) & Eye (Loss of Use)	5
Leg (Amputation) & Leg (Loss of Use)	7
Arm (Amputation) & Leg (Loss of Use)	2
Leg (Amputation) & Hand (Loss of Use)	1
Leg (Amputation) & Eyes (Loss of Use)	1
Foot (Amputation) & Hand (Loss of Use)	1
Leg (Amputation) & Arm (Loss of Use)	1
Total	18

OTHER PERMANENT TOTAL - AVE. AGE 51	
Head or Mental Impairment	263
Back or Spine	473
Paralysis	101
Occupational Disease	501
Not Classified and Other Cases	1300
Total	2638

DETAILED SUMMARY

AMPUTATION OR LOSS OF USE - AVE. AGE 50	
Arms	18
Hands	28
Legs	81
Feet	10
Eyes	69
Other Combinations (Bodily Members)	56
Other Permanent Total Case	2638
Total	2900

EXHIBIT C-II

AGE DISTRIBUTION - PERMANENT TOTAL DISABILITY

Age Group	No. of Cases	Age Group	No. of Cases
Under 15	2	50 a.u. 55	309
15 a.u. 20	45	55 a.u. 60	360
20 a.u. 25	110	60 a.u. 65	376
25 a.u. 30	137	65 a.u. 70	287
30 a.u. 35	177	70 a.u. 75	154
35 a.u. 40	251	75 a.u. 80	68
40 a.u. 45	237	80 a.u. 85	13
45 a.u. 50	309	Total	2835

NOTE: Age distribution taken from punch card data containing complete age information.

EXHIBIT D-I

PERMANENT PARTIAL DISABILITY

State	BASIS OF CONVERSION OF: "FINGERS" TO "HAND"							"TOES" AS PERCENT OF "FOOT"		
	Thumb	Index	Middle	Ring	Little	All	Hand	G.Toe	Other Toe	Foot
	SCHEDULED WEEKS OF INDEMNITY									
Ala.	60	45	30	20	15	170	150	30	10	125
Ark.	60	35	30	20	15	160	150	30	10	125
Col.	50	26	18	11	13	118	104	26	11	104
Conn.	75	48	38	25	20	206	208	38	13	156
Del.	60	35	30	20	15	160	200	30	10	150
D. C.	51	28	18	17	7	121	212	26	8	173
Fla.	60	35	30	20	15	160	175	30	10	175
Ga.	60	35	30	20	15	160	150	30	10	125
Hawaii	51	28	18	17	7	121	212	26	8	173
Ida.	70	40	40	30	20	200	200	30	12	125
Ill.	70	40	35	25	20	190	170	35	12	135
Ind.	60	40	35	30	20	185	200	60	10-30	150
Iowa	60	35	30	25	20	170	175	40	15	150
Kans.	60	37	30	20	15	162	150	30	10	125
Ky.	60	45	30	20	15	170	150	30	10	200
La.	50	30	20	20	20	140	150	20	10	125
Maine	50	30	25	18	15	138	125	25	10	125
Md.	50	30	25	20	15	140	166	25	10	150
Mich.	60	35	30	20	15	160	200	30	10	150
Minn.	60	35	30	20	15	160	188	35	10	140
Miss.	60	35	30	20	15	160	150	30	10	125
Mo.	58	43	33	33	19	186	168	40	14	150
Mont.	75	37	37	25	15	189	187	37	15	156
Nebr.	60	35	30	20	15	160	175	30	10	150
N. H.	40	25	20	15	10	110	140	20	8	120
N. J.	75	50	40	30	20	215	230	40	15	200
N. M.	50	25	20	15	12	122	105	30	12	100
N. Y.	75	46	30	25	15	191	244	38	16	205
N. C.	65	40	35	22	16	178	170	35	10	144
Okla.	60	35	30	20	15	160	200	30	10	150
Pa.	60	35	30	20	15	160	175	40	16	150
R. I.	60	36	26	20	18	160	199	30	10	150
S. C.	60	35	30	20	15	160	150	30	10	125
S. D.	50	35	30	20	15	150	150	30	10	125
Tenn.	60	35	30	20	15	160	150	30	10	125
Texas	60	45	30	21	15	171	150	30	10	125
Utah	60	30	30	20	12	152	150	30	12	125
Ut.	40	25	20	15	10	110	140	20	8	120
Va.	60	35	30	20	15	160	150	30	10	125
Total	2305	1394	1133	819	594	6245	6618	xx	xx	xx
Percent of All Fingers	36.9%	22.3%	18.1%	13.1%	9.5%	100.0%		By Inspection G.Toe = 25% Foot		
% Rounded	35	20	20	15	10	100.0		Other Toe = 1/3 G.Toe		

EXHIBIT D-II

PERMANENT PARTIAL DISABILITY

Basis of Conversion of "Hearing-One Ear" to "Hearing -Both Ears"

State	Scheduled Weeks Comp. 1 Ear (1)	Both Ears (2)	Ratio (2)÷(1) (3)
Alabama	-	150	-
Arizona	20	60	3.0
Arkansas	40	150	3.8
Colorado	35	139	4.0
Connecticut	52	156	3.0
Delaware	52	104	2.0
District of Columbia	52	200	3.8
Florida	40	150	3.8
Georgia	-	150	-
Hawaii	52	200	3.8
Idaho	35	150	4.3
Illinois	50	125	2.5
Indiana	75	200	2.7
Iowa	50	175	3.5
Kansas	25	100	4.0
Kentucky	75	-	-
Maine	25	65	2.6
Maryland	50	150	3.0
Minnesota	55	170	3.1
Mississippi	40	150	3.8
Missouri	44	168	3.8
Montana	25	150	6.0
Nebraska	50	100	2.0
New Hampshire	42	170	4.0
New Jersey	60	200	3.3
New Mexico	35	135	3.8
New York	60	150	2.5
North Carolina	70	150	2.1
Pennsylvania	-	150	-
Rhode Island	60	150	2.5
South Carolina	70	150	2.1
Tennessee	-	150	-
Texas	-	150	-
Vermont	42.5	170	4.0
Virginia	50	-	-
Wisconsin	(50)	(333 1/3)	-
		Unwtd Average	3.3
		Hearing One Ear 30% Both Ears	

EXHIBIT D - III

MAJOR PERMANENT PARTIAL DISABILITY

ACCIDENT DISTRIBUTION - AVERAGE PERCENT LOSS OF USE - AVERAGE HEALING PERIOD

Injured Member	Point & Nature of Injury	BASIS OF THE AWARD: Dism. Sched. No. Of Cases	Dism. Sched. % Loss	Related To P.T. No. Of Cases	Related To P.T. % Loss	Lump Sum Award No. Of Cases	Lump Sum Award % Loss	Total And Average No. Of Cases	Total And Average % Loss	(a) Healin Period (Wks.)
A. MAJOR MEMBERS (Schedule Injuries)										
Arm	Dism. at/above elbow	264	100	xx	xx	23	100	287	100	29
	Dism. below elbow	131	100	xx	xx	8	100	139	100	20
	Loss of Use	558	63	xx	xx	90	57	648	62	37
Hand	Dismemberment	518	100	xx	xx	42	100	560	100	21
	Loss of Use	894	69	xx	xx	106	56	1000	68	26
Leg	Dism. at/above knee	264	100	xx	xx	12	100	276	100	49
	Dism. below knee	106	100	xx	xx	8	100	114	100	49
	Loss of Use	500	63	xx	xx	135	59	635	62	51
Foot	Dismemberment	113	100	xx	xx	9	100	122	100	36
	Loss of Use	360	60	xx	xx	56	62	416	60	39
Eye	Enucleation	377	100	xx	xx	57	100	434	100	14
	Loss of Use	1007	97	xx	xx	111	92	1118	97	16
Hearing (Both Ears)		7	69	xx	xx	3	74	10	70	28
Total		5099	xx	xx	xx	660	xx	5759	xx	xx
B. OTHER MAJOR PERMANENT PARTIAL INJURIES (b)										
Head - Functional Loss		xx	xx	102	48	65	38	167	44	64
Back - " "		xx	xx	546	38	370	36	916	37	41
Hernia - " "		xx	xx	7	45	9	26	16	34	36
Other General "		xx	xx	1427	41	455	40	1882	41	42
Total & Average (Other P.P.)		xx	xx	2082	41	899	38	2981	40	43

(a) Based on durations for which compensation benefits were actually paid.
(b) Loss of function related to the body as a whole.

EXHIBIT D - IV

MINOR PERMANENT PARTIAL DISABILITY

ACCIDENT DISTRIBUTION - AVERAGE PERCENT LOSS OF USE - AVERAGE HEALING PERIOD

Injured Member	Point & Nature of Injury	BASIS OF THE AWARD: Dism. Sched. No. Of Cases	Dism. Sched. % Loss	Related To P.T. No. Of Cases	Related To P.T. % Loss	Lump Sum Award No. Of Cases	Lump Sum Award % Loss	Total And Average No. Of Cases	Total And Average % Loss	(a) Healin Period (Wks.)
A. MINOR MEMBERS (Schedule Injuries)										
Thumb	Dism. 1st Phalange	163	100	xx	xx	24	100	187	100	9
	Dism 2 Or more Phals.	79	100	xx	xx	12	100	91	100	11
	Loss of Use	1029	26	xx	xx	167	26	1196	26	7
Index	Dism. 1st Phalange	451	100	xx	xx	52	100	503	100	7
Finger	" 2 or more Phals.	345	100	xx	xx	51	100	396	100	12
	Loss of Use	1556	34	xx	xx	251	36	1807	34	6
Middle	Dism. 1st Phalange	402	100	xx	xx	60	100	462	100	6
Finger	" 2 or more Phals.	308	100	xx	xx	26	100	334	100	14
	Loss of Use	1261	31	xx	xx	221	30	1482	31	6
Ring	Dism. 1st Phalange	235	100	xx	xx	44	100	279	100	5
Finger	" 2 or more Phals.	198	100	xx	xx	28	100	226	100	10
	Loss of Use	942	32	xx	xx	134	33	1076	32	5
Little	Dism. 1st Phalange	154	100	xx	xx	29	100	183	100	5
Finger	" 2 or more Phals.	187	100	xx	xx	18	100	205	100	8
	Loss of Use	775	37	xx	xx	116	34	891	37	6
Great	Dism. 1st Phalange	23	100	xx	xx	1	100	24	100	9
Toe	" 2 or more Phals.	19	100	xx	xx	2	100	21	100	16
	Loss of Use	686	26	xx	xx	45	27	731	26	6
Other	Dismemberment	96	100	xx	xx	7	100	103	100	8
Toe (1)		373	32	xx	xx	31	38	404	32	7
Hearing (One Ear)		43	44	xx	xx	8	65	51	47	21
	Total	9328	xx	xx	xx	1327	xx	10652	xx	xx
B. MAJOR MEMBERS (Schedule Injuries)										
Arm	Loss of Use	1045	15	xx	xx	193	17	1238	15	16
Hand	Loss of Use	1541	16	xx	xx	279	17	1820	16	12
Leg	Loss of Use	1086	15	xx	xx	229	16	1315	15	21
Foot	Loss of Use	1129	15	xx	xx	246	15	1375	15	15
Eye	Loss of Use	276	19	xx	xx	79	21	355	19	10
Loss of Hearing (Both)		27	22	xx	xx	5	22	32	22	22
	Total	5104	xx	xx	xx	1031	xx	6135	xx	xx
C. OTHER PERMANENT PARTIAL INJURIES (b)										
Head - Functional Loss		xx	xx	171	5	66	9	237	6	14
Back - " "		xx	xx	980	8	435	12	1415	9	16
Hernia " "		xx	xx	66	7	129	6	195	6	11
Other General "		xx	xx	1082	7	407	10	1489	8	15
Total & Average (Other P.P.)		xx	xx	2299	7	1037	10	3336	8	15

(a) Based on durations for which compensation benefits were actually paid.
(b) Loss of function related to the body as a whole.

EXHIBIT D-V

MAJOR PERMANENT PARTIAL DISABILITY

Disfigurment Awards

State	Total Major P.P. Indemnity	Disfigurement Indem. Facial	Disfigurement Indem. Bodily	Percent of Major Ind Facial	Percent of Major Ind Bodily
South Carolina	501,093	17,903	83,965	3.6%	16.8%
Delaware	82,096	2,500	(a)	3.0	(a)
New York	8,554,395	77,160	(a)	0.9	(a)
Dist. of Col.	405,560	3,000	(a)	0.7	(a)
Pennsylvania	1,154,425	7,775	(a)	0.7	(a)
Virginia	370,230	2,097	(a)	0.6	(a)
Maryland	767,102	2,566	800	0.3	0.1
Massachusetts	1,628,300	0	2,485	-	0.2
Texas	2,781,619	1,100	4,602	-	0.2
All Other States			less than	0.1	0.1
Total (Facial)	35,266,477	125,919	xx	0.4%	xx
Total (Bodily)	21,977,112	xx	94,331	xx	0.4%

(a) No specific provision for bodily disfigurement.

EXHIBIT E-I

TEMPORARY TOTAL DISABILITY

Tabulation Of States According To Waiting Period

7 Day Waiting Period:	Alabama	Idaho	Massachusetts	New York
	Arizona	Illinois	Michigan	North Carolina
	Arkansas	Indiana	Minnesota	Pennsylvania
	California	Iowa	Montana	South Carolina
	Colorado	Kansas	Nebraska	South Dakota
	Connecticut	Kentucky	New Hampshire	Tennessee
	Dist. of Columbia	Louisiana	New Jersey	Texas
	Georgia	Maine	New Mexico	Vermont
		Virginia		
5 Day Waiting Period:	Hawaii	Mississippi		Oklahoma
4 Day Waiting Period:	Florida			
3 Day Waiting Period:	Alaska	Maryland	Rhode Island	Wisconsin
	Delaware	Missouri	Utah	

EXHIBIT E-II

TEMPORARY TOTAL ACCIDENT DISTRIBUTION

ACCORDING TO DURATION OF DISABILITY

Disability (x) Period		(1)	(2)	(3)	(4)	(5)
		Number Of Cases Lasting (x) Period				
Weeks	Days	7 Day W.P.	5 Day W.P.	4 Day W.P.	3 Day W.P.	Total Cases
0	0	.	.	.	.	.
	1	.	.	.	No	.
	2	.	No	No	Data	.
	3	No	Data	Data	.	Ltd. Data
	4	Data	.	.	450	or
	5	.	.	133	425	No Data
	6	.	71	79	323	.
1	0	.	80	109	296	.
	1	1605	61	88	257	2011
	2	1528	57	77	257	1919
	3	1531	63	54	320	1968
	4	1373	50	136	237	1796
	5	1178	58	63	196	1495
	6	1021	28	45	105	1199
2	0	2017	75	65	200	2357
	1	896	33	51	143	1123
	2	894	22	36	115	1067
	3	895	28	22	161	1106
	4	762	22	67	110	961
	5	657	26	34	103	820
	6	555	19	21	53	648
3wks. and under 4 wks		3761	100	130	493	4484
4 " " 5 "		2914	64	86	302	3366
5 " " 6 "		1953	44	65	235	2302
6 " " 7 "		1760	46	104	181	2091
7 " " 8 "		1290	30	42	157	1519
8 " " 9 "		1185	24	29	103	1341
9 " " 10 "		754	14	14	72	854
10 " " 15 "		1897	56	41	182	2176
15 " " 20 "		702	24	10	62	798
20 " " 25 "		357	13	8	23	401
25 " " 30 "		220	6	3	22	251
30 " " 35 "		152	2	6	8	168
35 " " 40 "		84	5	1	7	97
40 " " 45 "		46	1	2	6	55
45 " " 50 "		51	1	0	2	54
50 " " 60 "		53	2	2	2	59
60 " " 70 "		44	0	2	4	50
70 " " 80 "		28	1	0	1	30
80 " " 90 "		26	0	0	3	29
90 " " 100 "		14	0	1	0	15
100 wks and over		53	3	2	2	60
Number of cases over 7 days		32261	978	1307	4124	38670

EXHIBIT B-III

TEMPORARY TOTAL DISABILITY

Number of Cases with Duration of 4, 5, 6, and 7 Days

(1) Period Of Disability In Days (x)	(2) Number of Cases of Duration of (x) Days From States With 3 Day Waiting Period	(3) 4 Day Waiting Period	(4) 5 Day Waiting Period	(5) 7 Day Waiting Period	(6) All States
1					
2					
3					
4	450	(143)	(107)	(3520)	(4220)
5	425	133	(100)	(3314)	(3972)
6	323	79	71	(2381)	(2854)
7	296	109	80	(2441)	(2926)
Over 7	4124	1307	978	32261	38670

(7) Duration (x)	(8) No.of Cases Duration (x) (2)+(3)+(4)	(9) No.of Cases Over 7 Days (2)+(3)+(4)	(10) Ratio (8)÷(9)	(11) No.of Cases Over 7 Days (As Indicated)		(12) No.of Cases Duration (x) (11) x (10)
7 Days	485	6409	.07567	(Col.5)	32261	2441
6 Days	473	6409	.07380	"	32261	2381
5 Days	558*	5431*	.10274	"	32261	3314
"	"	"	.10274	(Col.4)	978	100
4 Days	450†	4124†	.10912	(Col.5)	32261	3520
"	"	"	.10912	(Col.4)	978	107
"	"	"	.10912	(Col.3)	1307	143

*Col. (2) + (3)
†Col. (2) Only

EXHIBIT E - IV

TEMPORARY TOTAL DISABILITY

Number of Cases with 1, 2 and 3 Days Duration

(1) Period Of Disability In Days	(2) Present American Accident Table	(3) New Tabulations	(4) Ratio (3) ÷ (2)
1	8823	(5954)*	.67485
2	8086	(5450)*	.67404
3	7282	(4898)*	.67267
4	6014	(4220)	.702
5	5255	(3972)	.756
6	4606	(2854)	.620
7	4817	(2926)	.607
8	3090	2011	.651
9	3074	1919	.624
10	2740	1968	.718
11	2475	1796	.726
12	2275	1495	.657
13	1868	1199	.642
14	2190	2357	1.076
Over 14	32793	25925	.791
TOTAL	95388	68944	.723

*Based on 10 Ensuing Days

Σ 2-11	47439	32014	.67485
Σ 3-12	41628	28059	.67404
Σ 4-13	36214	24360	.67267

EXHIBIT E - V

TEMPORARY TOTAL DISABILITY

COMPARISON OF NEW DISTRIBUTION WITH OTHER DATA

Period of Disability (x) Days	Percent Of Total Cases Where Disability Did Not Extend Beyond (x) Days			
			Accident and Health Data*	
	New Tabulations	Am.Acc.Table	Male	Female
1	8.6%	9.3%	2.7%	3.3%
2	16.5	17.7	7.8	9.0
3	23.7	25.4	14.0	15.3
4	29.8	31.7	19.9	21.0
5	35.5	37.2	24.4	25.2
6	39.7	42.0	27.8	28.4
7	43.9	47.1	40.5	39.3
8	46.8	50.3	44.3	42.7
9	49.6	53.5	47.4	45.6
10	52.5	56.4	51.1	49.0
11	55.1	59.0	53.4	51.2
12	57.2	61.4	55.2	53.1
13	59.0	63.3	56.7	54.6
14	62.4	65.6	66.2	62.4
15	64.0	67.7	68.0	64.0
16	65.6	69.6	69.6	65.4
17	67.2	71.4	70.8	66.7
18	68.6	73.1	71.9	67.9
19	69.8	74.5	72.7	68.7
20	70.7	75.9	73.5	69.4
21	72.7	77.1	76.7	72.4

*Source: Accident and Health distribution published by the Bureau of Accident and Health Underwriters for the years 1931 through 1940 - No "Waiting period" data.

EXHIBIT E - VI

Commutation Columns				Temporary Total Disability			
(1) Duration (Days)	(2) No.Of Cases	(3) Summa. Of (2) Upward	(4) Days Disability Lasting Col.(1) And Over	(1) Duration (Days)	(2) No.Of Cases	(3) Summa. Of (2) Upward	(4) Days Disability Lasting Col.(1) And Over
1	(5954)	68944	1,578,486	43 - 49	1861	9334	520,543-468,411
2	(5450)	62990	1,509,542	50 - 56	1552	7473	460,484-418,447
3	(4898)	57540	1,446,552	57 - 63	1134	5921	412,009-378,857
4	(4220)	52642	1,389,012	64 - 70	779	4787	373,760-346,549
5	(3972)	48422	1,336,370	71 - 77	555	4008	342,306-319,261
6	(2854)	44450	1,287,948	78 - 84	500	3453	315,670-295,839
7	2926	41596	1,243,498	85 - 91	355	2953	292,700-275,656
8	2011	38670	1,201,902	92 - 98	344	2598	272,963-258,018
9	1919	36659	1,163,232	99 - 105	262	2254	255,652-242,639
10	1968	34740	1,126,573	106 - 112	207	1992	240,572-228,992
11	1796	32772	1,091,833	113 - 119	176	1785	227,137-216,759
12	1495	30976	1,059,061	120 - 126	148	1609	215,091-205,708
13	1199	29481	1,028,085	127 - 133	130	1461	204,197-195,681
14	2357	28282	998,604	134 - 140	120	1331	194,311-186,481
15	1123	25925	970,322	141 - 147	103	1211	185,212-178,117
16	1067	24802	944,397	148 - 154	80	1108	176,974-170,487
17	1106	23735	919,595	155 - 161	70	1028	169,434-163,393
18	961	22629	895,860	162 - 168	64	958	162,410-156,753
19	820	21668	873,231	169 - 175	52	894	155,830-150,537
20	648	20848	851,563	176 - 182	61	842	149,669-144,710
21	1365	20200	830,715	183 - 189	46	781	143,906-139,313
22	570	18835	810,515	190 - 196	55	735	138,566-134,241
23	627	18265	791,680	197 - 203	38	680	133,541-129,526
24	566	17638	773,415	204 - 210	42	642	128,875-125,107
25	528	17072	755,777	211 - 217	33	600	124,490-120,933
26	459	16544	738,705	218 - 224	44	567	120,348-117,037
27	369	16085	722,161	225 - 231	23	523	116,501-113,403
28	1028	15716	706,076				
29	403	14688	690,360	232 - 266	121	500	112,897- 98,060
30	470	14285	675,672	267 - 301	67	379	97,675- 86,058
31	407	13815	661,387	302 - 336	54	312	85,742- 75,896
32	436	13408	647,572	337 - 371	50	258	75,632- 67,626
33	378	12972	634,164	372 - 406	22	208	67,414- 60,679
34	244	12594	621,192	407 - 441	19	186	60,491- 34,380
35	686	12350	608,598	442 - 476	24	167	54,211- 48,903
36	286	11664	596,248	477 - 511	24	143	48,760- 44,264
37	282	11378	584,584				
38	334	11096	573,206	512 - 581	24	119	44,144- 36,693
39	258	10762	562,110	582 - 651	27	95	36,597- 31,127
40	251	10504	551,348	652 & Over	-	68	31,059- xx
41	205	10253	540,844				
42	714	10048	530,591				

EXHIBIT F-I
WORKMEN'S COMPENSATION INJURY TABLE
FATAL DISABILITY

No. of Cases* 1000	Person Receiving Compensation	No. of Dependents	Average Age Arithmetic	Average Age Pension
139	None	0	xx	xx
342	Widow Alone	1	50	29
155	Widow and	1	35	31
	Child	1	8	-
117	Widow and	1	35	31
	Children	2	8	-
64	Widow and	1	35	31
	Children	3	8	-
32	Widow and	1	35	31
	Children	4	8	-
13	Widow and	1	35	31
	Children	5	8	-
15	Widow and	1	35	31
	Children (More than 5)	7 (Ave.)	8	-
18	Orphan	1	11	-
10	Orphans	2	11	-
4	Orphans	3	11	-
2	Orphans	4	11	-
2	Orphans (more than 4)	5 (Ave.)	11	-
40	Parent	1	61	61
27	Parents	2	56	56
4	Brother or Sister	1	43	43
1	Brothers or Sisters	2	43	43
1	Brothers or Sisters	4 (Ave.)	43	43
2	Parent and	1	51	51
	Brother or Sister	1	13	-
1	Parent and	1	51	51
	Brothers or Sisters	2	13	-
2	Parent and	1	51	51
	Brothers or Sisters	4 (Ave.)	13	-
3	Parents and	2	51	51
	Brothers or Sisters	2 (Ave.)	13	-
4	Widow and	1	39	29
	Parent	1	61	61
1	Widow and	1	50	29
	Other Dependent	1	43	43
1	Other Dependents	1 (Ave.)	61	61

* 24,282 Fatal cases included in the original study. 2002 "Undetermined Dependency" cases were excluded before proportionally reducing the remaining cases to 1000 for valuation purposes.

EXHIBIT F-II
WORKMEN'S COMPENSATION INJURY TABLE
PERMANENT TOTAL DISABILITY

No. of Cases*	Dependency Distribution	Average Age Arithmetic	Pension
100			
14	Injured (No Dependents)	50	50
86	Injured (With Dependents)	50	50

* 2900 Permanent Total cases included in the original study. Number of cases reduced proportionally to 100 for computation purposes.

EXHIBIT F-III
WORKMEN'S COMPENSATION INJURY TABLE
MAJOR PERMANENT PARTIAL DISABILITY

Member	Injury - Type and Point	No. of Cases*	Average Percent Loss of Use	Average Healing Period (weeks)
Arm	Dismemberment, at or above elbow	33	xx	29
	Dismemberment, below elbow	16	xx	20
	Loss of Use	74	62%	37
Hand	Dismemberment	64	xx	21
	Loss of Use	114	68%	26
Leg	Dismemberment, at or above knee	32	xx	49
	Dismemberment, below knee	13	xx	49
	Loss of Use	73	62%	51
Foot	Dismemberment	14	xx	36
	Loss of Use	48	60%	39
Eye	Enucleation	50	xx	14
	Loss of Use	127	97%	16
Loss of Hearing (Both Ears)		1	70%	28
Other Major Perm. Partial		341	40%**	43
Total Major Perm. Partial		1000	xx	35

* 8,740 cases included in the original study. Number of cases reduced proportionally to 1,000 for valuation purposes.
** Indicates Percent of Permanent Total (Body as a whole) or loss of earning power.

EXHIBIT F - IV
WORKMEN'S COMPENSATION INJURY TABLE
MINOR PERMANENT PARTIAL DISABILITY

Member	Injury - Type and Point	No.Of Cases*	Average Percent Loss Of Use	Average Healing Period (Weeks)
	A. Minor Members			
Thumb	Dismemberment, 1st Phalange	18	xx	9
	Dismemberment, 2 or more Phalanges	9	xx	11
	Loss of Use	112	26%	7
Index Finger	Dismemberment, 1st Phalange	47	xx	7
	Dismemberment, 2 or more Phalanges	37	xx	12
	Loss of Use	170	34%	6
Middle Finger	Dismemberment, 1st Phalange	43	xx	6
	Dismemberment, 2 or more Phalanges	31	xx	14
	Loss of Use	139	31%	6
Ring Finger	Dismemberment, 1st Phalange	26	xx	5
	Dismemberment, 2 or more Phalanges	21	xx	10
	Loss of Use	101	32%	5
Little Finger	Dismemberment, 1st Phalange	17	xx	5
	Dismemberment, 2 or more Phalanges	19	xx	8
	Loss of Use	84	37%	6
Great Toe	Dismemberment, 1st Phalange	2	xx	9
	Dismemberment, 2 or more Phalanges	2	xx	16
	Loss of Use	69	26%	6
Other Toe	Dismemberment	10	xx	8
	Loss of Use	38	32%	7
Loss of Hearing (one Ear)		5	47%	21
Total Minor Members		1000	xx	7
	B. Major Members			
Arm	Loss of Use	116	15%	16
Hand	Loss of Use	171	16	12
Leg	Loss of Use	123	15	21
Foot	Loss of Use	129	15	15
Eye	Loss of Use	33	19	10
Hearing	Loss of Hearing (Both Ears)	3	22	22
Total Major Members		575	xx	15
Other Minor Perm. Partial		313	8%**	15
Total Minor Perm. Partial		1888	xx	12

*20,123 Minor Permanent Partial Cases included in the original study, consisting of 10,652 cases involving loss or loss of use of "fingers" or "toes"; 6,135 involving loss of use of arms, legs, etc.; and 3,336 cases of "general disability" related to Permanent Total disability. Number of Cases reduced proportionally to produce 1,000 cases involving fingers and toes, 575 cases involving arms, legs, etc.; and 313 cases relates to Permanent Total.

**Indicates Percent of Permanent Total (Body as a whole) or loss of earning power.

EXHIBIT F-V
WORKMEN'S COMPENSATION INJURY TABLE
TEMPORARY TOTAL DISABILITY

(1) Duration (Days)	(2) No.Of Cases	(3) Summa. Of (2) Upward	(4) Total Disability (Days)	(1) Duration (Days)	(2) No.Of Cases	(3) Summa. Of (2) Upward	(4) Total Disabili (Days)
1	5954	68944	1,578,486	36	286	11664	596,248
2	5450	62990	1,509,542	37	282	11378	584,584
3	4898	57540	1,446,552	38	334	11096	573,206
4	4220	52642	1,389,012	39	258	10762	562,110
5	3972	48422	1,336,370	40	251	10504	551,348
6	2854	44450	1,287,948	41	205	10253	540,844
7	2926	41596	1,243,498	42	714	10048	530,591
8	2011	38670	1,201,902	43	272	9334	520,543
9	1919	36659	1,163,232	44	271	9062	511,209
10	1968	34740	1,126,573	45	250	8791	502,147
11	1796	32772	1,091,833	46	259	8541	493,356
12	1495	30976	1,059,061	47	190	8282	484,815
13	1199	29481	1,028,085	48	135	8092	476,533
14	2357	28282	998,604	49	484	7957	468,441
15	1123	25925	970,322	50	190	7473	460,484
16	1067	24802	944,397	51	181	7283	453,011
17	1106	23735	919,595	52	206	7102	445,728
18	961	22629	895,860	53	174	6896	438,626
19	820	21668	873,231	54	161	6722	431,730
20	648	20848	851,563	55	123	6561	425,008
21	1365	20200	830,715	56	517	6438	418,447
22	570	18835	810,515	57	151	5921	412,009
23	627	18265	791,680	58	162	5770	406,088
24	566	17638	773,415	59	192	5608	400,318
25	528	17072	755,777	60	149	5416	394,710
26	459	16544	738,705	61	97	5267	389,294
27	369	16085	722,161	62	73	5170	384,027
28	1028	15716	706,076	63	310	5097	378,857
29	403	14688	690,360	64	82	4787	373,760
30	470	14285	675,672	65	136	4705	368,973
31	407	13815	661,387	66	97	4569	364,268
32	436	13408	647,572	67	93	4472	359,699
33	378	12972	634,164	68	80	4379	355,227
34	244	12594	621,192	69	56	4299	350,848
35	686	12350	608,598	70	235	4243	346,549
				etc.	etc.	etc.	etc.

EXHIBIT F-VI
DISTRIBUTION OF MEDICAL LOSSES BY SIZE

Medical Loss Per Claim (1)	Percent of Total Medical in Excess of (1) (2)
0	100.0%
100	45.0
200	33.3
300	27.5
400	23.3
500	20.1
600	17.9
700	16.0
800	14.5
900	13.2
1,000	12.0
1,500	8.5
2,000	6.3
2,500	5.0
3,000	4.2
4,000	3.2
5,000	2.6
10,000	1.5
15,000	0.9
25,000	0.6

Note: Based on Unit Statistical Plan Data filed with the National Council for the states of Connecticut, Illinois, Maryland, Nebraska, South Carolina and New York.

PART II — DEVELOPMENT OF THE NEW STANDARD WAGE DISTRIBUTION TABLE

A. Statistical Background: When the joint study was inaugurated by Committees of the NAIC and the National Council on Compensation Insurance with respect to the accident distribution of industrial injuries (Part I), it was agreed to undertake the re-examination of wage distributions upon completion of the accident study. In conformity with this understanding, the Actuarial Committee, after consultation and agreement with the Subcommittee of Departmental Technicians of the NAIC, circulated a "Special Call for Wage Data" (reproduced as Appendix "C") among the carriers for the purpose of assembling the data necessary to complete the wage study. In addition, the National Council solicited the cooperation of the various Independent Bureaus to report data accumulated by carriers who were not members or subscribers of the National Council. It was expected that the "Call" would furnish over 150,000 cases. Actually, 185,384 cases were reported involving forty states, the District of Columbia and the territory of Hawaii. The study was based solely on insurance company statistics, as wage data for the seven "Monopolistic State Fund" jurisdictions, i.e., Nevada, North Dakota, Ohio, Oregon, Washington, West Virginia and Wyoming were not available.

B. Wage Data Tabulations: A glance at the intructions contained in the "Special Call" (Appendix "C") will reveal that, among other things, the carriers were requested to report data according to certain specified wage groups:

(a) Under $10 per week (one group)

(b) At $1.00 intervals up to $200 per week

(c) At $10.00 intervals above $200 per week

(d) Cases above the maximum weekly effective Wage where the exact wage cannot be determined to be reported en-bloc, giving the number only.*

*In explanation, it is known that for some compensation cases where the weekly wage is sufficient to ensure the payment of the maximum weekly compensation, the claim file does not include the exact weekly earnings. The Call requested the carriers to make every effort to secure the wage in such cases, but, if it was not possible to obtain this information, to report only the number of such cases. As a result, it was decided to tabulate the wage data in accordance with this outline for each state. As the tabulations became available the number of cases reported in group (d) were distributed among the number of cases with average wages in excess of the "maximum effective wage." The "maximum effective wage" is defined as the wage which, multiplied by the percentage compensation rate produces the maximum weekly compensation benefit specified by the Act. For example,

with a 66⅔% compensation rate and a $30 maximum weekly statutory amount, the "maximum effective wage" is equal to $45 (66⅔% × $45 = $30). The distribution of these indeterminate wage cases was performed for each state on a pro-rata basis. For the assumption made above, if we had 600 cases earning over $45 per week where the wage was reported and 18 cases reported with no wage given, the number of cases in each wage bracket above $45 would be increased 3% (18 ÷ 600); the number of cases earning less than $45 per week would be unaffected since it is known that the 18 cases earn in excess of $45 per week. From Exhibit I, it is noted that the total number of cases falling into this particular category constitute approximately 2% of the total distribution. Also shown in this exhibit are the "maximum effective wages" and the average weekly wages which underlie the adjusted state distributions. With respect to this latter item, it will be noted that the average wages thus determined line up fairly well with the average wages derived from another source (i.e.: the Semi-Annual Call for Wage Data) indicating, in a broad sense, that the wage data could be considered representative.

The next phase of the study centered about the possibility of combining individual state data with the ultimate purpose of establishing a single countrywide wage distribution. An examination of the data, state by state, showed essentially the same pattern, suggesting that the data for the various states could be combined. The direct combination of data, however, was not immediately possible since a distribution obtained by combining the data for a state with a $50 average wage with the data for a state with a $60 average wage would be meaningless. However, if the data for each state are transformed so as to express the different wage brackets in terms of the ratio to the state average wage and the number of cases reported (after assignment of the indeterminate wage cases) in each wage bracket in terms of the ratio to the total number of cases, a much better comparison can be made of the data for each state; it is also perfectly valid to combine data in this form. This transformation was made and resulted in a wage distribution for each state (Exhibit II) in the following form:

Col. (1) *Ratio Actual Wage To Average Wage*	Col. (2) *Percent of Total Number of Cases Earning Wage Equal to or Less Than Col.* (1)
10%	—
15	—
20	—

Comparison of results state by state expressed as above showed

essentially the same distribution about the state average wage. These results are summarized in Exhibit III. This exhibit has been limited to only eleven different actual wage sizes for ease in review but the figures for the other wage sizes show a similar agreement. Exhibit III shows for example that in Connecticut 7.85% of the cases earned a wage equal to or *less than* 55% of the average wage; 18.02% of workers earned a wage equal to or *less than* 70% of the average wage, etc. This is a cumulative distribution, i.e., the 18.02% of cases earning 70% or less of the average wage include the 7.85% of cases earning up to 55% of the wage, etc. This exhibit shows that 52.26% of all workers earn the average wage or less in Connecticut, 59.82% of all workers earn the average wage or less in Delaware, etc. The country-wide average shown by this latest study is 56.61% as compared with 57.76% in the old distribution.

A similar cumulative distribution of the wages reported in the Call is given in Exhibit IV. Here again the actual wage is expressed in terms of its ratio to the state average wage. The cumulative amount of wages paid is expressed in the form of index numbers, the total wage for all workers being given the index 10,000. This is in accordance with the procedure followed in the present wage distribution (See the May 27, 1953 Report to the NAIC re: Valuation of Law Amendments — American Accident Table for details of the calculation of limit factors). In discussing this exhibit it is more convenient to translate these index numbers to percentages by pointing off two places; thus an index of 350 is equivalent to 3.50%, an index of 1004 is equivalent to 10.04%, etc. Thus, Exhibit IV shows that 39.63% (index=3963) of the total wages in Connecticut are earned by workers earning the average weekly wage or less. The corresponding figure for Delaware is 43.23%, 43.50% for the District of Columbia, etc., with a countrywide average of 41.69% for the new distribution as compared with 44.27% for the old distribution.

A summary of the results shown in Exhibits III and IV is given in more complete detail in Exhibit V. This exhibit shows the countrywide "overall" average and also sectional averages (East, Central, West and South) as compared to the present distributions of employees and cumulative payrolls. In deriving the sectional and countrywide averages, the distributions for each state were assumed to be equally valid and were given equal weight.

From a review of the similarity of distribution of number of employees and wages earned when expressed in terms of percent of the average wage and percent of employees (or total wages), as shown in Exhibits II, III, IV and V, it is evident that a single countrywide distribution can be used for calculating the effect of a law amendment in any state. As an illustration of this conclusion, the effect on compensation costs of various amendments affecting the percentage rate of compensation and/or the amount of maximum weekly compensation were calculated, using:

(a) The new average countrywide distribution.

(b) Single state distributions for two states with the greatest departures from the average distribution. State #1 is a state with a large concentration of workers at the lower end of the wage scale, and State #2 is a state with a large concentration of workers at the upper end of the wage scale.

(c) The present wage distribution for purposes of comparison.

The amendments assumed and the corresponding law amendment factors are shown in Exhibit VI. The effect of these amendments were calculated in accordance with the standard procedure. It should be noted that the results obtained from the various wage distributions depend upon the type of amendment. For an amendment increasing the percentage compensation rate but not changing the maximum weekly compensation, it would be expected that the distribution showing the greatest concentration of cases at the lower end of the wage scale would show the greatest effect. In such a state the full percentage increase would be realized on more cases than in a state with a concentration of cases at the upper end of the wage scale where the maximum weekly compensation would be the governing element. This is borne out by the results for the first four assumptions, where the distribution for State #1 gives the largest amendment factors. Conversely, for an amendment increasing the maximum weekly compensation, the distribution with the concentration of cases at the upper end of the wage scale would show the greatest effect. This is illustrated by the results shown for State #2 for the 2nd and 3rd group of assumed law amendments in Exhibit VI. For an amendment increasing both the percentage compensation rate and the maximum weekly compensation, the two elements discussed above would work in opposite directions. This is illustrated by the last three assumptions of Exhibit VI which show only slight departures from the average distribution for States #1 and #2. An effect of a change in the amount of minimum weekly compensation would be calculated in the same manner. However, the minimum weekly compensation has only a very slight effect on the resulting limit factor and the calculations of Exhibit VI were carried through on the basis of assuming no minimum weekly compensation.

The results shown in this exhibit fully bear out the conclusion previously expressed, namely, "a single countrywide (wage) distribution can be used for calculating the effect of a law amendment in any state." In this exhibit the effects of typical changes in indemnity benefits have been calculated using the countrywide average distribution, and the individual state distributions for two states showing the greatest deviation from the countrywide average. The differences between the amendment factor produced by the individual state distribution and the countrywide average distribution are shown in columns (8) and (10). The greatest difference is an excess of .016

for the individual state distribution over the countrywide average. Medical benefits are of course unaffected by changes in the weekly limits or compensation rate, and this difference of .016 would therefore usually be less than .010 (1.0%) on an overall basis. This difference is insignificant.

The results shown in Exhibits I to VI inclusive were reviewed by the Actuarial Committee of the National Council at a meeting held May 19, 1954. It was noted that the data shown on these exhibits were based on the data as reported by state without adjustment, except to distribute the cases where the wage was not reported, pro rata among the other cases with wages in excess of the maximum effective wage. These final results for all states combined still showed minor irregularities in the percent of total cases falling in each wage bracket. It was recommended that this distribution of cases be smoothed, and the corresponding cumulative wage distribution be determined by accumulating the product of the percentage of cases in each wage bracket (10% to 15%, 15% to 20% etc.) by the midpoint of each wage bracket (12.5%, 17.5% etc.). The actual and/or smoothed distribution of cases and corresponding index of wages payable are presented in Exhibits VII, VIIA and VIIB.

Exhibit VIII shows a comparison of the "old," wage distribution with the "new." It will be noted that the new distribution shows a slightly heavier weight of cases toward higher wages — as could be expected. The new distribution runs to wages 200% above the average state wage as compared to 170% above the average for the old distribution.

The National Council on Compensation Insurance will use the revised wage distribution, as recommended by the Actuarial Committee and approved by the N.A.I.C. for calculating the effect of law amendments involving the use of "Limit Factors."

EXHIBIT I

State	Average Weekly Wage		Maximum Effective Wage	No. Of Cases Reported		
	Special Call	Semi-Annual Call		Total	Above Eff. Max. With Wage Stated	Wage Not Given
Connecticut	69.13	67.38	66.67	2,675	1,321	64
Delaware	63.57	-	50.00	433	267	2
Dist. Of Col.	65.08	66.52	52.50	962	569	8
Maine	55.02	53.50	40.50	1,082	739	5
Maryland	63.98	64.41	52.50	3,102	1,935	61
Massachusetts	63.01	62.93	45.00	8,994	4,357	35
New Hampshire	55.01	54.00	49.50	1,027	640	9
New Jersey	71.36	70.59	45.00	9,282	7,746	137
New York	66.96	66.77	46.00	16,942	12,411	576
Pennsylvania	65.10	-	43.75	4,623	3,296	133
Rhode Island	62.09	61.75	46.67	1,227	933	2
Vermont	54.31	53.67	50.00	504	339	2
EAST TOTAL	xx	xx	xx	50,853	34,553	1,036
Illinois	72.11	71.96	37.00	12,545	10,925	442
Indiana	65.83	65.29	50.00	4,471	3,002	86
Iowa	64.31	62.30	42.00	2,092	1,744	21
Kansas	71.42	70.50	46.67	2,077	1,735	22
Michigan	77.75	77.21	47.31	5,680	4,966	43
Minnesota	66.73	64.94	48.00	3,607	2,855	31
Mississippi	49.44	48.40	37.50	1,903	1,121	39
Missouri	64.36	63.81	52.50	5,558	3,481	132
Nebraska	65.31	64.79	42.00	1,383	1,136	32
South Dakota	64.98	64.67	50.91	349	242	4
Wisconsin	67.19	66.48	52.86	6,227	4,600	23
CENTRAL TOTAL	xx	xx	xx	45,892	35,807	877
California	76.40	73.27	53.85	23,572	18,901	152
Colorado	74.03	69.55	44.62	893	758	8
Idaho	75.05	78.26	46.67	476	406	2
Montana	74.02	72.77	47.34	210	174	2
New Mexico	78.37	78.46	50.00	1,948	1,616	28
Utah	71.01	69.74	45.83	975	667	198
Hawaii	56.69	63.01	52.50	518	345	0
WEST TOTAL	xx	xx	xx	28,592	22,867	390
Alabama	51.47	51.18	38.47	1,740	1,041	140
Arkansas	53.13	51.45	38.46	2,064	1,431	52
Florida	57.75	57.58	58.33	6,136	2,375	361
Georgia	52.35	51.68	48.00	2,543	1,128	49
Kentucky	62.35	62.34	41.54	1,719	1,298	11
Louisiana	59.41	59.21	46.15	5,666	3,288	181
North Carolina	51.57	51.73	50.00	3,345	1,336	5
Oklahoma	63.16	64.21	42.00	3,483	2,791	150
South Carolina	51.78	51.74	58.33	1,295	387	17
Tennessee	53.39	54.49	46.67	2,418	1,222	69
Texas	69.12	66.71	41.67	26,274	21,256	571
Virginia	54.41	52.05	41.67	3,364	2,212	5
SOUTH TOTAL	xx	xx	xx	60,047	39,765	1,611
GRAND TOTAL	xx	xx	xx	185,384	132,992	3,914

EXHIBIT II

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

Based On Raw Data

(1) Ratio Actual Wage To Average Wage	(2) Alabama	(3) Arkansas	(4) California	(5) Colorado	(6) Connecticut	(7) Delaware	(8) D. C.
PERCENT TOTAL EMPLOYEES WITH WAGES EQUAL TO OR LESS THAN COLUMN (1)							
10%	.11%	.00%	.20%	.00%	.00%	.00%	.31%
25	.34	.48	1.92	.34	.64	1.15	1.46
40	2.87	2.18	4.28	2.13	2.17	2.31	4.16
55	8.16	5.28	9.84	11.20	7.85	10.62	12.47
70	29.08	27.08	19.17	21.95	18.02	25.87	29.52
85	42.87	50.44	33.28	40.09	33.79	42.03	44.28
100	58.74	61.97	53.00	55.88	52.26	59.82	61.23
115	67.99	73.93	69.81	72.00	69.57	72.29	70.27
130	78.05	79.46	82.63	79.06	80.45	80.83	78.48
145	83.33	85.66	91.16	88.24	89.91	83.83	82.95
160	89.02	89.05	95.40	94.74	94.92	89.84	86.90
175	92.64	91.96	97.88	96.86	97.79	90.99	90.33
190	93.85	94.67	99.03	97.76	98.47	95.61	94.59
205	96.78	96.22	99.52	98.77	98.99	97.92	97.51
220	97.87	97.53	99.66	99.10	99.48	99.31	98.65
235	99.02	98.01	99.75	99.33	99.66	99.54	99.27
250	99.31	98.64	99.80	99.44	99.78	99.77	99.38
265	99.43	99.03	99.88	99.44	99.85	99.77	99.38
300	100.00	100.00	100.00	100.00	100.00	100.00	100.00
INDEX OF TOTAL PAYROLLS EARNED BY ABOVE EMPLOYEES, Total Payroll 10000							
10%	1	0	2	0	0	0	2
25	6	10	39	7	12	23	27
40	102	71	119	66	64	65	123
55	385	221	396	507	350	470	535
70	1804	1593	992	1184	1004	1431	1618
85	2862	3394	2084	2614	2241	2693	2774
100	4263	4456	3915	4068	3963	4323	4350
115	5209	5750	5723	5808	5766	5665	5322
130	6370	6424	7313	6670	6934	6720	6307
145	7056	7261	8487	7909	8321	7457	6907
160	7890	7778	9134	8890	9074	7997	7519
175	8469	8261	9544	9246	9548	8191	8078
190	8687	8753	9751	9409	9666	9057	8850
205	9234	9058	9843	9610	9763	9511	9403
220	9449	9329	9899	9683	9869	9807	9643
235	9703	9431	9918	9735	9904	9858	9786
250	9764	9586	9932	9763	9931	9912	9811
265	9796	9689	9952	9763	9951	9912	9811
300	10000	10000	10000	10000	10000	10000	10000

EXHIBIT II (CONT'D.)

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

Based On Raw Data

(1) Ratio Actual Wage To Average Wage	(2) Florida	(3) Georgia	(4) Idaho	(5) Illinois	(6) Indiana	(7) Iowa	(8) Kansas
PERCENT TOTAL EMPLOYEES WITH WAGES EQUAL TO OR LESS THAN COLUMN (1)							
10%	.00%	.00%	.84%	.14%	.13%	.53%	.19%
25	.31	.47	1.47	.70	.78	2.06	.77
40	4.25	2.36	4.62	1.96	3.24	4.11	2.41
55	10.80	6.21	10.92	10.24	8.70	8.70	7.03
70	27.15	28.67	21.01	22.31	17.29	22.08	17.43
85	39.29	44.87	36.34	39.56	37.91	36.62	41.07
100	54.56	63.15	54.83	55.08	56.86	56.41	57.20
115	68.95	73.41	70.17	70.08	72.58	70.12	72.32
130	78.93	79.43	78.36	80.49	83.00	82.22	80.50
145	83.60	86.22	89.71	87.10	88.73	86.95	88.20
160	88.25	88.95	93.28	90.39	92.93	91.25	92.87
175	92.11	91.62	95.59	96.30	95.21	94.74	94.99
190	95.05	92.96	97.06	98.10	97.70	96.89	97.30
205	96.99	96.26	99.16	98.66	98.34	98.57	97.98
220	98.53	98.07	99.37	99.18	98.79	99.19	98.99
235	98.97	98.39	99.58	99.46	99.28	99.47	99.37
250	99.48	99.02	99.58	99.70	99.44	99.57	99.66
265	99.72	99.13	99.58	99.69	99.49	99.62	99.66
300	100.00	100.00	100.00	100.00	100.00	100.00	100.00
INDEX OF TOTAL PAYROLLS EARNED BY ABOVE EMPLOYEES. Total Payroll 10000							
10%	0	0	6	1	1	5	2
25	6	9	21	13	14	33	13
40	142	76	134	57	100	103	69
55	480	266	458	441	371	325	292
70	1598	1693	1095	1240	932	1199	931
85	2607	2966	2270	2549	2544	2335	2746
100	4080	4659	3999	3988	4271	4152	4242
115	5511	5754	5638	5590	5948	5604	5855
130	6657	6481	6638	6853	7213	7047	6855
145	7252	7386	8142	7756	7989	7693	7917
160	7903	7807	8698	8256	8623	8351	8626
175	8507	8241	9079	9249	9005	8928	8973
190	9002	8473	9343	9575	9458	9318	9395
205	9351	9100	9764	9686	9583	9641	9529
220	9656	9473	9810	9793	9680	9774	9735
235	9746	9546	9859	9857	9788	9841	9822
250	9859	9691	9859	9913	9827	9864	9892
265	9917	9722	9859	9932	9844	9877	9892
300	10000	10000	10000	10000	10000	10000	10000

EXHIBIT II (CONT'D.)

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

Based On Raw Data

(1) Ratio Actual Wage To Average Wage	(2) Kentucky	(3) Louisiana	(4) Maine	(5) Maryland	(6) Massachusetts	(7) Michigan	(8) Minn.
PERCENT TOTAL EMPLOYEES WITH WAGES EQUAL TO OR LESS THAN COLUMN (1)							
10%	.00%	.00%	.00%	.06%	.12%	.07%	.00%
25	.41	.74	.65	.52	.69	.58	1.08
40	2.73	3.67	1.85	2.74	2.84	3.06	2.41
55	12.80	13.94	6.75	10.06	8.28	8.94	8.43
70	26.41	29.97	26.99	21.18	20.55	19.61	18.30
85	41.42	46.95	40.11	37.85	35.82	38.10	38.81
100	56.08	57.70	55.55	54.61	55.03	57.71	57.03
115	69.34	68.09	70.15	71.24	70.62	72.69	73.41
130	80.45	75.56	81.05	82.14	83.16	83.59	83.75
145	85.69	81.01	89.46	87.94	89.60	88.61	89.02
160	88.13	85.69	93.62	91.68	93.98	93.54	93.65
175	93.08	91.18	95.47	93.91	96.43	96.29	96.78
190	96.74	95.89	97.13	96.55	97.53	97.15	98.03
205	98.14	97.30	98.15	98.48	99.09	98.24	98.56
220	98.72	98.01	98.61	99.07	99.38	98.64	99.14
235	99.01	98.41	99.35	99.61	99.49	98.86	99.28
250	99.42	98.87	99.72	99.71	99.69	99.12	99.50
265	99.77	99.28	99.72	99.77	99.77	99.42	99.64
300	100.00	100.00	100.00	100.00	100.00	100.00	100.00
INDEX OF TOTAL PAYROLLS EARNED BY ABOVE EMPLOYEES, Total Payroll 10000							
10%	0	0	0	1	1	1	0
25	6	13	12	10	13	10	20
40	74	113	51	91	86	98	66
55	562	627	300	461	353	386	366
70	1421	1652	1621	1169	1124	1064	1004
85	2580	2976	2635	2478	2315	2507	2606
100	3946	3922	4072	4000	4099	4327	4300
115	5364	4998	5643	5734	5772	5920	6064
130	6716	5891	6960	7050	7294	7252	7332
145	7438	6629	8110	7836	8175	7947	8055
160	7811	7331	8733	8407	8848	8697	8761
175	8617	8205	9046	8780	9261	9150	9283
190	9274	9033	9351	9256	9460	9304	9514
205	9551	9304	9553	9633	9763	9518	9620
220	9676	9451	9651	9758	9822	9604	9738
235	9743	9542	9820	9879	9847	9653	9770
250	9841	9647	9911	9903	9895	9713	9825
265	9934	9749	9911	9920	9915	9791	9861
300	10000	10000	10000	10000	10000	10000	10000

EXHIBIT II (CONT'D.)

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

Based On Raw Data

(1) Ratio Actual Wage To Average Wage	(2) Miss.	(3) Missouri	(4) Montana	(5) Nebraska	(6) N. H.	(7) New Jersey	(8) New Mexico	(9) New York
	PERCENT TOTAL EMPLOYEES WITH WAGES EQUAL TO OR LESS THAN COLUMN (1)							
10%	.00%	.18%	.48%	.00%	.00%	.20%	.00%	.19%
25	.42	.61	2.86	.58	.49	.79	1.13	.93
40	1.94	2.14	5.71	2.75	1.27	2.74	3.44	2.87
55	6.94	9.57	10.95	8.03	6.33	7.66	11.04	9.13
70	29.64	23.43	19.52	20.97	12.37	17.56	24.90	20.30
85	51.71	38.79	35.24	39.48	30.19	35.61	41.53	36.84
100	59.75	56.68	55.24	57.41	55.99	54.72	55.95	54.69
115	72.20	70.28	69.52	73.46	74.10	74.64	67.15	70.58
130	78.98	82.28	78.10	81.78	87.05	84.60	77.10	81.52
145	83.55	87.24	90.00	87.64	92.21	90.02	89.84	88.86
160	88.44	90.64	92.86	93.20	96.11	92.28	94.15	92.70
175	91.64	93.65	97.62	95.66	97.86	94.79	96.00	95.47
190	93.75	97.37	98.10	97.18	98.73	97.35	97.95	97.43
205	96.32	98.63	98.57	98.19	99.22	98.83	98.51	98.49
220	97.16	99.14	99.52	98.77	99.81	99.38	99.18	98.95
235	98.00	99.59	99.52	99.13	99.90	99.49	99.54	99.32
250	98.27	99.69	99.52	99.28	99.90	99.61	99.74	99.49
265	99.00	99.80	99.52	99.64	100.00	99.74	99.90	99.63
300	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	INDEX OF TOTAL PAYROLLS EARNED BY ABOVE EMPLOYEES. Total Payroll 10000							
10%	0	2	3	0	0	2	0	2
25	8	11	40	13	9	7	24	17
40	61	64	145	89	35	64	106	85
55	302	437	395	349	287	302	485	398
70	1751	1346	937	1178	687	917	1375	1119
85	3455	2567	2189	2613	2083	2319	2696	2380
100	4187	4197	4037	4278	4463	4099	4034	3991
115	5481	5643	5562	6026	6412	6224	5226	5691
130	6301	7084	6623	7045	7995	7443	6475	7021
145	6925	7754	8203	7839	8692	8182	8223	8016
160	7654	8320	8635	8679	9285	8523	8874	8592
175	8187	8758	9434	9083	9567	8941	9185	9052
190	8569	9434	9520	9353	9728	9401	9543	9405
205	9068	9680	9612	9555	9826	9695	9654	9613
220	9251	9785	9821	9664	9953	9810	9798	9710
235	9433	9886	9821	9748	9975	9837	9879	9792
250	9499	9913	9821	9784	9975	9866	9931	9833
265	9691	9937	9821	9878	10000	9897	9971	9869
300	10000	10000	10000	10000	10000	10000	10000	10000

EXHIBIT II (CONT'D.)

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

Based On Raw Data

(1) Ratio Actual Wage To Average Wage	(2) N. C.	(3) Oklahoma	(4) Pa.	(5) Rhode Island	(6) S. C.	(7) South Dakota	(8) Tennessee	(9) Texas
PERCENT TOTAL EMPLOYEES WITH WAGES EQUAL TO OR LESS THAN COLUMN (1)								
10%	.00%	.06%	.00%	.00%	.00%	.00%	.00%	.00%
25	.42	.52	1.47	.81	.62	.57	.74	.50
40	2.33	2.04	4.67	1.71	2.08	2.58	2.81	2.60
55	5.86	6.23	12.83	8.23	6.87	6.02	6.91	12.53
70	24.13	18.06	23.53	19.40	28.73	16.33	25.89	27.19
85	44.30	42.72	39.89	36.84	45.10	40.11	43.71	42.09
100	62.75	58.43	57.41	57.29	59.54	58.74	58.19	55.07
115	72.86	70.94	71.92	70.42	69.42	70.49	71.92	66.76
130	81.94	81.77	80.62	83.37	80.23	82.52	79.57	77.41
145	88.31	87.60	86.13	89.41	87.88	89.40	85.11	85.26
160	91.75	92.25	90.66	93.72	90.81	93.98	89.37	92.15
175	93.99	95.58	93.21	96.25	93.51	95.42	91.85	96.06
190	95.49	97.50	95.59	97.88	94.75	96.56	95.62	97.52
205	97.79	98.02	97.36	99.02	97.07	97.99	96.90	98.41
220	98.45	98.79	98.53	99.43	97.68	98.28	98.39	99.15
235	99.16	99.11	99.00	99.67	97.99	99.14	99.13	99.36
250	99.40	99.54	99.22	99.92	98.61	99.71	99.34	99.57
265	99.49	99.66	99.42	99.92	98.76	99.71	99.42	99.71
300	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
INDEX OF TOTAL PAYROLLS EARNED BY ABOVE EMPLOYEES. Total Payroll 10000								
10%	0	1	0	0	0	0	0	0
25	7	10	30	16	11	11	13	9
40	77	68	144	46	58	75	89	81
55	248	278	558	376	293	248	288	587
70	1417	1044	1263	1074	1690	909	1489	1511
85	3008	2920	2522	2440	2984	2766	2904	2653
100	4745	4359	4130	4349	4338	4485	4222	3837
115	5829	5694	5688	5770	5405	5714	5660	5080
130	6930	7002	6751	7334	6664	7140	6574	6379
145	7819	7791	7480	8169	7689	8101	7314	7468
160	8349	8501	8159	8837	8121	8773	7947	8522
175	8731	9055	8577	9256	8566	9018	8355	9173
190	9006	9401	8013	9550	8779	9233	9027	9438
205	9449	9508	9359	9772	9227	9519	9268	9613
220	9590	9666	9604	9859	9344	9581	9573	9772
235	9754	9741	9710	9914	9414	9777	9739	9819
250	9812	9842	9759	9974	9566	9918	9790	9871
265	9835	9873	9810	9974	9607	9918	9812	9905
300	10000	10000	10000	10000	10000	10000	10000	10000

EXHIBIT II (CONT'D.)

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

Based On Raw Data

(1) Ratio Actual Wage To Average Wage	(2) Utah	(3) Vermont	(4) Virginia	(5) Wisconsin	(6) Hawaii
	PERCENT TOTAL EMPLOYESS WITH WAGES EQUAL TO OR LESS THAN COLUMN (1)				
10%	.21%	.00%	.00%	.05%	.00%
25	.41	.99	.36	.51	.19
40	2.15	2.38	1.96	1.80	1.16
55	8.62	4.96	5.68	7.47	4.25
70	14.97	11.51	24.85	18.29	10.62
85	31.79	26.19	45.93	33.05	25.48
100	48.92	57.14	59.78	55.89	43.24
115	69.64	76.98	71.58	71.66	61.97
130	83.08	86.51	79.25	83.65	69.11
145	92.72	92.86	85.05	90.12	82.82
160	96.92	95.04	89.60	94.38	90.35
175	98.15	97.02	92.60	97.53	93.63
190	99.08	99.01	94.89	98.83	96.14
205	99.38	99.60	96.40	99.44	97.49
220	99.59	99.60	97.24	99.58	98.07
235	99.59	99.80	98.16	99.73	99.03
250	99.79	99.80	99.38	99.76	99.03
265	99.79	99.80	99.49	99.89	99.42
300	100.00	100.00	100.00	100.00	100.00
	INDEX OF TOTAL PAYROLLS EARNED BY ABOVE EMPLOYEES. Total Payroll 10000				
10%	2	0	0	0	0
25	8	17	6	10	4
40	82	65	61	52	36
55	463	189	235	327	175
70	896	610	1363	1008	535
85	2172	1758	2971	2165	1571
100	3731	4635	4238	4282	3046
115	5904	6747	5500	5980	4847
130	7497	7889	6439	7449	5627
145	8775	8757	7233	8333	7291
160	9404	9085	7924	8977	8313
175	9595	9416	8424	9506	8805
190	9759	9782	8837	9741	9210
205	9810	9901	9136	9861	9449
220	9864	9901	9311	9891	9558
235	9864	9945	9520	9924	9754
250	9896	9945	9814	9931	9754
265	9896	9945	9845	9964	9844
300	10000	10000	10000	10000	10000

EXHIBIT III

STUDY OF WAGE DISTRIBUTIONS

Cumulative Distribution Of Cases Receiving Actual Wage Indicated
(Figures In Percent)

State	Ratio Of Actual Wage To Average Wage										
	55%	70%	85%	100%	115%	130%	145%	160%	175%	190%	205%
Conn.	7.85	18.02	33.79	52.26	69.57	80.45	89.91	94.92	97.79	98.47	98.99
Dela.	10.62	25.87	42.03	59.82	72.29	80.83	86.37	89.84	90.99	95.61	97.92
D. of C.	12.47	29.52	44.28	61.23	70.27	78.48	82.95	86.90	90.33	94.59	97.51
Maine	6.75	26.99	40.11	55.55	70.15	81.05	89.46	93.62	95.47	97.13	98.15
Md.	10.06	21.18	37.85	54.61	71.24	82.14	87.94	91.68	93.91	96.55	98.48
Mass.	8.28	20.55	35.82	55.03	70.62	83.16	89.60	93.98	96.43	97.53	99.09
N.Hamp.	6.13	12.37	30.19	55.99	74.10	87.05	92.21	96.11	97.86	98.73	99.22
N. J.	7.66	17.56	35.61	54.72	74.64	84.60	90.02	92.28	94.79	97.35	98.83
N. Y.	9.13	20.30	36.84	54.69	70.58	81.52	88.86	92.70	95.47	97.43	98.49
Pa.	12.83	23.53	39.89	57.41	71.92	80.62	86.13	90.66	93.21	95.59	97.36
R. I.	8.23	19.40	36.84	57.29	70.42	83.37	89.41	93.72	96.25	97.88	99.02
Vt.	4.96	11.51	26.19	57.14	76.98	86.51	92.86	95.04	97.02	99.01	99.60
EAST AVERAGE	8.75	20.57	36.62	56.31	71.90	82.48	88.81	92.62	94.96	97.16	98.56
Ill.	10.24	22.91	39.56	55.08	70.08	80.49	87.10	90.39	96.30	98.10	98.66
Ind.	8.70	17.29	37.91	56.86	72.58	83.00	88.73	92.93	95.21	97.70	98.34
Iowa	8.70	22.08	36.62	56.41	70.12	82.22	86.95	91.25	94.74	96.89	98.57
Kansas	7.03	17.43	41.07	57.20	72.32	80.50	88.20	92.87	94.99	97.30	97.98
Mich.	8.94	19.61	38.10	57.71	72.69	83.59	88.61	93.54	96.29	97.15	98.28
Minn.	8.43	18.30	38.81	57.03	73.41	83.75	89.02	93.65	96.78	98.03	98.56
Miss.	6.94	29.64	51.71	59.75	72.20	78.98	83.55	88.44	91.64	93.75	96.32
Mo.	9.57	23.43	38.79	56.68	70.28	82.28	87.24	90.64	93.65	97.37	98.63
Neb.	8.03	20.97	39.48	57.41	73.46	81.78	87.64	93.20	95.66	97.18	98.19
S. D.	6.02	16.33	40.11	58.74	70.49	82.52	89.40	93.98	95.42	96.56	97.99
Wisc.	7.47	18.29	33.05	55.89	71.66	83.65	90.12	94.38	97.53	98.83	99.52
CENTRAL AVERAGE	8.19	20.57	39.56	57.16	71.75	82.07	87.87	92.30	95.29	97.17	98.28
Calif.	9.84	19.17	33.28	53.00	69.81	82.63	91.16	95.40	97.88	99.03	99.52
Colo.	11.20	21.95	40.09	55.88	72.00	79.06	88.24	94.74	96.86	97.76	98.77
Idaho	10.92	21.01	36.34	54.83	70.17	78.36	89.71	93.28	95.59	97.06	99.16
Mont.	10.95	19.52	35.24	55.24	69.52	78.10	90.00	92.86	97.62	98.10	98.57
N. M.	11.04	24.90	41.53	55.95	67.15	77.10	89.84	94.15	96.00	97.95	98.51
Utah	8.62	14.97	31.79	48.92	69.64	83.08	92.72	96.92	98.15	99.08	99.38
Hawaii	4.25	10.62	25.48	43.24	61.97	69.11	82.82	90.35	93.63	96.14	97.49
WEST AVERAGE	9.55	18.88	34.82	52.44	68.61	78.21	89.21	93.96	96.53	97.87	98.77
Ala.	8.16	29.08	42.87	58.74	67.99	78.05	83.33	89.02	92.64	93.85	96.78
Ark.	5.28	27.08	50.44	61.97	73.93	79.46	85.66	89.05	91.96	94.67	96.22
Fla.	10.80	27.15	39.29	54.56	68.95	78.93	83.60	88.25	92.11	95.05	96.99
Ga.	6.21	28.67	44.87	63.15	73.41	79.43	86.12	88.95	91.62	92.96	96.26
Ky.	12.80	26.41	41.42	56.08	69.34	80.45	85.69	88.13	93.08	96.74	98.14
La.	13.94	29.97	46.95	57.70	68.09	75.56	81.01	85.69	91.18	95.89	97.30
N. C.	5.86	24.13	44.30	62.75	72.86	81.94	83.31	91.75	93.99	95.49	97.79
Okla	6.23	18.06	42.72	58.43	70.94	81.77	87.60	92.25	95.58	97.50	98.02
S. C.	6.87	28.73	45.10	59.54	69.42	80.23	87.88	90.81	93.51	94.75	97.07

EXHIBIT III (CONT'D.)

STUDY OF WAGE DISTRIBUTIONS

Cumulative Distribution Of Cases Receiving Actual Wage Indicated
(Figures In Percent)

State	Ratio Of Actual Wage To Average Wage 55%	70%	85%	100%	115%	130%	145%	160%	175%	190%	205%
Tenn.	6.91	25.89	43.71	58.19	71.92	79.57	85.11	89.37	91.85	95.62	96.90
Texas	12.53	27.19	42.09	55.07	66.76	77.41	85.26	92.15	96.06	97.52	98.41
Va.	5.68	24.85	45.93	59.78	71.58	79.25	85.05	89.60	92.60	94.89	96.40
SOUTH AVERAGE	8.44	26.43	44.14	58.83	70.43	79.34	84.97	89.59	93.02	95.41	97.19
OVERALL AVERAGE	8.65	21.97	39.24	56.61	70.89	80.77	87.53	91.89	94.75	96.78	98.13
SMOOTHED AVERAGE	9.05	22.08	39.01	56.45	70.66	80.52	87.35	91.64	94.94	97.00	98.32

STATES WITH GREATEST DEVIATION FROM OVERALL AVERAGE*

Plus	La.	La.	Miss.	N.C.	N.J.	N.H.	N.H.	N.H.	Cal. (N.H.)	Cal. (N.H.)	Wisc.
Minus	Ark.	N.H.	N.H.	Conn.	Tex.	La.	La.	La.	La.	Ga.	Ark.

*Excludes states with less than 1000 reported cases.

EXHIBIT IV

STUDY OF WAGE DISTRIBUTIONS

Cumulative Distribution of Wage (Total = 10,000)

State	Ratio Of Actual Wage To Average Wage										
	55%	70%	85%	100%	115%	130%	145%	160%	175%	190%	205
Conn.	350	1004	2241	3963	5766	6934	8321	9074	9548	9666	976
Dela.	470	1431	2693	4323	5665	6720	7457	7997	8191	9057	951
D. of C.	535	1613	2774	4350	5322	6307	6907	7519	8078	8850	940
Maine	372	1621	2314	4072	5643	6960	8110	8733	9046	9351	955
Md.	461	1169	2473	4000	5734	7050	7836	8407	8780	9256	963
Mass.	353	1124	2315	4099	5772	7294	8175	8848	9261	9460	976
New Hamp.	287	687	2003	4463	6412	7995	8692	9285	9567	9728	982
N. J.	302	917	2319	4099	6224	7443	8182	8523	8941	9401	965
N. Y.	398	1119	2380	3991	5691	7021	8016	8592	9052	9405	961
Pa.	558	1263	2522	4130	5638	6751	7480	8159	8577	8013	935
R. I.	376	1074	2440	4349	5770	7334	8169	8337	9256	9550	977
Vt.	189	610	1758	4635	6747	7389	8757	9085	9416	9702	990
EAST AVERAGE	388	1136	2360	4206	5870	7142	8009	8588	8976	9293	964
Ill.	441	1240	2549	3933	5590	6853	7756	8256	9249	9575	968
Ind.	371	932	2544	4271	5943	7213	7939	8623	9005	9458	950
Iowa	325	1199	2335	4152	5604	7047	7693	8351	8928	9313	964
Kansas	292	931	2746	4242	5955	6055	7917	8626	8973	9395	952
Mich.	336	1064	2507	4327	5920	7252	7947	8697	9150	9304	951
Minn.	366	1004	2606	4300	6064	7332	7955	8761	9283	9514	962
Miss.	302	1751	3455	4137	5481	6301	6925	7654	8187	8569	906
Mo.	437	1346	2567	4197	5643	7034	7754	8320	8758	9434	969
Neb.	349	1178	2613	4278	6026	7045	7839	8679	9083	9353	955
S. D.	248	909	2766	4485	5714	7140	8101	8773	9018	9233	951
Wisc.	327	1008	2165	4232	5930	7449	8333	8977	9506	9741	986
CENTRAL AVERAGE	349	1142	2623	4246	5802	7052	7846	8520	9013	9354	956
Calif.	396	992	2084	3915	5723	7313	8487	9134	9544	9751	984
Colo.	507	1134	2614	4068	5303	6670	7909	8890	9246	9409	961
Idaho	453	1095	2270	3999	5638	6638	8142	8698	9079	9343	976
Mont.	395	937	2189	4037	5562	6623	7794	8635	9434	9520	961
N. M.	485	1375	2696	4034	5226	6475	8223	8874	9184	9543	965
Utah	463	896	2172	3731	5904	7497	8775	9404	9595	9759	983
Hawaii	175	535	1571	3046	4847	5627	7291	8313	8805	9210	944
WEST AVERAGE	411	1002	2228	3833	5530	6692	8089	8850	9270	9505	967
Ala.	385	1304	2862	4263	5209	6370	7056	7890	8469	8687	923
Ark.	221	1593	3394	4456	5750	6424	7261	7773	8261	8753	905
Fla.	480	1598	2607	4080	5511	6657	7252	7903	8507	9002	935
Ga.	266	1693	2966	4659	5754	6481	7386	7807	8241	8473	910
Ky.	562	1421	2580	3946	5364	6716	7438	7911	8617	9274	955
La.	627	1652	2976	3922	4998	5891	6629	7331	8205	9033	930
N. C.	248	1417	3008	4745	5329	6930	7819	8349	8731	9006	944
Okla.	278	1044	2920	4359	5694	7002	7791	8501	9055	9401	950
S. C.	293	1690	2984	4338	5405	6664	7689	8121	8566	8779	922

EXHIBIT IV (CONT'D)

STUDY OF WAGE DISTRIBUTIONS

Cumulative Distribution of Wage (Total = 10,000)

	Ratio Of Actual Wage To Average Wage										
State	55%	70%	85%	100%	115%	130%	145%	160%	175%	190%	205%
Tenn.	283	1489	2904	4227	5660	6574	7314	7947	8355	9027	9268
Texas	587	1511	2653	3837	5030	6379	7468	8522	9173	9438	9613
Va.	235	1363	2971	4238	5500	6439	7233	7924	8424	8837	9136
SOUTH AVERAGE	373	1523	2902	4255	5479	6544	7361	7990	8550	8976	9317
OVERALL AVERAGE	377	1226	2562	4169	5634	6873	7794	8443	8913	9254	9538
SMOOTHED AVERAGE	382	1201	2512	4122	5642	6843	7777	8429	8978	9353	9612

STATES WITH GREATEST DEVIATION FROM OVERALL AVERAGE*

Plus	La.	Ala.	Miss.	N.C.	N.H.	N.H.	N.H.	N.H.	N.H.	Cal. (N.H.)	Wisc. (N.H.)
Minus	Ark.	N.H.	N.H.	Tex.	La.	La.	La.	La.	Miss. (La.)	Ga.	Ark.

*Excludes states with less than 1,000 reported cases.

EXHIBIT V

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

(1) Ratio Actual Wage To Av. Wage	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13
	Percent Total Employees With Wages Equal To Or Less Than Col. (1)				Over All		Index Of Total Payroll's Earned By Such Employees Total Payroll=10,00				Over All	
	East	Cent.	West	South	Act.	Smooth	East	Cent.	West	South	Act.	Smoo
10%	.07%	.12%	.25%	.01%	.10%	.10%	1	1	2	0	1	
15	.20	.20	.50	.14	.23	.25	2	2	5	2	2	
20	.48	.46	.67	.30	.45	.48	7	7	8	4	6	
25	.88	.79	1.19	.49	.80	.81	16	14	20	9	14	
30	1.31	1.18	1.67	.91	1.22	1.27	28	25	35	21	26	
35	1.80	1.78	2.16	1.76	1.84	1.92	44	45	51	49	47	
40	2.64	2.58	3.36	2.66	2.75	2.89	77	76	98	84	82	
45	3.79	4.22	4.88	3.93	4.12	4.31	127	147	167	141	143	1
50	5.71	6.04	6.74	6.15	6.09	6.28	219	235	260	249	239	2
55	8.75	8.19	9.55	8.44	8.65	9.05	388	349	411	373	377	3
60	11.75	10.97	11.87	14.73	12.42	12.73	557	511	549	742	596	5
65	16.01	15.96	15.58	20.29	17.15	17.16	828	826	783	1097	897	8
70	20.57	20.57	18.88	26.43	21.97	22.08	1136	1142	1002	1523	1226	12
75	25.72	26.41	23.18	31.72	27.20	27.49	1513	1571	1307	1911	1608	15
80	31.59	32.89	28.41	38.58	33.40	33.24	1972	2075	1709	2442	2089	20
85	36.62	39.56	34.82	44.14	39.24	39.01	2360	2623	2228	2902	2562	25
90	42.41	44.49	39.85	48.83	44.37	44.85	2894	3054	2655	3313	3016	30
95	50.09	51.60	45.80	54.20	50.95	50.66	3600	3708	3199	3807	3621	35
100	56.31	57.16	52.44	58.83	56.61	56.45	4206	4246	3833	4255	4169	41
105	61.54	62.70	58.17	63.21	61.76	61.60	4738	4812	4411	4697	4691	46
110	66.79	67.29	64.23	66.52	66.42	66.35	5298	5302	5047	5047	5186	51
115	71.90	71.75	68.61	70.43	70.89	70.66	5870	5802	5530	5479	5684	56
120	76.07	75.95	72.03	73.80	74.72	74.40	6357	6291	5926	5865	6128	60
125	79.19	78.92	75.07	76.47	77.66	77.68	6736	6710	6296	6186	6499	64
130	82.48	82.07	78.21	79.34	80.77	80.52	7142	7052	6692	6544	6873	68
135	84.70	84.06	83.01	81.19	83.25	83.16	7434	7316	7300	6794	7198	71
140	86.95	86.19	86.45	83.16	85.58	85.41	7749	7607	7766	7050	7515	75
145	88.81	87.87	89.21	84.97	87.53	87.35	8009	7846	8089	7361	7794	77
150	90.07	89.27	91.14	86.70	89.07	88.97	8194	8053	8425	7561	8015	80
155	91.19	91.03	92.21	88.09	90.43	90.34	8365	8317	8583	7759	8215	82
160	92.62	92.30	93.96	89.59	91.89	91.64	8588	8520	8850	7990	8443	84
165	93.46	93.36	95.21	90.85	92.98	92.90	8724	8687	9053	8189	8616	86
170	94.17	94.41	96.16	92.10	93.97	94.12	8840	8861	9205	8397	8780	88
175	94.96	95.29	96.53	93.02	94.75	94.94	8976	9013	9270	8550	8913	89
180	95.69	95.88	97.30	93.74	95.45	95.66	9105	9116	9403	8675	9035	91
185	96.48	96.46	97.55	94.67	96.13	96.34	9249	9220	9448	8840	9158	92
190	97.16	97.17	97.87	95.41	96.78	97.00	9293	9354	9505	8976	9254	93

EXHIBIT V (CONT'D.)

CUMULATIVE DISTRIBUTION OF EMPLOYEES AND PAYROLL BY SIZE OF WEEKLY WAGE

(1) Ratio Actual Wage To Av. Wage	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Percent Total Employees With Wages Equal To Or Less Than Col. (1)				Over All		Index Of Total Payroll's Earned By Such Employees Total Payroll=10,000				Over All	
	East	Cent.	West	South	Act.	Smooth	East	Cent.	West	South	Act.	Smooth
195	97.69%	97.70%	98.17%	96.45%	97.42%	97.55	9540	9458	9555	9171	9416	9459
200	98.26	97.91	98.46	96.76	97.77	98.00	9590	9498	9619	9230	9468	9547
205	98.56	98.28	98.77	97.19	98.13	98.32	9649	9569	9677	9317	9538	9612
210	98.82	98.50	98.87	97.55	98.38	98.60	9706	9616	9698	9388	9590	9670
215	99.04	98.65	98.98	97.93	98.61	98.83	9751	9649	9722	9465	9638	9719
220	99.18	98.81	99.21	98.20	98.81	99.03	9782	9681	9776	9524	9681	9762
225	99.30	98.95	99.34	98.43	98.97	99.19	9809	9714	9803	9575	9716	9798
230	99.41	99.11	99.36	98.57	99.08	99.32	9834	9749	9806	9607	9742	9827
235	99.51	99.21	99.48	98.73	99.20	99.43	9856	9773	9833	9641	9769	9853
240	99.58	99.28	99.49	98.98	99.31	99.53	9872	9791	9835	9700	9796	9876
245	99.62	99.37	99.50	99.10	99.39	99.62	9881	9810	9838	9737	9814	9898
250	99.67	99.43	99.56	99.21	99.46	99.68	9893	9825	9851	9757	9829	9913
255	99.70	99.50	99.57	99.27	99.50	99.73	9902	9845	9855	9771	9842	9926
260	99.71	99.57	99.61	99.33	99.55	99.77	9905	9863	9863	9787	9853	9936
265	99.73	99.60	99.65	99.41	99.59	99.81	9910	9871	9872	9807	9864	9946
270	99.76	99.65	99.72	99.44	99.63	99.85	9917	9884	9891	9815	9875	9957
300	100.00	100.00	100.00	100.00	100.00	100.00	10000	10000	10000	10000	10000	10000

EXHIBIT VI

SHOWING EFFECT OF WAGE DISTRIBUTION ON LAW AMENDMENT FACTORS
BASED ON $35.00 AVERAGE WEEKLY WAGE

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Law Amendment					Indemnity Amendment Based On				
From		To			New	New Single State Distribution			
%	Max.Wk.	%	Max.Wk.	Old Distr.	Overall Distr.	State #1	Diff. (7)-(6)	State #2	Diff. (9)-(6)
60	$25.00	65	$25.00	1.008	1.009	1.013	+.004	1.006	-.003
60	30.00	65	30.00	1.016	1.017	1.021	+.004	1.011	-.006
60	35.00	65	35.00	1.027	1.027	1.034	+.007	1.022	-.005
60	40.00	65	40.00	1.037	1.040	1.042	+.002	1.038	-.002
60	$25.00	60	$30.00	1.164	1.161	1.150	-.011	1.176	+.015
60	30.00	60	35.00	1.116	1.111	1.099	-.012	1.127	+.016
60	35.00	60	40.00	1.080	1.076	1.067	-.009	1.077	+.001
65	$25.00	65	$30.00	1.173	1.170	1.159	-.011	1.182	+.012
65	30.00	65	35.00	1.139	1.122	1.112	-.010	1.138	+.016
65	35.00	65	40.00	1.090	1.089	1.076	-.013	1.095	+.001
60	$25.00	65	$30.00	1.182	1.181	1.174	-.007	1.189	+.008
60	30.00	65	35.00	1.147	1.142	1.136	-.006	1.151	+.009
60	35.00	65	40.00	1.120	1.119	1.119	-.007	1.119	.000

EXHIBIT VII

Revised Standard Wage Distribution

(1) Ratio Actual Wage To Average Wage	(2) % Of Cases Actual	(3) % Of Cases Smoothed*	(4) Group Wages Midpoint (1)x(3)	(5) % Of Workmens Earning = Or Less Than Upper Limit Col. (1) = Col. (3)	(6) Wages Corres. To (5) Total Wages = 10,000 = Col. (4)
0 - 10	.10%	.10%	.50	.10%	0
10.01 - 15	.13	.15	1.87	.25	2
15.01 - 20	.22	.23	4.03	.48	6
20.01 - 25	.35	.33	7.42	.81	13
25.01 - 30	.42	.46	12.65	1.27	26
30.01 - 35	.62	.65	21.13	1.92	47
35.01 - 40	.91	.97	36.37	2.89	83
40.01 - 45	1.37	1.42	60.35	4.31	144
45.01 - 50	1.97	1.97	93.58	6.28	237
50.01 - 55	2.56	2.77	145.42	9.05	382
55.01 - 60	3.77	3.68	211.60	12.73	593
60.01 - 65	4.73	4.43	276.83	17.16	870
65.01 - 70	4.82	4.92	332.10	22.08	1201
70.01 - 75	5.23	5.41	392.22	27.49	1592
75.01 - 80	6.20	5.75	445.63	33.24	2037
80.01 - 85	5.84	5.77	476.02	39.01	2512
85.01 - 90	5.13	5.84	511.00	44.85	3022
90.01 - 95	6.53	5.81	537.43	50.66	3559
95.01 - 100	5.66	5.79	564.52	56.45	4122
100.01 - 105	5.15	5.15	527.88	61.60	4649
105.01 - 110	4.66	4.75	510.62	66.35	5159
110.01 - 115	4.47	4.31	484.88	70.66	5642
115.01 - 120	3.83	3.74	439.45	74.40	6081
120.01 - 125	2.94	3.28	401.80	77.68	6482
125.01 - 130	3.11	2.84	362.10	80.52	6843
130.01 - 135	2.43	2.64	349.80	83.16	7193
135.01 - 140	2.33	2.25	309.37	85.41	7501
140.01 - 145	1.95	1.94	276.45	87.35	7777
145.01 - 150	1.54	1.62	238.95	88.97	8016
150.01 - 155	1.36	1.37	208.93	90.34	8224
155.01 - 160	.66	1.30	204.75	91.64	8429
160.01 - 165	1.89	1.26	204.75	92.90	8633
165.01 - 170	.99	1.22	204.35	94.12	8837
170.01 - 175	.78	.82	141.45	94.94	8978
175.01 - 180	.70	.72	127.80	95.66	9106
180.01 - 185	.68	.68	124.10	96.34	9229
185.01 - 190	.65	.66	123.75	97.00	9353
190.01 - 195	.64	.55	105.87	97.55	9459

EXHIBIT VII- CONT'D.

Revised Standard Wage Distribution

(1)	(2)	(3)	(4)	(5)	(6)
Ratio Actual Wage To Average Wage	% Of Cases Actual	% Of Cases Smoothed*	Group Wages Midpoint (1)x(3)	% of Workmens Earnings = or Less Than Upper Limit Col. (1) =Col. (3)	Wages Corres. To (5) Total Wages = 10,000 =Col. (4)
195.01 - 200	.35%	.45%	88.38	98.00%	9547
200.01 - 205	.36	.32	64.80	98.32	9612
205.01 - 210	.25	.28	58.10	98.60	9670
210.01 - 215	.23	.23	48.37	98.83	9719
215.01 - 220	.20	.20	43.50	99.03	9762
220.01 - 225	.16	.16	35.60	99.19	9798
225.01 - 230	.11	.13	29.56	99.32	9827
230.01 - 235	.12	.11	25.57	99.43	9853
235.01 - 240	.11	.10	23.75	99.53	9876
240.01 - 245	.08	.09	21.83	99.62	9898
245.01 - 250	.07	.06	14.85	99.68	9913
250.01 - 255	.04	.05	12.62	99.73	9926
255.01 - 260	.05	.04	10.30	99.77	9936
260.01 - 265	.04	.04	10.50	99.81	9946
265.01 - 270	.04	.04	10.70	99.85	9957
270.01 - 275	.07	.03	8.18	99.88	9965
275.01 - 280	.06	.03	8.32	99.91	9974
280.01 - 285	.06	.03	8.48	99.94	9982
285.01 - 290	.06	.02	5.75	99.96	9988
290.01 - 295	.06	.02	5.85	99.98	9994
295.01 - 300	.06	.02	5.95	100.00	10000

Actual percent of cases

* Generally smoothed by 3 term moving average
i.e. .10+.13+.22=15, .13+.22+.35=.23

EXHIBIT VII - A
COUNTRYWIDE WAGE DISTRIBUTION
Unsmoothed Frequency Distribution

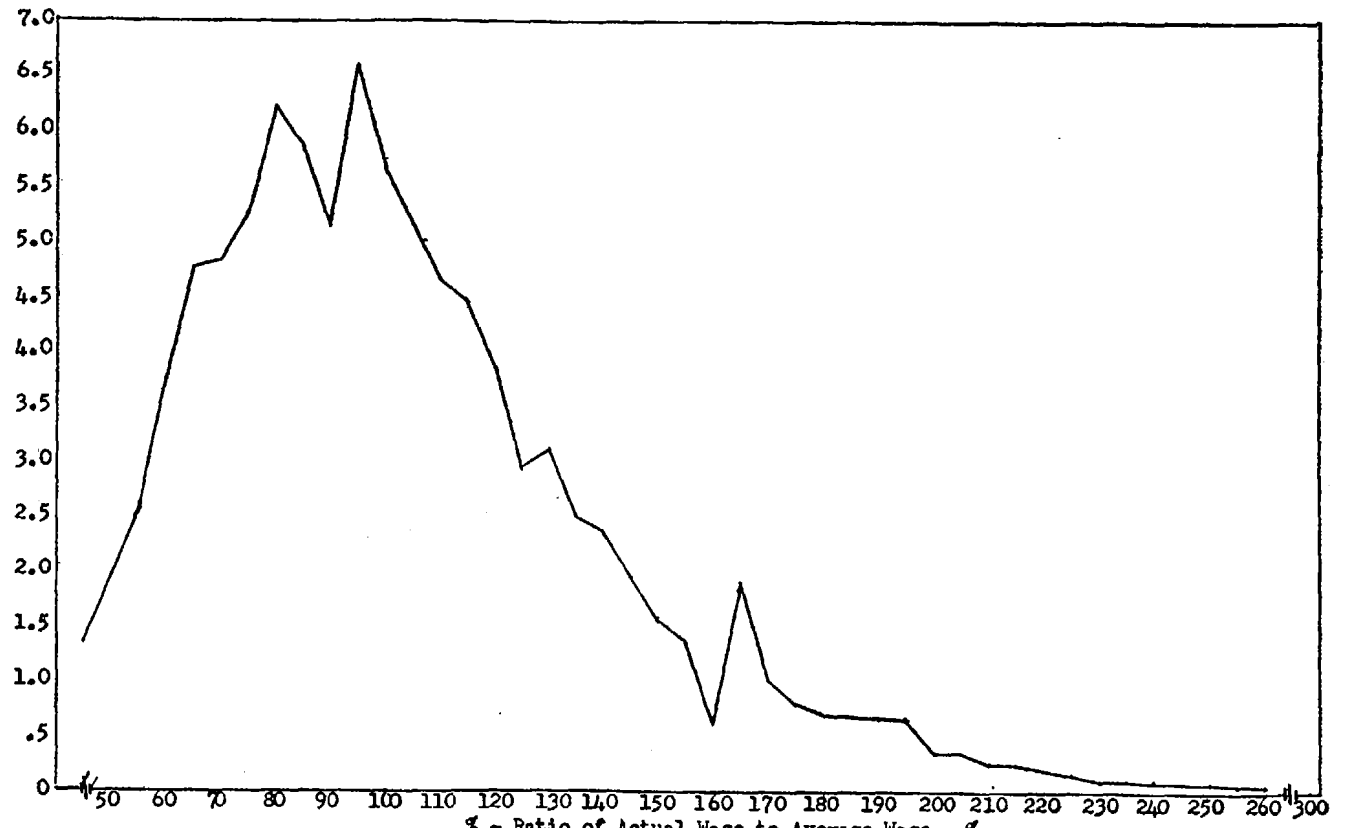

EXHIBIT VII - B
COUNTRYWIDE WAGE DISTRIBUTION
Ogive of Smoothed Distribution - Columns 5 & 6, Exh. VII

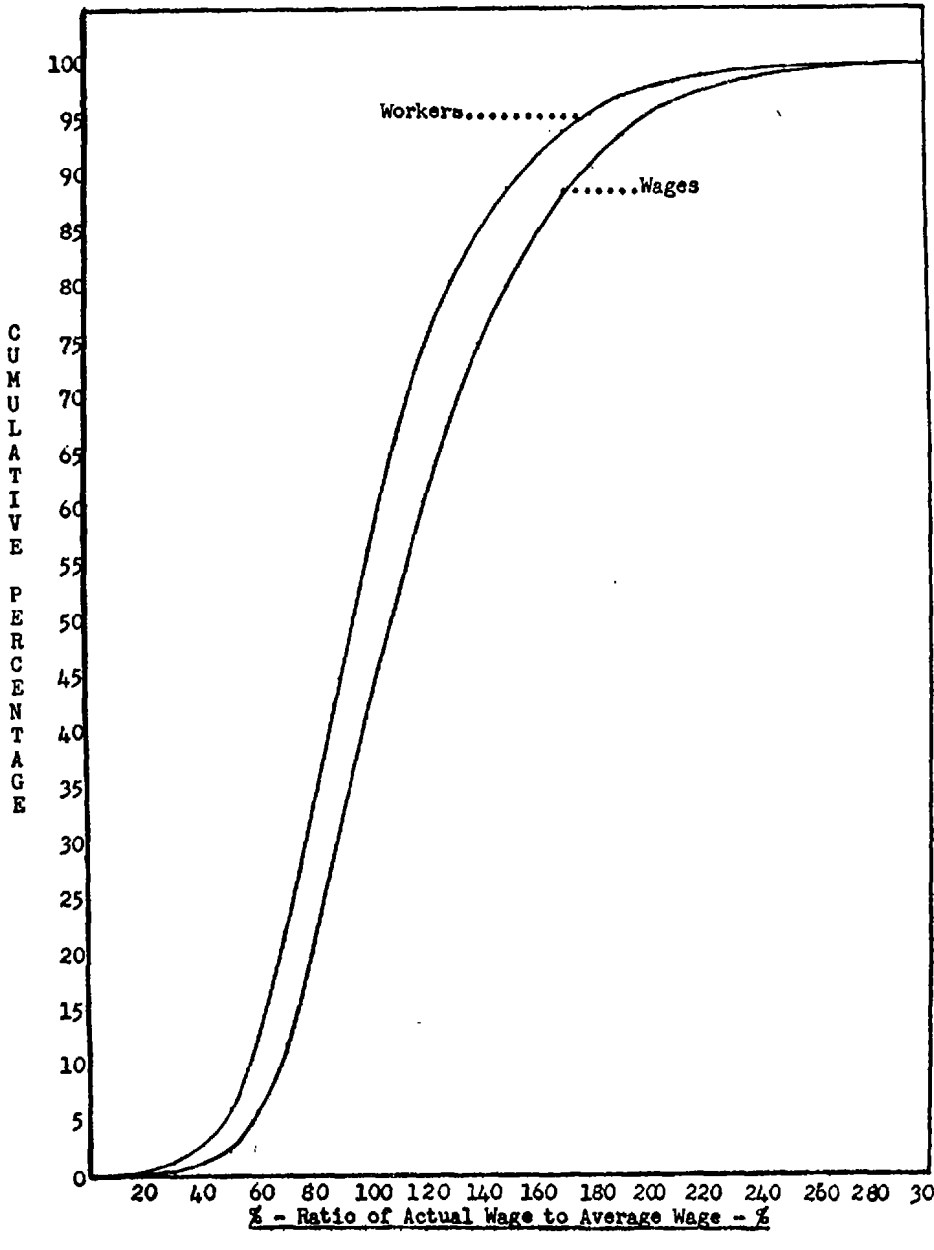

EXHIBIT VIII

Smoothed Cumulative Distribution Of Employees And Payroll By Size Of Weekly Wage

(1)	(2)		(3)	
Ratio Actual Wage To Av. Wage	Percent Total Employee With Wages Equal To Or Less Than Col. (1)		Index Of Total Payroll's Earned by Such Employees. Total Payroll=10,000	
	New Distribution	Old Distribution	New Distribution	Old Distribution
10%	.10	.02	0	0
15	.25	.06	2	1
20	.48	.14	6	2
25	.81	.32	13	7
30	1.27	.65	26	17
35	1.92	1.24	47	37
40	2.89	2.20	83	76
45	4.31	3.66	144	142
50	6.28	5.75	237	246
55	9.05	8.56	382	401
60	12.73	12.14	593	616
65	17.16	16.48	870	898
70	22.08	21.52	1201	1251
75	27.49	27.13	1592	1672
80	33.24	33.15	2037	2154
85	39.01	39.39	2512	2684
90	44.85	45.68	3022	3250
95	50.66	51.85	3559	3836
100	56.45	57.76	4122	4427
105	61.60	63.31	4649	5010
110	66.35	68.41	5159	5573
115	70.66	73.03	5642	6104
120	74.40	77.15	6081	6599
125	77.68	80.77	6482	7051
130	80.52	83.91	6843	7459
135	83.16	86.61	7193	7824
140	85.41	88.91	7501	8146
145	87.35	90.86	7777	8429
150	88.97	92.49	8016	8673
155	90.34	93.85	8224	8884
160	91.64	94.98	8429	9065
165	92.90	95.91	8633	9219
170	94.12	96.62	8837	9350
175	94.94	97.31	8978	9460
180	95.66	97.82	9106	9552
185	96.34	98.24	9229	9630
190	97.00	98.58	9353	9694

EXHIBIT VIII (CONT'D)

Smoothed Cumulative Distribution Of Employees And Payroll By Size Of Weekly Wage

(1) Ratio Actual Wage To Av. Wage	(2) Percent Total Employees With Wages Equal To Or Less Than Col. (1)		(3) Index Of Total Payroll's Earned By Such Employees. Total Payroll=10,000	
	New Distribution	Old Distribution	New Distribution	Old Distribution
195	97.55	98.86	9459	9749
200	98.00	99.03	9547	9793
205	98.32	99.26	9612	9830
210	98.60	99.41	9670	9861
215	98.83	99.53	9719	9888
220	99.03	99.63	9762	9910
225	99.19	99.71	9793	9928
230	99.32	99.77	9827	9942
235	99.43	99.82	9853	9954
240	99.53	99.86	9876	9963
245	99.62	99.89	9898	9971
250	99.68	99.92	9913	9978
255	99.73	99.94	9926	9983
260	99.77	99.96	9936	9988
265	99.81	99.98	9946	9994
270	99.85	100.00	9957	10000
275	99.88	100.00	9965	10000
280	99.91	100.00	9974	10000
285	99.94	100.00	9982	10000
290	99.96	100.00	9988	10000
295	99.98	100.00	9994	10000
300	100.00	100.00	10000	10000

PART III — DETERMINATION OF THE EFFECT ON BENEFIT COSTS RESULTING FROM LEGISLATIVE ENACTMENT OF A HYPOTHETICAL LAW AMENDMENT

The purpose of this part is to present the student with a general example of the manner in which the effects of law amendment on benefit costs are calculated when based on the accident and wage distributions established in Parts II and III. The following calculations were performed by type of benefit (i.e. Fatal, Permanent Total, Major and Minor Permanent Partial and Temporary Total) in accordance with standard procedure as presented to and adopted by The National Association of Insurance Commissioners. Before continuing with explanations of the exhibits, however, it may serve a useful purpose to clarify certain basic notions and to define the technical terminology underlying the computations.

A. **Definitions:** The effect on benefit costs for a specific type of benefit, resulting from a change in benefit provisions of the Workmen's Compensation Law, may be expressed by the following relationships:

(1) $$\text{Effect of Amendment} = \frac{\text{Monetary Cost (After Amendment)}}{\text{Monetary Cost (Before Amendment)}}$$

where

(2) Monetary Cost = The Cost Expressed in Units of Weeks Wages × The Average Weekly Benefit Payable

which are further defined

(3) Cost in Weeks Wages = Accident Frequency × Commuted Benefit Duration

(4) Average Weekly Benefit = Average Weekly Wage × % Rate of Compensation × Limit Factor

Thus, the relationship indicated in (1) above is expressed in its simplest elements for the purpose of computation:

(5) $$\text{Effect of Amendment} = \frac{\text{Monetary Cost (After Amendment)}}{\text{Monetary Cost (Before Amendment)}}$$

$$= \frac{\text{Acc. Freq.} \times \text{Commuted Duration} \times \text{Av. Wage} \times \% \text{ Rate} \times \text{Limit Factor}}{\text{Acc. Freq.} \times \text{Commuted Duration} \times \text{Av. Wage} \times \% \text{ Rate} \times \text{Limit Factor}}$$

(Cost In Weeks Wages) (Average Weekly Benefit)

B. **Source of Elements:** The accident frequencies referred to in the basic formula, above, are taken from the accident distributions of the Workmen's Compensation Injury Table. The Benefit Duration, before commutation, is usually specified in the Workmen's Compensa-

tion Act. Some Acts do not expressly specify a Benefit Duration but do provide for a maximum amount payable in aggregate. In which instance, the

Amount payable = Benefit Duration × Average Weekly Benefit

and by simple algebraic transposition, the

$$\text{Benefit Duration} = \frac{\text{Amount Payable}}{\text{Average Weekly Benefit}}$$

The Average Weekly Wage is taken from the National Council's Semi-Annual Call for Wage Data which is based on the latest available compensable injury wage experience. The % Rate of Compensation is also specified in the Act, usually indicating that benefits are payable at (×)% of the injured workman's average weekly wage. The Limit Factor involves a separate calculation based on the wage distribution table established in Part II.

C. **The Limit Factor:** This factor serves to measure the effect of the minimum and maximum weekly benefit limitations specified in the Workmen's Compensation Act. The Average Weekly Wage to which the calculations are keyed cannot be used for determining the Average Weekly Benefit without adjusting for the effect of weekly compensation limitations. Due to these limits, the effective % rate of compensation may differ from the percentage rate specified by statute. For example, in our hypothetical calculations, the statutory limits imposed by the Act are $5.00 minimum and $25.00 maximum. Since Compensation is payable at the rate of 50% of average weekly wages, an injured employee who earns more than $50.00 ($25 ÷ .50) per week would receive less than 50% of his wages as benefits and, conversely, an injured employee who earns less than $10.00 ($5 ÷ .50) per week would receive more than 50% of his wages as benefits. Employees earning between $10.00 and $50.00 weekly would, of course, not be subject to the minimum and maximum limits and, therefore, receive exactly 50% of his wages as benefits.

The following exhibit may serve to illustrate the characteristics and operations involved in a Limit Factor calculation. It will be noted, in this illustration, that the Effect of Amendment (1.395) results from the ratio of Average Weekly Benefit of which 33⅓% (.6667÷.50) is due to the change in the % Rate of Compensation and 4.6% (.8873 ÷ .8481) is due to the change in minimum and maximum weekly benefits, or stated in another way, the ratio of Limit Factors, before and after amendment, will produce the effect of amendment resulting from a change in weekly benefit limits.

Fortunately, it is not necessary to become involved in this rather lengthy calculation in order to determine Limit Factors. In Exhibit VII, we have computed Limit Factors in a less time consuming but equally accurate manner. An explanation of this latter calculation appears in the following "Explanation of Exhibits."

LIMIT FACTOR CALCULATION AND EFFECT OF LAW AMENDMENT
(Based on Revised Wage Distribution - PART II, EXHIBIT VII)

Hypothetical Workmen's Compensation Law and Law Amendment:	After Amendment	Before Amendment
(1) - State Average Weekly Wage	$50.00	$50.00
(2) - Rate of Compensation - % of Average Weekly Wage	66 2/3	50
(3) - Minimum Weekly Benefit Specified by Act	10.00	5.00
(4) - Maximum Weekly Benefit Specified by Act	36.67	25.00

(5) Ratio Of Actual Wage To Average Wage	(6) Number of Injured Employees	(7) LAW AFTER AMENDMENT Average Weekly Benefits (1) x (2) x Midpoint (5) Without Limits	(8) LAW AFTER AMENDMENT Average Weekly Benefits (1) x (2) x Midpoint (5) With Limits	(9) LAW BEFORE AMENDMENT Average Weekly Benefits (1) x (2) x Midpoint (5) Without Limits	(10) LAW BEFORE AMENDMENT Average Weekly Benefits (1) x (2) x Midpoint (5) With Limits	(11) LIMIT FACTOR After Amend. (8)÷(7)	(12) LIMIT FACTOR Before Amend. (10)÷(9)	(13) Effect Of Law Amendment (8)÷(10)
Under 20%	48	$ 4.44	$10.00*	$ 3.34	$ 5.00*	2.252	1.497	2.000
20 - 30	79	8.33	10.00*	6.25	6.25	1.200	1.000	1.600
30 - 40	162	11.67	11.67	8.75	8.75	1.000	1.000	1.334
40 - 50	339	15.00	15.00	11.25	11.25	1.000	1.000	1.333
50 - 60	645	18.33	18.33	13.75	13.75	1.000	1.000	1.333
60 - 70	935	21.66	21.66	16.25	16.25	1.000	1.000	1.333
70 - 80	1116	25.00	25.00	18.75	18.75	1.000	1.000	1.333
80 - 90	1161	28.33	28.33	21.25	21.25	1.000	1.000	1.333
90 -100	1160	31.67	31.67	23.75	23.75	1.000	1.000	1.333
100 -110	990	35.00	35.00	26.25	25.00†	1.000	.9524	1.400
Over -110%	3365	47.96	36.67†	35.96	25.00†	.7646	.6952	1.467
Total or Average	10000	$33.35	$29.59	$25.01	$21.21	.8873	.8481	1.395

*Minimum weekly benefit applicable
†Maximum weekly benefit applicable

D. Explanation of Exhibit I to X

EXHIBIT I — ANALYSIS AND COMPARISON OF BENEFIT PROVISIONS

This exhibit is a summary of the assumed benefit provisions of the Compensation Act before and after amendment and serves to present in abbreviated form those features which are to be valued. In selecting this hypothetical illustration, an attempt has been made to select an example which will serve to illustrate the standard procedure and, at the same time, to avoid unnecessary complications of a technical nature which are matters of detail rather than of fundamental principle.

EXHIBITS II, II-A AND II-B — FATAL CALCULATIONS

Exhibits II-A and II-B involve the determination of benefit costs expressed in Units of Weeks Wages, that is to say, the Monetary Cost at a $1.00 weekly benefit rate. The first four columns constitute the frequency, dependency and age distributions of the Workmen's Compensation Injury Table for 1,000 Fatal cases. Since the benefits under the law before and after amendment are payable for limited periods, the arithmetic average age has been used in these calculations instead of the pension age referred to in Part I.

Column (5) shows the standard annuity symbols for 312 weeks (or 6 years) and for 400 weeks (or 7.692 years) before and after amendment, respectively.

$\bar{a}'_{x\,:\,\overline{y}|}$ = An annuity payable momently to a widow age (x) for (y) years provided she lives and remains unmarried (′) during the allowed benefit period.

$\bar{a}_{x\,:\,\overline{y}|}$ = An annuity payable momently to a single dependent age (x) for (y) years provided the dependent lives during the allowed benefit period.

$a_{\overline{y}|}$ = An annuity certain payable at the end of each week for (y) weeks.

This symbol was employed where the Workmen's Compensation Injury Table indicated the existence of more than one dependent and assumes that at least one dependent will survive the benefit period to receive compensation benefits.

Column (6) shows the present value of an annuity of 1 per year for the annuity symbol shown in column (5).

Column (7) shows the present value of an annuity of 1 per week for the annuity symbols shown in column (5). For Widow alone cases, the annuity value was computed from Commutation Columns based

on U. S. Life Tables (White Females) 1939-41 and American Remarriage Tables at a 2½% interest rate. An extract of these particular Commutation Columns are appended as Exhibit X. For other single dependencies, the annuity values were computed from Commutation Columns based solely on U. S. Life Tables (Total Population) 1939-41 at a 2½% interest rate. An extract of these Commutation Columns are appended as Exhibit IX. Where the Workmen's Compensation Injury Table indicates multiple dependencies the specified duration were discounted merely for interest at 2½%.

Column (8) shows the Cost In Weeks Wages.

Exhibit II shows the development of Total Monetary Cost for Fatal. This exhibit is self-explanatory.

EXHIBITS III, III-A, III-B AND III-C — PERMANENT PARTIAL CALCULATIONS

The first four columns of Exhibits III-A, III-B and III-C are taken from the Workmen's Compensation Injury Table. The number and type of injury are shown in column (1); the number of cases in column (2); the percent loss of use in column (3); the average duration of temporary total disability (Healing Period) in column (4). Dismemberment is taken as 100% except for "other" cases where the percentage shown is the percent of Permanent Total disability.

Column (5) shows the benefit durations provided in the schedule of the Compensation Act for each member. The Compensation Law is assumed to provide that dismemberment of an arm below the elbow or leg below the knee is equivalent to the loss of a hand or foot respectively.

Column (6) shows the number of weeks benefit payable as the product of the schedule duration for 100% loss times the percent loss shown in column (3). Where such product is greater than 52 weeks, the present value of an annuity certain of 1 per week, with payment at the end of the week, has been entered in lieu of the uncommuted duration represented by the product. Because of the extremely slight commutation effect, durations of less than 52 weeks were not discounted for 2½% interest.

Column (7) shows the cost of Permanent Partial injuries expressed in Units of Weeks Wages and column (8) the cost of the Healing Period similarly expressed.

Exhibit III uses the costs, thus determined, in order to arrive at the Total Monetary Cost for Major and Minor Permanent Partial separately.

EXHIBIT IV — PERMANENT TOTAL CALCULATION

This exhibit shows the operations involved in determining the Total Monetary Cost. The effect of amendment shown on Line (11) could have been more easily obtained simply by taking a ratio of

Average Weekly Benefits, Line (9), since the elements which make up the Cost In Weeks Wages were unchanged by amendment. The determination of Total Cost is computed for the sake of completeness. The number of cases shown on Line (1) were taken from the Workmen's Compensation Injury Table. Line (2) shows the standard annuity symbol for the 520 week, uncommuted, benefit duration specified in the Compensation Act before and after amendment. Line (3) shows the present value of the annuity of 1 per year for the annuity symbol shown on Line (2) and the annuity value of 1 per week on Line (4). The present value of this annuity was determined from Commutation Columns based on U. S. Life Tables 1939-41 (Total Population) at 2½% interest rate (See Exhibit IX).

EXHIBIT V — TEMPORARY TOTAL CALCULATION

The Cost expressed in Units of Weeks Wages for this particular calculation is based on the Temporary Total Distributions of the Workmen's Compensation Injury Table (See Exhibit F-V, Part I). We first enter Exhibit F-V at the eighth day of disability since benefits do not become payable until the eighth day because of the seven day waiting period specified by statute. It is found from column (4) Exhibit F-V, that for cases lasting eight days or more we can expect 1,201,902 total days of disability. As compensation payments become retroactive to the date of injury after 28 days, before amendment, it is necessary to determine the additional days' disability resulting from the "retroactive" feature of the Compensation Law. It is found from column (3), Exhibit F-V, that there are 14,688 cases where Temporary Total disability exceeds 28 days. As the initial waiting period is seven days, these additional cases involve 102,816 days ($14{,}688 \times 7$). The Total Number of Days' Disability, therefore, is 1,201,902 plus 102,816. The division of the total by 7 days produces the cost expressed in Units of Weeks Wages or 186,388. The application of the Average Weekly Benefit to this figure results in the Total Monetary Cost.

EXHIBIT VI — MEDICAL CALCULATION

In our hypothetical example, we have assumed that prior to amendment, the Compensation Act provided for a maximum medical of $500 with no monetary maximum subsequent to amendment. Exhibit F-VI, Part I, shows that if medical losses were unlimited, 20.1% of the total medical losses would result from medical losses in excess of $500 per claim. The other 79.9% of total medical losses represent medical losses with a $500 per claim limit. In other words, if the monetary limit on medical losses were to be removed, the amount of medical losses incurred would increase by the ratio of 100% to 79.9% or 25.2% ($100.0 \div 79.9 = 1.252$).

It is known that insurance carriers sometimes pay medical losses

in excess of the statutory limit when the payment of such medical will speed recovery or reduce the amount of terminal disability. In calculating the effect of medical amendments, the amount paid in excess of the statutory amount is taken into consideration. For this example, it is assumed that of the total medical paid on the basis of the law prior to amendment, 7.5% of the total medical represents medical in excess of $500 per claim. The medical amendment under this condition would, therefore, be equal to $(1.000 - .075) \times 1.252 = 1.158$ or an increase of 15.8% in the medical already paid.

EXHIBIT VII
EXPLANATION OF LIMIT FACTOR CALCULATION

This exhibit shows the calculations to recognize the fact that, due to the minimum and maximum limits to weekly compensation specified in most Acts, the actual effective rate of compensation may be different from the percentage rate specified by the statute.

The unnumbered column at the extreme left of Exhibit VII is merely an identification column. The figures in this column indicate 10% of the average weekly wage, 20% of such average, 30%, and so on.

Column (A) is based on the standard wage distribution and shows the percentage of workers receiving the percentage, or less, of the average wage indicated in the preceding column. Thus, 6.28% of the workers receive a wage equal to, or less than, 50% of the average wage; 56.45% of the workers receive a wage equal to, or less than, 100% of the average wage, etc.

Column (B) shows, as index numbers, the summation of wages received by the percentage of workers shown in Column A. Thus, 237 is the index number representing the wages received by the 6.28% of employees who receive a wage equal to, or less than, 50% of the average wage.

Lines (1) and (2) are merely identifying items.

Line (3) shows the nominal percentage of weekly wages payable as compensation.

Lines (4) and (5) show the minimum and maximum weekly limits to compensation, as specified by the Act.

Lines (6) and (7) show the weekly wage required to produce the minimum and maximum weekly compensation shown on Lines (4) and (5) respectively, at the statutory percentage rate shown on Line (3).

Line (9) is the average weekly wage based on injury cases occurring in the State.

Lines (10), (11), (12) and (13) express the minimum and maximum effective weekly wage [Lines (6) and (7)] as percentages of the state average weekly wage shown on Line (9).

Line (14) is an index number representing the total wages received by all employees receiving a weekly wage equal to, or less than, the effective minimum weekly wage shown on Line (6). The

figure shown on Line (14) is the figure of Column B corresponding to the ratio shown on Line (12).

Line (15), similarly, represents the total wages received by all employees receiving a weekly wage equal to, or less than, the maximum effective weekly wage shown on Line (7). The figure shown on Line (15) is the figure of Column B corresponding to the ratio shown on Line (13).

Line (16), therefore, which is the difference between Lines (15) and (14), represents the total wages received by all employees receiving wages between the minimum and maximum.

Line (17) represents the percentage of employees receiving a wage equal to or less than the minimum and is the figure of Column A corresponding to the ratio shown on Line (12).

Line (18) represents the percentage of employees receiving wages equal to or less than the maximum and is the figure of Column A corresponding to the ratio shown on Line (13).

Line (19), which is the difference between 100% and Line (18) represents the percentage of employees receiving wages equal to or greater than the maximum.

Line (20) represents the effective wage income of employees receiving the minimum weekly compensation.

Line (21) represents the effective income of employees receiving the maximum weekly compensation. The sum of Lines (16), (20) and (21) represents the effective wage of all employees related to the index 10,000 as representing total actual wages.

Line (22) is the "Limit Factor" representing the average effect of the minimum and maximum limits. In other words the limit factor represents the reduction in this example, due to the limits, from those compensation benefits which would be applicable in the absence of limits.

EXHIBIT VIII — PURE PREMIUM MULTIPLIER AND OVERALL EFFECT

This exhibit uses the State actual loss experience for the two latest available policy periods for the purpose of determining the Serious and Non-Serious Pure Premium Multipliers and Overall Effect of Law Amendment. The Serious Pure Premium Multiplier of 1.587, involving Fatal, Permanent Total and Major Permanent Partial benefits, is determined by taking the sum of column (4) for the same injuries and dividing by the sum of column (2), (11,209,887 ÷ 7,063,970). The Non-Serious Pure Premium Multiplier is determined by taking the sum of column (4) for Minor Permanent Partial and Temporary Total benefits and dividing by the sum of column (2) for the same benefits, (5,213,511 ÷ 3,647,580). The Overall Effect of Amendment is determined by taking the sum of column (4) for all injuries and dividing by the sum of column (2), (22,625,374 ÷ 16,067,324).

EXHIBIT I - ANALYSIS AND COMPARISON OF BENEFIT PROVISIONS

Law Effective Before Amendment	Law Effective After Amendment
FATAL	
Rate of Compensation: 50% of average weekly wages	Rate of Compensation: 66 2/3% of average weekly wages
Maximum weekly: $25.00	Maximum weekly: $36.67
Minimum weekly: $ 5.00	Minimum weekly: $10.00
Maximum duration: 312 weeks	Maximum duration: 400 weeks
Burial: $200.00	Burial: $250.00
Upon death of widow or widower, compensation shall be paid to other dependents.	Upon death of widow or widower, compensation shall be paid to other dependents.
PERMANENT TOTAL	
Rate of Compensation: 50% of average weekly wages	Rate of Compensation: 66 2/3% of average weekly wages
Maximum weekly: $25.00	Maximum weekly: $36.67
Minimum weekly: $ 5.00	Minimum weekly: $10.00
Maximum duration: 520 weeks	Maximum duration: 520 weeks
PERMANENT PARTIAL	
Rate of Compensation: 50% of average weekly wages	Rate of Compensation: 66 2/3% of average weekly wages
Maximum weekly: $25.00	Maximum weekly: $36.67
Minimum weekly: $ 5.00	Minimum weekly: $10.00
Specific schedule: 13 - 225 weeks	Specific schedule: 13 - 250 weeks
Temporary Total payable during healing period	Temporary Total payable during healing period
TEMPORARY TOTAL	
Rate of Compensation: 50% of average weekly wages	Rate of Compensation: 66 2/3% of average weekly wages
Maximum weekly: $25.00	Maximum weekly: $36.67
Minimum weekly: $ 5.00	Minimum weekly: $10.00
Maximum duration: 520 weeks	Maximum duration: 520 weeks
Waiting period 7 days, retroactive after 28 days	Waiting period 7 days, retroactive after 21 days
MEDICAL	
No limit on duration. Monetary limit of $500.	No limit with respect to either duration or monetary amount

EXHIBIT II

FATAL - CALCULATION OF MONETARY COSTS AND EFFECT OF AMENDMENT

	(a) Workmen's Compensation Law Before Amendment	(b) Workmen's Compensation Law After Amendment
1. Cost Expressed in Units of Weeks Wages - (See Totals Exhibit IIA and IIB)	244,404	304,039
2. Average Weekly Wage	$50.00	$50.00
3. Rate of Compensation	.50	.66-2/3
4. Limit Factor (See Exhibit VII)	.8431	.8373
5. Average Weekly Benefit (2)x(3)x(4)	$21.20	$29.57
6. Cost of Dependency (1)x(5)	$5,181,365	$8,990,433
7. Funeral Costs, per case	$200	$250
8. Cost of 1,000 Funerals	$200,000	$250,000
9. Total Monetary Cost (6)+(8)	$5,381,365	$9,240,433
10. Effect of Amendment on Fatal Benefit Cost (9b)÷(9a)		1.717

EXHIBIT IIA

VALUATION OF FATAL BENEFIT PROVISIONS

LAW BEFORE AMENDMENT

(1) No.Of Cases 1,000	(2) Person Receiving Compensation	(3) No.Of Depen-dents	(4) Aver. Age (Arith.)	(5) Annuity Symbol	(6) Annuity Value 1 Per Yr.	(7) 1 Per Wk.	(8) Cost in Weeks Wages (1)x(7)
139	None	None	XXX	XX	XX	XX	XX
342	Widow alone	1	50	$a^{\$}50:\overline{6}/$	5.3359	277.47	94,895
155	Widow with child	1 1	35 8	$a\overline{312}/$		239.37	44,930
117	Widow with children	1 2	35 3	"		"	33,915
64	Widow with children	1 3	35 8	"		"	13,552
32	Widow with children	1 4	35 3	"		"	9,276
13	Widow with children	1 5	35 3	"		"	3,763
15	Widow with (More) children(than5)	1 7*	35 8	"		"	4,343
13	Orphan	1	11	$a\overline{11:6}/$	5.5593	239.11	5,204
10	Orphans	2	11	$a\overline{312}/$		239.37	2,399
4	Orphans	3	11	"		"	1,159
2	Orphans	4	11	"		"	580
2	Orphans(More than 4)	5*	11	"		"	580
4	Widow and parent	1 1	39 61	"		"	1,159
1	Widow and Other dependent	1 1*	50 43	"		"	290
40	Parent	1	61	$a\overline{61:6}/$	5.1533	267.97	10,719
27	Parents	2	56	$a\overline{312}/$		239.37	7,326
4	Brother or Sister	1	43	$a\overline{43:6}/$	5.4607	283.96	1,136
1	Brothers or Sisters	2	43	$a\overline{312}/$		239.37	290
1	Brothers or Sisters	4*	43	"		"	290
2	Parent Brother or Sister	1 1	51 13	"		"	580
1	Parent Brothers or Sisters	1 2	51 13	"		"	290
2	Parent Brothers or Sisters	1 4*	51 13	"		"	580
3	Parents Brothers or Sisters	2 2*	51 13	"		"	870
1	Other Dependents	1*	61	$a\overline{61:6}/$	5.1533	267.97	268
	*Average					Total	244,404

EXHIBIT IIB

VALUATION OF FATAL BENEFIT PROVISIONS

LAW AFTER AMENDMENT

(1) No.Of Cases 1.000	(2) Person Receiving Compensation	(3) No.Of Depen-dants	(4) Aver. Age (Arith.)	(5) Annuity Symbol	(6) Annuity Value 1 Per Yr. 1	(7) Per Wk.	(8) Cost in Weeks Wages (1)x(7)
139	None	None	XXX	XX	XX	XX	XX
342	Widow alone	1	50	$a^{1}50:\overline{76923}$	6.6163	344.07	117,672
155	Widow with child	1 1	35 8	$a\overline{400}$		364.15	56,443
117	Widow with children	1 2	35 3	"		"	42,606
64	Widow with children	1 3	35 8	"		"	23,306
32	Widow with children	1 4	35 8	"		"	11,653
13	Widow with children	1 5	35 8	"		"	4,734
15	Widow with children (More than 5)	1 7*	35 8	"		"	5,462
18	Orphan	1	11	$a\overline{11:7}^{\dagger}$	6.4048	333.05	5,995
10	Orphans	2	11	$a\overline{364}$		334.14	3,341
4	Orphans	3	11	"		"	1,337
2	Orphans	4	11	"		"	668
2	Orphans (More than 4)	5*	11	"		"	668
4	Widow and parent	1 1	39 61	"		"	1,457
1	Widow and Other dependent	1 1*	50 43	"		"	364
40	Parent	1	61	$a\overline{61:76923}$	6.3059	327.91	13,116
27	Parents	2	56	$a\overline{400}$		364.15	9,832
4	Brother or Sister	1	43	$a\overline{43:76923}$	6.3101	354.13	1,417
1	Brothers or Sisters	2	43	$a\overline{400}$		364.15	364
1	Brothers or Sisters	4*	43	"		"	364
2	Parent Brother or Sister	1 1	51 13	"		"	728
1	Parent Brothers or Sisters	1 2	51 13	"		"	364
2	Parent Brothers or Sisters	1 4*	51 13	"		"	728
3	Parents Brothers or Sisters	2 2*	51 13	"		"	1,092
1	Other Dependents	1*	61	$a\overline{61:76923}$	6.3059	327.91	328
	*Average					Total	304,039

†Compensation to cease at age 18.

EXHIBIT III

Permanent Partial - Calculation of Monetary Cost and Effect of Amendment

		(a) Workmen's Compensation Act Before Amend.	(b) Workmen's Compensation Act After Amend.
A.	MAJOR PERMANENT PARTIAL		
1.	Cost Expressed in Units of Weeks Wages (See Totals Exhibits III-A)	195,283	204,110
2.	Average Weekly Wage	$50.00	$50.00
3.	Rate of Compensation	.50	.66-2/3
4.	Limit Factor (See Exhibit VII	.8481	.8873
5.	Average Weekly Benefit (2)x(3)x(4)	$21.20	$29.57
6.	Total Monetary Cost (1)x(5)	$4,140,000	$6,035,533
7.	Effect of Amendment on Major Perm. Part. Benefit Cost (6b)÷(6a)	-	1.458
B.	MINOR PERMANENT PARTIAL		
8.	Cost Expressed Units of Weeks Wages (See Totals Exhibit III-B and III-C)	63,584	65,602
9.	Average Weekly Benefit (Same as Major)	$21.20	$29.57
10.	Total Monetary Cost (8)x(9)	$1,347,981	$1,939,851
11.	Effect of Amendment on Minor Perm. Part. Benefit Cost (10b)÷(10a)	-	1.439

EXHIBIT XXI-A

CALUATION OF MAJOR PERMANENT PARTIAL

(1) Type Injury	(2) No.Of Cases	(3) % Loss	(4) Aver. Heal. Period (Wks.)	(5) Weeks Duration Benefit Sched. At 100%	(6) Weeks Payable* (3)x(5)	(7) Cost In Wks. Compensation Schedule Injuries (2)x(6)	(8) Wages Healing Period (2)x(4)
LAW BEFORE AMENDMENT							
Arm:							
Dism. at or above elbow	33	100%	29	225	213.32	7,040	957
Dism. below elbow	16	100	20	175	167.87	2,686	320
Loss of use	74	62	37	225	134.94	9,986	2,738
Hand:							
Dismemberment	64	100	21	175	167.87	10,744	1,344
Loss of Use	114	68	26	175	115.67	13,186	2,964
Leg:							
Dism. at or above knee	32	100	49	208	197.99	6,336	1,568
Dism. below knee	13	100	49	156	150.31	1,954	637
Loss of Use	73	62	51	208	125.05	9,129	3,723
Foot:							
Dismemberment	14	100	36	156	150.31	2,104	504
Loss of use	48	60	39	156	91.52	4,393	1,872
Eye:							
Enucleation	50	100	14	156	150.31	7,516	700
Loss of use	127	97	16	156	145.96	18,537	2,032
Hearing:							
Both ears	1	70	28	156	106.39	107	28
Other Maj.(Relat.to P.T.)	341	40(P.T.)	43	520	197.99	67,515	14,663
TOTAL MAJOR PERM.	1000	XX	XX	XX	XX	161,233	34,050
LAW AFTER AMENDMENT							
Arm:							
Dism. at or above elbow	33	100%	29	250	235.64	7,776	957
Dism below elbow	16	100	20	208	197.99	3,168	320
Loss of use	74	62	37	250	149.39	11,055	2,738
Hand:							
Dismemberment	64	100	21	208	197.99	12,671	1,344
Loss of use	114	68	26	208	136.75	15,590	2,964
Leg:							
Dism. at or above knee	32	100	49	225	213.32	6,826	1,568
Dism. below knee	13	100	49	175	167.87	2,182	637
Loss of use	73	62	51	225	134.94	9,851	3,723
Foot:							
Dismemberment	14	100	36	175	167.87	2,350	504
Loss of use	48	60	39	175	102.40	4,916	1,872
Eye:							
Enucleation	50	100	14	156	150.31	7,516	700
Loss of use	127	97	16	156	145.96	18,537	2,032
Hearing:							
Both ears	1	70	28	156	106.39	107	28
Other Maj.(relat.to P.T.)	341	40(P.T.)	43	520	197.99	67,515	14,663
TOTAL MAJOR PERM. PART.	1000	XX	XX	XX	XX	170,060	34,050

*Use commuted duration if over 52 weeks

EXHIBIT III-B

VALUATION OF MINOR PERMANENT PARTIAL

LAW BEFORE AMENDMENT

(1) Type Injury	(2) No.Of Cases	(3) % Loss	(4) Aver. Heal. Period (Wks.)	(5) Weeks Duration Benefit Sched. At 100%	(6) Weeks Payable* (3)x(5)	(7) Cost In Wks. Wages Schedule Injuries (2)x(6)	(8) Healing Period (2)x(4)
Thumb:							
Dism. 1 phalange	18	100%	9	30	30	540	162
Dism. 2 or more phalange	9	100	11	60	59.14	532	99
Loss of use	112	26	7	60	15.60	1,747	784
Index Finger:							
Dism. 1 phalange	47	100	7	12 2/3	12.67	595	329
Dism. 2 or more phalange	37	100	12	38	38	1,406	444
Loss of use	170	34	6	38	12.92	2,196	1,020
Middle Finger:							
Dism. 1 phalange	43	100	6	10	10	430	258
Dism. 2 or more phalange	31	100	14	30	30	930	434
Loss of use	139	31	6	30	9.30	1,293	834
Ring Finger:							
Dism. 1 phalange	26	100	5	8 1/3	8.33	217	130
Dism. 2 or more phalange	21	100	10	25	25	525	210
Loss of use	101	32	5	25	8	808	505
Little Finger:							
Dism. 1 phalange	17	100	5	6 2/3	6.67	113	85
Dism. 2 or more phalange	19	100	8	20	20	380	152
Loss of use	84	37	6	20	7.40	622	504
Great Toe:							
Dism. 1 phalange	2	100	9	19	19	38	18
Dism. 2 phalange	2	100	16	38	38	76	32
Loss of use	69	26	6	38	9.88	682	414
Other Toes:							
Dismemberment	10	100	8	13	13	130	80
Loss of use	38	32	7	13	4.16	158	266
Hearing: One Ear	5	47	21	52	24.44	122	105
Loss of use of:							
Arm	116	15	16	225	33.75	3,915	1,856
Hand	171	16	12	175	28.00	4,788	2,052
Leg	123	15	21	208	31.20	3,838	2,583
Foot	129	15	15	156	23.40	3,019	1,935
Eye	33	19	10	156	29.64	978	330
Hearing(2 ears)	3	22	22	156	34.32	103	66
Other (Related to P.T.)	313	8(P.T.)	15	520	41.60	13,021	4,695
TOTAL MINOR PERM. PART.	1888	XX	XX	XX	XX	43,202	20,382

*Use commuted duration if over 52 weeks

EXHIBIT IIIC

VALUATION OF MINOR PERMANENT PARTIAL

LAW AFTER AMENDMENT

(1) Type Injury	(2) No.Of Cases	(3) % Loss	(4) Aver. Heal. Period (Wks.)	(5) Weeks Duration Benefit Sched. At 100%	(6) Weeks Payable* (3)x(5)	(7) Cost in Wks. Wages Schedule Injuries (2)x(6)	(8) Healing Period (2)x(4)
Thumb:Dism. 1 phalange	18	100%	9	30	30	540	162
Dism. 2 or more phalange	9	100	11	60	59.14	532	99
Loss of use	112	26	7	60	15.60	1,747	784
Index Finger:Dism.1 phalange	47	100	7	12-2/3	12.67	595	329
Dism.2 or more phalange	37	100	12	38	38	1,406	444
Loss of use	170	34	6	38	12.92	2,196	1,020
Middle Finger:Dism. 1 phalange	43	100	6	10	10	430	258
Dism. 2 or more phalange	31	100	14	30	30	930	434
Loss of use	139	31	6	30	9.30	1,293	834
Ring Finger:Dism. 1 phalange	26	100	5	8-1/3	8.33	217	130
Dism. 2 or more phalange	21	100	10	25	25	525	210
Loss of use	101	32	5	25	8	808	505
Little Finger:Dism. 1 phalange	17	100	5	6-2/3	6.67	113	85
Dism. 2 or more phalange	19	100	8	20	20	380	152
Loss of use	84	37	6	20	7.40	622	504
Great Toe:Dism. 1 phalange	2	100	9	19	19	38	18
Dism. 2 phalange	2	100	16	38	38	76	32
Loss of use	69	26	6	38	9.88	682	414
Other Toes:Dismemberment	10	100	8	13	13	130	80
Loss of use	38	32	7	13	4.16	158	266
Hearing: One Ear	5	47	21	52	24.44	122	105
Loss of use of:							
Arm	116	15	16	250	37.50	4,350	1,856
Hand	171	16	12	208	33.28	5,691	2,052
Leg	123	15	21	225	33.75	4,151	2,583
Foot	129	15	15	175	26.25	3,386	1,935
Eye	33	19	10	156	29.64	978	330
Hearing(2 ears)	3	22	22	156	34.32	103	66
Other(Related to P.T.)	313	8(P.T.)	15	520	41.60	13,021	4,695
TOTAL MINOR PERM.	1888	XX	XX	XX	XX	45,220	20,382

*Use commuted duration if over 52 weeks

EXHIBIT IV

PERMANENT TOTAL - CALCULATION OF MONETARY COST AND EFFECT OF AMENDMENT

	(a) Workmen's Compensation Law Before Amendment	(b) Workmen's Compensation Law After Amendment
1. Number of Permanent Total Cases	100	100
2. Annuity Symbol, years	$a_{\overline{50:10}}$	$a_{\overline{50:10}}$
3. Annuity Value, 1 per year	3.3132	3.3132
4. Annuity Value, 1 per week	432.29	432.29
5. Cost in Units of Weeks Wages (1)x(4)	43229	43229
6. Average Weekly Wage	$50.00	$50.00
7. Rate of Compensation	.50	66 2/3
8. Limit Factor	.8481	.8873
9. Average Weekly Benefit (6)x(7)x(8)	$21.20	$29.57
10. Total Monetary Cost (5)x(9)	$916,455	$1,278,232
11. Effect of Amendment on Perm. Total Benefit Cost (11b)÷(11a)	-	1.395

EXHIBIT V

TEMPORARY TOTAL - CALCULATION OF MONETARY COST AND EFFECT OF AMENDMENT

	(a) Workmen's Compensation Law Before Amendment	(b) Workmen's Compensation Law After Amendment
1. Waiting Period	7 Days	7 Days
2. Retroactive Feature Applicable After:	28 Days	21 Days
3. Total Days Disability Based On (1)	1,201,902(a)	1,201,902(a)
4. Additional Days Disability Based On (2)	(14,683x7 Days) 102,816(b)	(18,335x7 Days 131,345(c)
5. Cost in Units of Weeks Wages $\frac{(3)+(4)}{7 \text{ Days}}$	186,338	190,535
6. Average Weekly Wage	$50.00	$50.00
7. Rate of Compensation	.50	.66-2/3
8. Limit Factor	.8481	.8873
9. Average Weekly Benefit (6)x(7)x(8)	$21.20	$29.57
10. Total Monetary Cost (5)x(9)	$3,951,426	$5,634,120
11. Effect of Amendment on Temporary Total Benefit Cost (10b)÷(10a)	-	1.426

(a) See line 3, column 4, Exhibit F-V, Part I, Workmen's Compensation Injury Table.

(b) See line 9, column 3, Same Exhibit as note (a), above.

(c) See line 22, column 3, Same Exhibit as note (a), above.

EXHIBIT VI

Medical - Determination of the Effect of Amendment on Medical Cost

1.	Increase %, Unlimited From $500	20.1% (a)
2.	Increase Factor, 100% ÷ (100% - 20.1%)	1.252
3.	% of Hypothetical State Paid Medical Losses in Excess of $500	7.5% (b)
4.	Discount Factor (1.000 - .075)	.925
5.	Effect of Amendment on Medical Benefit Cost (2) x (4)	1.158

(a) See Exhibit F-VI, Part I

(b) Assumed % of medical losses paid by the carriers in excess of the statutory amount specified in the Compensation Act of our hypothetical state

EXHIBIT VII

LIMIT FACTOR CALCULATION

		Fatal and Disability	
(1)	Class of Injury	Before Amendment	After Amendment
(2)	Effective Date of Comp.Law		
(3)	Nominal % of Compensation	.50	.6667
(4)	Minimum Weekly Compensation	$5.00	10.00
(5)	Maximum Weekly Compensation	$25.00	36.67
(6)	Eff.Weekly Wage for Min.Benefits (4)÷(3)	$10.00	15.00
(7)	Eff.Weekly Wage for Max.Benefits (5)÷(3)	$50.00	55.00
(8)	Policy Year		(Not Used)
(9)	Average Weekly Wage	$50.00	$50.00
(10)	Ratio to Aver.(Minimum) % (6)÷(9)	20	30
(11)	Ratio to Aver.(Maximum) % (7)÷(9)	100	110
(12)	Line (10) adjusted to nearest 5%	20	30
(13)	Line (11) adjusted to nearest 5%	100	110
(14)	(B) for (12) From Table Below	6	26
(15)	(B) for (13) From Table Below	4122	5159
(16)	Difference (15)-(14)	4116	5133
(17)	(A) for (12) From Table Below	.48	1.27
(18)	(A) for (13) From Table Below	56.45	66.35
(19)	Difference 100.00 - (13)	43.55	33.65
(20)	Product (10)x(17)	10	33
(21)	Product (11)x(19)	4355	3702
(22)	Limit Factor [(16)+(20)+(21)] + 10,000	.8431	.8873

Column (A) - Percentage of workers receiving not more than the average wage percentage indicated in preceding column.

Column (B) - Summation of Wages, as index numbers with 10,000 as the radix, received by the percentage of works shown in Column (A).

WORKMEN'S COMPENSATION WAGE DISTRIBUTION TABLE

Ratio To Average %	(A)	(B)	Ratio To Average %	(A)	(B)	Ratio To Average %	(A)	(B)
10	.10	0	110	66.35	5159	210	98.60	9670
15	.25	2	115	70.66	5642	215	98.83	9719
20	.48	6	120	74.40	6031	220	99.03	9762
25	.81	13	125	77.68	6382	225	99.19	9793
30	1.27	26	130	80.52	6343	230	99.32	9327
35	1.92	47	135	83.16	7193	235	99.43	9353
40	2.89	83	140	85.41	7501	240	99.53	9376
45	4.31	144	145	87.35	7777	245	99.62	9393
50	6.28	237	150	88.97	8016	250	99.63	9913
55	9.05	332	155	90.34	8224	255	99.73	9926
60	12.73	593	160	91.64	8429	260	99.77	9936
65	17.16	870	165	92.90	8633	265	99.81	9946
70	22.08	1201	170	94.12	8837	270	99.85	9957
75	27.49	1592	175	94.94	8978	275	99.88	9965
80	33.24	2037	180	95.66	9106	280	99.91	9974
85	39.01	2512	185	96.34	9229	285	99.94	9982
90	44.85	3022	190	97.00	9353	290	99.96	9988
95	50.66	3559	195	97.55	9459	295	99.98	9994
100	56.45	4122	200	98.00	9547	300	100.00	10000
105	61.60	4649	205	98.32	9612			

EXHIBIT VIII

DETERMINATION OF PURE PREMIUM MULTIPLIERS AND OVERALL EFFECT OF AMENDMENT

(1) Type of Benefit	(2) Assumed State Actual Loss Experience*	(3) Effect Of Amendment	(4) Actual Losses Adjusted To Amended Benefit Level (2)x(3)
Fatal	$3,659,930	1.717	$6,284,100
Permanent Total	592,290	1.395	826,245
Major Perm. Partial	2,811,750	1.458	4,099,532
Serious	7,063,970	(1.587)	11,209,877
Minor Perm. Partial	927,810	1.439	1,335,119
Temporary Total	2,719,770	1.426	3,878,392
Non-Serious	3,647,580	(1.429)	5,213,511
Medical	5,355,774	1.158	6,201,986
Total & Average	$16,067,324	(1.408)	22,625,374

*Latest 2 policy periods of actual loss experience developed in our hypothetical state, adjusted, if necessary, to reflect the benefit provisions of the Compensation Act before Amendment and converted to an ultimate Unit Statistical Plan reporting basis.

EXHIBIT IX - COMMUTATION COLUMNS

EXTRACT FROM COMMUTATION COLUMNS BASED ON U. S. LIFE TABLES AND ACTUARIAL TABLES 1939 - 41 FOR TOTAL POPULATION (2-1/2% INTEREST).

Age (x)	Commutation Columns D_x	$\bar{N}_x$	Age (x)	Commutation Columns D_x	$\bar{N}_x$
•	•	•			
•	•	•			
•	•	•			
8	77058	2332094	45	27673	518699
9	75105	2256013	46	26798	491463
10	73206	2181057	47	25934	465097
11	71356	2109576	48	25084	439588
12	69553	2039122	49	24245	414924
13	67790	1970450	50	23417	391093
14	66066	1903522	51	22600	368084
15	64376	1838301	52	21793	345888
16	62717	1774755	53	20997	324491
17	61093	1712850	54	20208	303869
18	59499	1652553	55	19429	284072
19	57938	1593835	56	18659	265028
20	56410	1536661	57	17897	246750
21	54915	1480999	58	17145	229229
22	53452	1426815	59	16401	212456
23	52022	1374078	60	15665	196423
24	50627	1322754	61	14939	181121
25	49265	1272808	62	14222	166540
26	47937	1224207	63	13515	152672
27	46644	1176916	64	12816	139506
28	45381	1130904	65	12127	127035
29	44148	1086139	66	11447	115248
30	42944	1042593	67	10776	104136
31	41768	1000237	68	10113	93692
32	40619	959044	69	9460.2	83905
33	39495	918987	70	8816.2	74767
34	38399	880040	71	8182.0	66268
35	37322	842179	72	7558.7	58397
36	36270	805383	73	6946.9	51144
37	35240	769628	74	6347.9	44497
38	34230	734893	75	5764.8	38441
39	33241	701158	76	5199.3	28032
40	32271	668402	77	4654.7	28032
41	31319	636607	78	4133.6	23638
42	30384	605755	79	3639.0	19751
43	29466	575830			
44	28562	546816			

EXHIBIT X - COMMUTATION COLUMNS

EXTRACT FROM COMMUTATION COLUMNS BASED ON U.S. LIFE TABLES AND ACTUARIAL TABLES (WHITE FEMALES) 1939-41 AND AMERICAN REMARRIAGE TABLES* (2-1/2% INTEREST)

Age (x)	Commutation Columns D_x^r	$\bar{N}_x^r$	Age	Commutation Columns D_x^r	$\bar{N}_x^r$
20	48303	553150	55	4534.1	67989.8
21	41891	508053	56	4352.5	63546.5
22	36547	466834	57	4174.9	59282.8
23	32106	434508	58	4001.9	55194.4
24	28450	404230	59	3832.4	51277.3
25	25372	377319	60	3666.3	47527.9
26	22814	353226	61	3503.3	43943.1
27	20637	331500	62	3342.5	40520.2
28	18817	311773	63	3184.5	37256.7
29	17233	293748	64	3028.3	34150.3
30	15864	277200	65	2874.3	31199.0
31	14680	261928	66	2722.1	28400.8
32	13644	247766	67	2571.6	25754.0
33	12734	234577	68	2422.2	23257.1
34	11926	222247	69	2274.5	20908.7
35	11204	210682	70	2128.3	18707.3
36	10556	199802	71	1983.2	16651.6
37	9973.6	189537	72	1839.6	14740.2
38	9448.6	179826	73	1697.9	12971.4
39	8970.1	170616	74	1558.9	11343.2
40	8532.4	161865	75	1425.4	9851.3
41	8130.3	153534	76	1294.8	8491.2
42	7758.1	145589	77	1167.6	7260.0
43	7414.1	138003	78	1044.6	6153.9
44	7094.5	130749	79	926.52	5168.3
45	6796.0	123804	80	814.17	4298.0
46	6516.0	117147	81	708.40	3536.7
47	6252.4	110763	82	609.67	2877.6
48	6002.4	104636	83	518.55	2313.5
49	5765.2	98751.8	84	435.54	1836.4
50	5538.6	93099.9	85	360.90	1438.2
51	5322.8	87099.2	86	294.69	1104.4
52	5114.7	82450.4	87	237.00	844.57
53	4914.7	77435.7	88	187.49	632.33
54	4721.5	72617.6	89	145.82	465.67

*See An American Remarriage Table by William F. Roeber and Ralph M. Marshall, Volume XIX, Proceedings CAS.

APPENDIX "A"

PERMANENT PARTIAL AND TEMPORARY TOTAL DISABILITY INSTRUCTIONS FOR PREPARATION OF "CALL FOR ACCIDENT STATISTICS"

The attached Call for Accident Statistics is to be filled out for all cases on which indemnity was paid, (except death, permanent total and occupational disease cases) from the information contained in the claim file at the time of closing, supplemented by such other information as may be readily available from other sources. The following instructions should be observed:

GENERAL

(a) Occupational disease cases shall not be reported.

(b) All cases involving "temporary disability," but no permanent disability, closed during one calendar month shall be reported.

(c) All cases involving "minor" permanent partial disability only, closed during three calendar months shall be reported.

(d) "Major" permanent partial cases shall be reported from a random selection of recent cases where the nature of the injury has been established. The random selection shall be made from any source which is readily convenient to the carriers and which includes all states in which the carrier operates. The number of cases reported shall be in accordance with the quota assigned to each carrier.

(e) One of the attached forms shall be submitted for each case report, filled out in accordance with the details of the case being reported. Check marks only are required in the squares. Appropriate figures shall be entered on the blank lines.

SPECIAL INSTRUCTIONS

(f) The "State" reported shall be the one to which the case is assigned.

(g) "Class Code" shall be the Workmen's Compensation Manual classification to which the case is assigned.

(h) "Date of Accident" reported shall be the date the accident occurred.

(i) "I TYPE OF INJURY." Indicate by check in the appropriate square the type of injury to which the case is assignable for the Unit Statistical Plan report.

(j) "II PRINCIPAL BASIS OF AWARD OR SETTLEMENT."

"(1) Dismemberment Schedule"
The compensation laws of most states provide specific schedules of duration of benefits for the loss of various members, such as a hand, foot, arm, leg, eye, finger, toe, etc., and such laws usually provide that partial loss of use shall be compensated in proportion to such schedule. Cases compensated in accordance with the schedule or proportional to the schedule shall be indicated by a check mark following item (1) on the form.

"(2) Related to Permanent Total"
Certain types of injury, such as back cases for example (all cases in California), are not provided for in a specific schedule, and the amount of compensation for permanent disability is determined on the basis of the percentage of total disability or resulting loss of earning power. Such cases shall be indicated by a check mark following item (2) on the form.

"(3) Temporary Only"
Item (3) on the form should be checked for cases involving temporary total or temporary partial disability only. The block "IV Disability Period — For Temporary Disability Cases" at the upper right hand side of the form shall also be filled in for these cases only.

"(4) Lump Sum"
Certain cases are closed on a compromise basis by a lump sum settlement. Such cases shall be indicated by a check mark following item (4) on the form.
The nature and location of injury shall nevertheless be filled in for these cases, and if the claim file does not disclose the percentage loss of use of member, or percentage of permanent total disability, it shall be determined by relating the amount of settlement to the amount that would be paid for complete loss of the member or permanent total disability.

(k) "III TOTAL INDEMNITY." Enter total amount of indemnity incurred, including indemnity for the specific injury, for the healing period, for disfigurement, and for any other reason, in this blank. Do not include medical losses.

(l) "IV DISABILITY PERIOD — FOR TEMPORARY DISABILITY CASES." The block at the upper right hand side of the form shall be filled in for each case involving temporary disability only. The duration of the period of disability shall include the "waiting period" provided by the Compensation Act. Report the disability period in weeks and days. In cases involving both total disability and partial disability show the total durations of each type of disability. In cases involving partial

disability give the average percent of partial disability as related to total disability, following item (3) on the form.

(m) "V NATURE AND LOCATION OF INJURY — PERMANENT DISABILITY CASES ONLY" "AGE." The age at date of accident shall be shown in the space provided on the form for each case involving permanent disability.

The nature and location of injury shall be shown by entering check marks or appropriate figures under items "1. ARM" to "16. HEALING PERIOD," inclusive. This information is not required on cases where no permanent disability was incurred.

Under item "1. ARM" and item "2. HAND" on the form, the first lines require a check mark after "Major (1)" or "Minor (2)". The right arm or hand is considered the "Major" arm or hand, except for a left handed person the left would be the "Major" arm or hand. In cases where specific information is lacking the right arm or hand shall be considered the "major" member. (This has nothing to do with the Type of Injury.)

Dismemberment (or enucleation of an eye) shall be indicated by a check mark in the appropriate square. It is desired that the physical facts of the case should be reported rather than the basis upon which compensation is awarded. For example some laws provide that amputation between the elbow and the wrist is equivalent to loss of hand; such case should be checked on the form opposite (3) under "1. ARM", provided the claim file reveals this information. Otherwise such a case would be indicated by entering the figure "100%" after dismemberment under item "2. HAND." Provision is made for entering a percentage figure rather than a check after dismemberment of hand to provide for those cases where only part of the hand is lost. However in case of dismemberment of several digits, the individual digits severed should be indicated and no entry made under "2. HAND", if the claim file gives this information, even though compensation may be based on partial loss of hand.

It is desired to keep "loss of use" cases separate from dismemberment cases even though the compensation may be the same. The appropriate percentage loss of use should be indicated, using 100% for complete loss of use, or a lesser figure for partial loss of use.

Dismemberment or loss of use of more than one digit should be indicated by checks or appropriate notation for each digit.

In the case of "13. OTHER TOES", show the number of

toes, using fractions if necessary. In case of loss of use of more than one toe, add the percentages, for example 30% of one toe plus 50% of another toe would appear as 80%.

If the award includes an amount for disfigurement show the amount awarded for such disfigurement under item "14. DISFIGUREMENT", on the form.

"15. OTHER PERMANENT" is to be used for reporting cases that are not related to a specific dismemberment schedule. The percent of permanent total disability should be indicated; if the claim file does not show the required percentage it should be estimated to the best ability of the carrier. The ratio of indemnity incurred to the amount of indemnity which would be payable for permanent total disability may be used to determine this ratio if no better basis is available.

"16. HEALING PERIOD" requires the healing period compensated in addition to any award for permanent partial disability. The compensation laws of some states provide that the dismemberment schedule is in lieu of all other compensation; for such states the only entry required is a check mark after "(1) Not compensated." Otherwise, the healing period compensated should be shown in weeks and days. The same instructions apply as for reporting in block "IV DISABILITY PERIOD — FOR TEMPORARY DISABILITY CASES", except that the waiting period would not be included unless compensation was paid for such period. In cases involving injury to more than one member, each member affected should be indicated by appropriate check or notation. However, minor injuries of an inconsequential nature, such as bruises or abrasions to a second member, should be disregarded.

PERMANENT PARTIAL AND TEMPORARY TOTAL DISABILITY

CARRIER_____

CALL FOR ACCIDENT STATISTICS

Co. Claim File No._____

State_____ Class Code____ Date of Accident_____ (Mo.) (Day) (Year)

IV. DISABILITY PERIOD - FOR TEMPORARY DISABILITY CASES

I. TYPE OF INJURY

(1)Maj. ☐ (3)Temp. ☐

(2)Minor ☐

II. PRINCIPAL BASIS OF AWARD OR SETTLEMENT

(1)Dism.Schedule ☐ (3)Temporary Only ☐

(2)Related to P.T. ☐ (4)Lump Sum ☐

III. TOTAL INDEMNITY

$_____

(1)Total Disability__Wk__Days

(2)Part.Disability __Wk__Days

(3)Av.Part.Disability_____%

V. NATURE AND LOCATION OF INJURY - PERMANENT DISABILITY CASES ONLY

Indicate by check or enter appropriate figure under member affected. Age____

1. ARM

Maj.(1), ☐ Min.(2) ☐

(1)Dism.above elbow ☐

(2)Dism. at elbow ☐

(3)Dism.below elbow ☐

(4)Loss of use_____%

2. HAND

Maj.(1), ☐ Min.(2) ☐

(1)Dism._____%

(2)Loss of use_____%

3. LEG

(1)Dism.above knee ☐

(2)Dism.at knee ☐

(leg Cont.)

(3)Dism.below knee ☐

(4)Loss of use_____%

4. FOOT

(1)Dism._____%

(2)Loss of use_____%

5. EYE

(1)Enucleation ☐

(2)Loss of Vision____%

6. LOSS OF HEARING

(1)One Ear_____%

(2)Other Ear_____%

7. THUMB

(1)Dism.1 phal. ☐

(2)Dism.2 pl.or more ☐

(Thumb Cont.)

(3)Loss of use_____%

8. INDEX FINGER

(1)Dism.1 phal. ☐

(2)Dism.2 pl.or more ☐

(3)Loss of use_____%

9. MIDDLE FINGER

(1)Dism.1 phal. ☐

(2)Dism.2 pl.or more ☐

(3)Loss of use_____%

10. RING FINGER

(1)Dism.1 phal. ☐

(2)Dism.2 pl.or more ☐

(Ring Finger Cont.)

(3)Loss of use_____%

11. LITTLE FINGER

(1)Dism.1 phal. ☐

(2)Dism.2 pl.or more ☐

(3)Loss of use_____%

12. GREAT TOE

(1)Dism.1 phal. ☐

(2)Dism.2 pl. ☐

(3)Loss of use_____%

13. OTHER TOES

(1)Amputation ☐

No.of toes_____

(2)Loss of use

No. of toes_____

Sum % each toe_____%

14. DISFIGUREMENT Cost

(1)Facial $_____

(2)Bodily $_____

15. OTHER PERMANENT

Give % of Total Disab.

(1)Head or mental___%

(2)Back_____%

(3)Hernia_____%

(4)Other Gen._____%

16. HEALING PERIOD

(1)Not compensated ☐

Give Period Compensated

(2)Tot.Dis.__Wk__Day

(3)Pt.Dis.__Wk__Day

(4)Av.Part.Dis._____%

Note: In case of settlement based on injury of more than one member, enter appropriate notation under each member affected.

APPENDIX "B" — FATAL

Instructions For Completing Call For Accident Statistics — Death

1. "Page No." is to be left blank.
2. Use a separate sheet for each state and each policy year.*
3. Use one line of the form for each death case.
4. Indicate each case with total dependents by Code "1" in column (1).
   Indicate each case with only partial dependents by Code "2" in column (1).
5. Enter number of dependents of each type in columns (2) to (9).

W = Widow or Widower	B = Brother or Sister
C = Children	G.P. = Grandparents
O = Orphan	G.C. = Grandchildren
P = Parents	Others = All Others

   In cases involving both total and partial dependents, disregard the partial dependents.
6. Enter age of deceased in column 10.
7. Enter ages of dependents in columns (11) to (16). In entering ages, list in the same order as dependents are listed in columns (2) to (9). In cases involving more than one dependent of the same kind, list the ages in ascending order (youngest first). Enter a check mark or an "x" for each dependent whose age is not given. For example with a widow age 27, three children ages 7, 10, and "not given," and a parent age not given, columns (2), (3), (4) and (5) would show "1", "3", "0", and "1" respectively, and the ages would be listed in columns (11) to (15) inclusive in the order "27", "7", "10", "x", "x". Do not show ages beyond the sixth dependent.
8. Give total number of cases with no dependents at bottom of sheet.
9. Give total number of cases where number and type of dependents are not given at bottom of sheet.

*Limited to the latest available 5 policy periods.

Call For Accident Statistics — Death (51)

State:_____(5-6) Policy Year:_____(4)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
KIND	Number of Dependents								Age of Deceased Employee	Age of Dependents					6th or Over
	W	C	O	P	B	G.P.	G.C.	Others		1st	2nd	3rd	4th	5th	
50	7	8	9	10	11	12	13	14	2-3	65-66	73-74	80-81	87-88	34-35	40-41

No. Cases with no Dependents_____ No. Cases type dependency unknown_____

APPENDIX "B" — PERMANENT TOTAL DISABILITY

Instructions for Completing Call for Accident Statistics — Permanent Total

1. "Page No." is to be left blank.
2. Use a separate sheet for each state and each policy year.*
3. Use one line of the form for each permanent total case.
4. Leave column (1) blank. This column will be filled in at the National Council.
5. For each case, indicate the member or members affected by entering the number of such members affected in the appropriate column. Use columns 2 to 6 inclusive for amputation of members, columns 7 to 11 for loss of use but not amputation. Cases of permanent total disability due to general disability where amputation or loss of use of more than one member is not involved shall be indicated by a check mark or "x" under column (12) to (15) as may be appropriate. The meaning of the symbols shown at the head of the various columns is as follows:

A = Arm
H = Hand
L = Leg
F = Foot
E = Eye
S = Skull, brain or head injuries
B = Back or spine injuries
P = Paralysis
NOC = All Others

6. Enter the age of the injured employee at date of accident in the last column.

*Limited to the latest available 5 policy periods.

Call For Accident Statistics — Permanent Total (51)

State:_____(5-6) Policy Year:_____(4)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
CODE	Amputation					Loss of Use					All Other				Age of Injured
E	A	H	L	F	E	A	H	L	F	E	S	B	P	N.O.C.	87-88
10	62	63	64	65	66	70	71	72	73	74	78	79	80		

APPENDIX (C)

Special Call for Wage Data

In accordance with the action of the Actuarial Committee, you are hereby requested to file with the National Council on or before February 1, 1954 your wage data, distributed by size of average weekly wage, for the three calendar months September, October and November, 1953.

The data are to be reported separately by state and shall show for all compensable cases arising during the three month period, the following items assigned to wage groups as indicated on the attached forms.

1. Number of compensable accidents falling within each wage group.
2. Summation of the average *weekly* wage for all claims falling within each wage group. Individual items are to be left in terms of dollars and cents, but the sums are to be rounded to the nearest dollar before posting on the form. If wage is given in terms of "monthly" wage, "daily" wage, etc., the wages should be converted to a weekly basis.

The form consists of two sheets. It will be noted that the first wage group includes all claims where the weekly wage is under $10.00. From $10 to $200, claims are to be reported at intervals of One Dollar. For example any claim with average weekly wage of $36.00 to and including $36.99 is to be assigned to the "$36 Group". Where there are no claims falling in a particular wage group, the line may be left blank. Cases with an average weekly wage of $200 per week or over are to be reported by Ten Dollar intervals, $200.00 to $209.99 to $210.00 to $219.99, etc. Since it is expected there will not be many claims with weekly wage over $200 per week, the wage groups have not been entered on the form and the carrier is requested to report for only those wage groups where they have cases, as for example:

Wage Group	*No. of Cases*	*Total Wages*
230	4	928
250	2	510
290	1	295

BE SURE TO FILL IN THE CARRIER NAME AND STATE ON EACH SHEET

It is *important* that actual weekly wages be reported for those cases earning wages greater than the wage equivalent of the maximum weekly compensation and a special effort should be made to secure

such actual data. If it is not possible to secure an exact wage it is requested that the carriers omit such cases from the distribution by wage size, but that they report the number of such cases in the special block provided at the end of the form.

Carriers who do not keep their statistical records so that data on compensable cases may be separated from those on non-compensable cases, may include all accidents reported instead of confining the report to compensable cases. In this case the reports should be clearly marked "All Accidents Reported."

Wage data in connection with underground coal mines and risks written under the National Defense Projects Rating Plan should be excluded.

Please note that the date for reporting these data is February 1, 1954. We expect to submit a report to the National Association of Insurance Commissioners at the June Convention. Therefore it is essential that these data be reported promptly.

Instead of reporting wage data on these special forms, a carrier may if it so desires, submit a tabulator tape giving its wage data in equivalent form. If this latter option is adopted, an individual listing of claims where the weekly wage is $200 or more will be acceptable.

A sample of a form for reporting these data is attached. There is also attached an acknowledgement of receipt of this Call which we request that you sign and return to the National Council at once, indicating the number of sets of forms you will need (one set for each state) or whether you will adopt the alternate procedure of reporting on tabulator tapes.

Carrier_____ State_____

Wage Group	No.Of Comp. Cases	Total Wages	Wage Group	No.Of Comp. Cases	Total Wages	Wage Group	No.Of Comp. Cases	Total Wages	Wage Group	No.Of Comp. Cases	Total Wages
Under $10.00			35			61					
$10			36			62					
11			37			63					
12			38			64					
13			39			65					
14			40			66					
15			41			67					
16			42			68			198		
17			43			69			199		
18			44			70			$200 & Over By $10 Intervals As Needed		
19			45			71					
20			46			72					
21			47			73					
22			48			74					
23			49			75					

Note: (1) Exclude Underground Coal Mine and National Defense Data
(2) Use block at the end of this form when the Actual wage is unobtainable.

29			55			81					
30			56			82					
31			57			83					
32			58			84					
33			59			85			No.of cases with wage greater than equiv.of max. weekly Comp. No. Cases		
34			60			86					

ACTUARIAL ASPECTS OF UNEMPLOYMENT INSURANCE

BY

NATHANIEL GAINES

INTRODUCTION

The following article is a condensed version of a more comprehensive paper. The uncondensed paper is available, in its entirety, in the library of the Casualty Actuarial Society.

Any paper on this subject would not be complete without acknowledging the contributions of the late H. J. Winslow and W. S. Woytinsky. The uncondensed paper contains more detailed references to their contributions in this field.

CHAPTER I

THE ACTUARIAL PROBLEM IN UNEMPLOYMENT INSURANCE

Unemployment insurance is a program which provides, in accordance with a definite formula, indemnity against wage loss resulting from involuntary unemployment. The best known examples of such programs up to now have been the 51 State unemployment insurance programs and the Federal Railroad Unemployment Insurance program. As a result of recent collective bargaining agreements, the field has been expanded considerably by the introduction of the guaranteed wage or supplementary unemployment benefit programs. Up to now, unemployment insurance programs were almost entirely government-operated. Now, private corporations are beginning to play a role in unemployment insurance analagous to the one they have had over the past years in the field of retirement pensions.

DESIGN OF AN UNEMPLOYMENT BENEFIT PROGRAM

The unemployment insurance programs in the United States, both governmentally and privately operated, have the following characteristics:

1. Benefits are generally payable to workers involuntarily unemployed.
2. In order to be eligible for unemployment benefits, the claimant must have demonstrated an "attachment" to the worker group covered by the program. Such attachment is generally considered to exist if certain specified requirements for eligibility are fulfilled such as the following:
    a. Specified minimum duration of employment prior to the involuntary termination; or
    b. Specified minimum earnings prior to termination of employment; or
    c. A combination of prior earnings and employment.
3. Benefits are paid on a regular basis, usually weekly.
4. The weekly benefit payment is a specified proportion of the claimant's average weekly earnings, generally with the proviso that such payments may not exceed a specified maximum amount.
5. Benefits are payable only for a limited duration, such as 20 or 26 weeks, or whatever figure may be specified.
6. A claimant may be required to serve a waiting period of one or more weeks during which he is not entitled to benefits.

Almost all State programs have such a waiting period requirement.

COST DETERMINANTS

Benefit expenditures are dependent both upon the benefit provisions contained in the unemployment insurance plan and economic conditions. The benefit provisions specify the amount of benefits payable for each week of insured unemployment, the number of weeks of entitlement to benefits, and the conditions necessary to qualify for benefits in the event of unemployment. Regardless of potential benefit entitlement, however, benefits are payable only upon the incidence of insured unemployment; the number of claimants applying for benefits and the number of weeks for which they apply under a given program vary with economic conditions.

Assuming rigid benefit provisions, two crucial items in the preparation of actuarial estimates in unemployment insurance are (1) the man-weeks of compensable unemployment per man-week of insured employment, and (2) the weekly payment per man-week of compensable unemployment. If values for the above items are known, costs can be calculated as follows:

B = total benefits disbursements

C = man-weeks of compensable unemployment

E = man-weeks of insured or covered employment

H = number of hours worked per man-week of insured or covered employment

R = weekly benefit payment per man-week of compensable unemployment

W = wages or earnings per man-week of covered employment

$\frac{B}{E}$ = benefit cost per man-week of covered employment

$\frac{B}{HE}$ = benefit cost per man-hour of covered employment

$\frac{B}{WE}$ = the ratio of benefit costs to covered earnings

If contributions for financing benefits under the plan are to be so many cents per hour worked, it would clearly be desirable to calculate $\frac{B}{HE}$. The ratio $\frac{B}{WE}$ would be convenient in cases where contributions are a percent of earnings.

The following equations follow from the definitions:

$$B = RC$$

$$\frac{B}{HE} = \frac{R}{H} \cdot \frac{C}{E}$$

$$\frac{B}{WE} = \frac{R}{W} \cdot \frac{C}{E}$$

Unusual technical problems are not encountered in determining the size of the average weekly benefit payment R, or the ratio of the average weekly benefit payment to the average number of hours per week $\frac{R}{H}$, or the ratio of the average weekly benefit amount to average weekly considered earnings, $\frac{R}{W}$. The problem of estimating $\frac{C}{E}$, man-weeks of compensable unemployment per man-week of covered employment, is peculiar to unemployment insurance and presents the basic difficulty in the preparation of actuarial estimates for this type of program. The difficulty in estimating the value of $\frac{C}{E}$, man-weeks of compensable unemployment per man-week of covered employment, stems from the lack of stability in the incidence of the unemployment risk.

As stated, an unemployment insurance program provides benefit entitlement for limited duration, and may also contain a waiting period requirement before benefits become payable. Hence, an otherwise eligible unemployed worker will receive the weekly unemployment benefit payments only if he has been unemployed long enough to have fulfilled the waiting-period requirements but not for so long as to have exhausted his entitlement to benefits. If there were no labor turnover over prolonged periods and no change in the level of unemployment, the unemployed group would be composed of the same persons in a continuing state of unemployment.[1] Under such conditions, all unemployed would have exhausted their benefit rights because of the length of their unemployment and there would be no benefit disbursements. Regardless of the level of unemployment — whether it be high or low — benefit disbursements for a static unemployed group would ultimately be zero.

It is possible for compensable unemployment and consequently benefit expenditures to be higher during periods of low unemploy-

[1] Assuming no withdrawals of unemployed workers from the labor force and no deaths among the unemployed.

ment than during high unemployment. This can occur if during periods of high unemployment, for example, unemployment is heavily concentrated in the longer duration-of-unemployment intervals, with only a small proportion of the total entitled to benefits; on the other hand, a high proportion of the unemployed may be receiving benefits during periods of low unemployment because of the high rates of labor turnover frequently experienced during such periods.

In our economy, persons are continually shifting from employment to unemployment status and back again, even when there is no change in the level of unemployment. Employed workers are continually being laid off and unemployed are being hired. Hence, even during stable periods of extremely low levels of unemployment, workers are exercising benefit entitlement and receiving benefits.

If the incidence of unemployment were relatively stable, subject only to gradual change because of secular factors in the economy, the preparation of actuarial estimates in unemployment insurance would not involve special problems. Estimates could be prepared from data on loss ratios, adjusted for changes in wage levels and benefit formulas.

However, unemployment varies with business conditions. Because of lack of stability in the incidence of the unemployment risk, special problems are encountered in the preparation of actuarial estimates in unemployment insurance.

ACTUARIAL SOUNDNESS IN UNEMPLOYMENT INSURANCE

In general, actuarial soundness implies an orderly arrangement for financing obligations under a benefit program. Precise formulations of what constitutes actuarial soundness have been adequately developed elsewhere, so that there is no need for further discussion here.

Without ascribing regularity or periodicity to the so-called "cyclical" fluctuations in the economy, it is essential in planning an unemployment insurance system to recognize that unemployment will rise and fall. If benefits are to be financed on a level-premium basis, surplus funds must be accumulated during favorable years when unemployment benefit expenditures are low, and used during periods of rising unemployment to supplement the regular contributions. The actuarial problem in unemployment insurance is to determine the rate of contribution which will provide adequate funds over periods of low and high unemployment.

CHAPTER II

ANALYSIS OF UNEMPLOYMENT BENEFIT COSTS

The main problem in deriving level cost rates in unemployment insurance is to determine the additional cost to be paid during peak

years of business activity to provide reserves to meet the added expenditures during years of rising unemployment. Consequently, costs of unemployment insurance must be estimated on the basis of economic assumptions wherein recognition is given to the danger of a rise in unemployment.

LONG-"RANGE" COSTS OF UNEMPLOYMENT INSURANCE

The distinction between "long run" and "short run" costs of unemployment insurance is relative. Because of uncertainties with regard to future economic developments, the outlook with respect to unemployment insurance costs can change radically over a relatively short time interval. For example, costs could be increased sharply during periods of high unemployment over what they would otherwise have been if employers should decide to rotate jobs among unemployed workers in such a way as to maximize the outlay in unemployment benefits. In this discussion, costs over the long run are the estimated costs over a "cycle" of business activity.

The term "business cycle," as used here, is not intended to imply that there is regularity or periodicity in the variations in business activity or unemployment levels. As used here, it is only intended to represent a pattern of business activity which includes periods of increasing and decreasing unemployment.

LONG-RANGE IMPACT OF CYCLICAL UNEMPLOYMENT

Even during peak years of business activity there is unemployment, which is generated by seasonal, technological and frictional factors in the economy. When employment declines, the "cyclical" layoffs in covered industries occur among workers hitherto in relatively stable employment, with sufficient background of earnings and employment to be eligible for benefits. Benefit costs will rise sharply in the initial stages of a downturn.

Benefit expenditures should eventually decline even if business conditions do not improve,[2] since a large proportion of the unemployed workers will exhaust benefit rights and will not have the opportunity to renew benefit entitlement because of the scarcity of job opportunities. Moreover, if business conditions improve, the most likely to be hired first will be those most recently laid off who will be the most likely ones not to have exhausted their benefit rights. In periods of relatively high unemployment, after sufficient time has passed for the "depression" claimants to exhaust their benefit entitle-

[2] Implicit in this statement is the assumption that the employer will not cooperate with the worker to institute job rotation, whereby the proportion of unemployment in compensable status is deliberately maximized or augmented over what it would otherwise have been.

ment, unemployment may be regarded for purposes of actuarial estimating as being composed of the following two groups:

(1) "Long-duration" unemployment composed of workers with practically no chance of receiving unemployment benefits.

(2) "Turnover" group composed of seasonal intermittent and frictional unemployment.

As a first approximation, therefore, compensable unemployment in an average week of a business cycle will be the sum of the following two items:

(1) The volume of compensable unemployment generated on the average during a week of peak business activity; and

(2) The total number of compensable weeks of unemployment incurred because of the "cyclical" rise in unemployment, averaged out over the total number of weeks assumed to be covered by the business cycle pattern.

In general, long-range cost estimates in unemployment insurance may be regarded as the cost rate during peak years of business activity loaded for additional losses due to "cyclical" declines in business activity.

DISTRIBUTION OF UNEMPLOYMENT BY DURATION

During peak years of business activity, unemployed workers are out of work for relatively short duration.

Table I shows the distribution of unemployed workers by duration of unemployment during each of the calendar years 1947 through 1951, when the unemployment rate varied from 3.0 to 5.5 percent. The proportion unemployed for more than 26 weeks varied from 5.6 to 11.4 percent. The 11.4 percent of the unemployed out of work for more than 26 weeks occurred in 1950 following a mild rise in unemployment during 1949 and early 1950. In all of these five years, the proportion out of work for more than a year was negligible.

TABLE I

PERCENTAGE DISTRIBUTION OF UNEMPLOYMENT IN THE UNITED STATES BY DURATION OF UNEMPLOYMENT DURING AN AVERAGE WEEK OF EACH CALENDAR YEAR, 1947-51

Duration of unemployment (in weeks)	*Percent of unemployment*				
	1947	*1948*	*1949*	*1950*	*1951*
1 or less	9.9	11.0	7.8	8.0	12.4
2	14.4	16.2	12.9	12.7	16.0
3	12.8	14.2	12.8	10.7	13.7
4	11.6	11.2	11.2	10.2	11.3
5 to 6	9.5	10.1	9.1	8.8	9.0
7 to 10	14.4	14.4	16.3	15.2	13.4
11 to 14	9.0	7.9	9.7	9.6	8.1
15 to 26	10.9	9.4	12.6	13.5	8.8
over 26	7.7	5.6	7.5	11.4	7.3
Unemployment as a percent of civilian labor force	3.6	3.4	5.5	5.0	3.0

Source: U.S. Bureau of the Census: *Current Population Reports*, Series P-50 Nos. 13, 19, 31, and 40.

Data on distribution of unemployment by duration during years of high unemployment are available from area surveys made during the depression years of the 1930's.

A survey of unemployment for each of the years 1929-33 was sponsored in the city of Buffalo, New York, by the Buffalo Foundation in cooperation with the State Department of Labor. Students of the State Teachers' College in Buffalo and of the University of Buffalo made house-to-house calls for the purpose of determining what proportion of those able and available for work were without jobs. The enumerations were made on the same date in November of each year and in the same areas, in order to obtain maximum comparability over the years. The duration distributions were computed separately for male and female workers the first three years, but only for males in 1932 and 1933. Table II shows the unemployment rates among males and the corresponding duration distributions derived from the survey.

As shown by the data in Table II, the proportion of unemployment in long duration intervals rose sharply with increasing unemployment, and continued to rise even when the unemployment was no longer rising, indicating that hiring chances might be better among workers unemployed for short durations. In 1933, the propor-

tion of unemployed males out of work for more than a year is shown to have been as high as 68 percent.

TABLE II

PERCENTAGE DISTRIBUTION OF UNEMPLOYED MEN BY DURATION OF UNEMPLOYMENT IN BUFFALO, N. Y., 1929 to 1933

Duration of Unemployment	*1929*	*1930*	*1931*	*1932*	*1933*
Under 2 weeks	15.8	4.3	2.6	1.4	2.7
2 to 3 weeks	22.2	7.9	5.0	2.7	5.2
4 to 9 weeks	30.4	21.0	12.7	6.3	10.1
10 to 19 weeks	12.3	17.9	13.4	7.8	5.7
20 to 29 weeks	6.2	14.3	11.7	10.7	4.4
30 to 39 weeks	3.1	7.9	6.4	5.9	2.3
40 to 51 weeks	0.7	5.6	5.2	5.1	1.4
52 weeks and over	9.3	21.1	43.0	60.1	68.2
Unemployment as a percent of labor force:	6.2	17.2	24.3	32.6	28.7

Source: *Monthly Labor Review,* March 1934, page 526.

Table III contains similar data for the city of Philadelphia compiled for each year of the period 1931-7 except 1934. The Philadelphia experience is consistent with what was found in Buffalo.

TABLE III

PERCENT DISTRIBUTION OF UNEMPLOYMENT BY DURATION OF UNEMPLOYMENT IN PHILADELPHIA, 1931-7*

Duration of Unemployment	*1931*	*1932*	*1933*	*1935*	*1936*	*1937*
Under 2 months	24.9	18.8	11.9	6.5	14.3	21.2
3 to 5 months	26.9	17.3	9.4	11.5	10.7	10.6
6 to 8 months	14.8	10.1	8.7	7.6	6.9	5.9
9 to 11 months	13.4	18.1	15.1	9.0	7.7	4.4
Total, under one year	80.0	64.3	45.2	34.6	39.6	42.1
Unemployment as a percent of labor force	25.7	42.1	46.0	33.0	30.2	24.4

*Except 1934

Source: "Recent Trends in Employment and Unemployment in Philadelphia", by Gladys L. Palmer; distributions for males and females were combined.

SUMMARY

The rate of benefit expenditures in unemployment insurance is not a simple function of the unemployment rate. It also depends upon the variations in the duration-distributions of unemployment with changing economic conditions.

In the next chapter a theory is developed for constructing mathematical models to study variations in duration-distribution of unemployment and their effect on unemployment benefit costs.

CHAPTER III
MATHEMATICAL MODELS

Experience with unemployment insurance under the State programs after the end of World War II provides an empirical basis for estimating rates of unemployment benefit expenditures during periods of low unemployment. Similarly, individual companies could utilize the statistics obtainable from their records for the postwar years of operations to obtain similar cost estimates for years of low unemployment. By the use of mathematical models, the additional benefit costs from assumed rises in unemployment can be reflected.

The mathematical models are used to determine the variations in the duration-distribution of unemployment.

BASIC LABOR FORCE MODEL

In order to develop manageable mathematical concepts, it is necessary to oversimplify the dynamics of the labor market by postulating rigid mechanistic models. As a starting point, a labor force with the following characteristics may be considered:

1. The covered labor force is constant in size and composition, i.e. there are no new entrants into and no withdrawals out of the labor force.
2. All workers are subject to the same probabilities of being hired or laid off; no account is taken of superior skills, attachment to expanding industries, personal connections, sex, age, or any other factor which would create disparities among workers with respect to their abilities to find jobs or to retain their current positions.
3. The hiring and layoff probabilities are constant over a specified period of time such as a month or a year.

4. Hirings and layoffs occur continuously over the specified time interval.

The dynamics of this labor force model over an interval of time may be described by the following variables:

L = labor force

U = unemployment

E = employment

h = probability of a worker unemployed at the beginning of the interval being hired at least once sometime before the end of the interval

f = probability of a worker employed at the beginning of the interval being separated at least once before the end of the interval

$\hat{h}$ = an approximation of h from empirical data

$\hat{f}$ = an approximation of f from empirical data

The formulation of this type of model is an initial step in the estimating. Consideration may then be given to adjustments for bridging the gap between the simplified model and the realities of the labor market.

HIRING AND FIRING PROBABILITIES

For the labor force model postulated above, the following relationships follow from the definitions of the terms:

(1) $\frac{U_o - U_t}{U_o} = h$ where U_o represents the unemployed workers at the beginning of an interval, and U_t the workers in the original U_o continuously unemployed up to the point $t = 1$.

(2) $\frac{E_o - E_t}{E_o} = f$ where E_t represents the workers continuously employed from the beginning of the interval to the point $t = 1$.

(3) $U_o - U_t = hU_o$

(4) $E_o - E_t = fE_o$

If the total number of accessions were equal to $U_o - U_t$ and the total number of separations to $E_o - E_t$, then the monthly hiring and firing probabilities could be readily calculated from data on total accessions and total separations. However, the separations and accessions totals

are not the same as $E_o - E_t$ and $U_o - U_t$, respectively, as the latter expressions were defined in (1) and (2). Even if accessions and separations were adjusted to exclude shifts from job to job and new entrants into the labor market, they would include hiring of workers not unemployed at the beginning of the month, and layoffs among workers not employed at the beginning of the month. This is due to the fact that workers may be hired or fired more than once over the course of a month.

Let S = total number of separations over the interval

A = total number of accessions over the interval

$$\frac{A}{U_o} > h$$

$$\frac{S}{E_o} > f$$

This problem might be resolved by a simple approximation. If hiring occurred only among workers unemployed at the beginning of the month, then the probability of an unemployed worker being hired within a month would be $\frac{A}{U_o}$. However, workers separated during the month compete for the available jobs with those unemployed at the beginning. Consequently, the accessions must be related to a quantity greater than U_o in order to reflect the fact that the newly separated workers apply for jobs and in some instances obtain them before the end of the month. One might use $U_o + S$ as the group exposed to hiring during the month and let $\hat{h} = \frac{A}{U_o + S}$. It might be reasoned that, if separations occur evenly over the month, a worker separated during the month will be exposed to hiring for only half of the month on the average. If this reasoning is correct, then the exposure quantity for the month will be $U_o + \frac{S}{2}$ and an approximation of the hiring probability will be computed from $\hat{h} = \frac{A}{U_o + S/2}$. The same reasoning can be followed to obtain an approximation for the firing probability, $\hat{f}$.

An alternative approach for deriving approximate values of the hiring and firing probabilities would be to fit a continuous probability density function to empirical data. An unemployed group at the

beginning of a specified time interval, U_o, may be treated as a cohort subject to continuous diminution with the passage of time because of hires, with U_t representing the volume continuously unemployed from the beginning of the interval to the point t. Thus, U_t will be a function of t:

$$U_t = U(t)$$

If $U(t)$ is a continuous function of t with the first derivative existing at each point of the interval, the slope of the curve at each point will be negative and equal to $\frac{dU_t}{dt}$ and the number in the initial cohort, U_o, unemployed from the beginning of the interval to a point t will be $\int_t^\infty \frac{dU_t}{dt}\,dt$. It follows that:

$$(5)\quad \frac{dU_t}{dt} = -rU_t, \text{ where } r = \left|\frac{1}{U_t}\frac{dU_t}{dt}\right|.$$

$$\int_t^\infty \frac{dU_t}{dt} = -\int_t^\infty rU_t \cdot dt$$

Thus, $(-rU_t)$ is a continuous curve, and the area under the curve may represent the number of workers continuously unemployed or the number hired in an interval of time. When multiplied by a constant $\frac{1}{U_o}$, this curve becomes a probability density function, and the total area under it is unity. In similar fashion, a cohort of employment at the beginning of a time interval may be considered, with $s = \left|\frac{1}{E_t}\frac{dE_t}{dt}\right|$ and $(-sE_t)$ a probability density function when multiplied by the constant $\frac{1}{E_o}$.

Instead of evaluating $-\int rU_t dt$ directly, it is more convenient to begin with equation (5) and work with differential equations. Thus,

(6) $dU_t = -rU_t dt$ where rdt represents the probability of a worker U_t being hired within an infinitesimal interval; r is a constant because of the assumption of constant hiring probability in the model.

$$\frac{dU_t}{U_t} = -rdt$$

$$U_t = Ke^{-rt};\ k = U_o$$

$$U_t = U_o e^{-rt} \tag{7}$$

$$U_o - U_t = U_o(1 - e^{-rt})$$

$$\frac{U_o - U_t}{U_o} = 1 - e^{-rt} \tag{8}$$

The symbol K shown above, is the constant of integration, and e is the base of the natural logarithms.

Similarly, it can be shown for the employment cohort, that

$$dE_t = -sE_t\,dt \tag{9}$$

$$\frac{E_o - E_t}{E_o} = 1 - e^{-st} \tag{10}$$

Over a unit of time, when $t = 1$,

$$\frac{U_o - U_t}{U_o} = 1 - e^{-r} = h \tag{11}$$

$$\frac{E_o - E_t}{E_o} = 1 - e^{-s} = f \tag{12}$$

Thus, it has been shown that the hiring probability as defined in (1) is a function of r and the firing probability as defined in (2) is a function of s. The values of r and s can be approximated empirically, as will be shown in the following discussion.

Consider a convenient time interval of, say, four weeks, and denote it by unity. Let t be any point in this interval such that $0 \leq t \leq 1$. Also, let us assume that accessions and separations occur continuously and evenly over the time-interval.

$S =$ the number of separations per unit time-interval

$A =$ the number of accessions per unit time-interval

$S \cdot \triangle t =$ the number of separations in a sub-interval, $\triangle t$ in length

$A \cdot \triangle t =$ the number of accessions in a sub-interval, $\triangle t$ in length

In an interval from the point zero to the point t_1, which is assumed to be $\triangle t$ in length, the number of separations is $S \cdot \triangle t$ and the number of accessions, $A \cdot \triangle t$. Considering only intervals bounded by the point zero at one extreme, as $\triangle t$ becomes smaller, $S \cdot \triangle t$ tends to include a continuously increasing proportion of workers employed at the beginning of the interval; similarly, $A \cdot \triangle t$ tends to include a continuously

increasing proportion of workers unemployed at the beginning of the interval.

$\underset{\Delta t \to 0}{\text{LIMIT}} \frac{S}{E_o} \Delta t =$ the probability of a worker employed at the beginning of an interval being separated in an infinitesimal time-interval after the beginning.

$\underset{\Delta t \to 0}{\text{LIMIT}} \frac{A}{U_o} \Delta t =$ the probability of a worker unemployed at the beginning of a time interval being hired within an infinitesimal interval after the beginning.

Since hiring and firing probabilities are assumed to be constant over the time-interval, $0 \leq t \leq 1$ it follows that

$U_t \cdot \frac{A}{U_o} dt \doteq$ the number of workers unemployed at point t who will be hired within an infinitesimal subinterval.

$E_t \cdot \frac{S}{E_o} dt \doteq$ the number of workers employed at point t who will be separated within an infinitesimal subinterval.

Hence

$$dU_t \doteq -U_t \left(\frac{A}{U_o}\right) dt$$

$$dE_t \doteq -E_t \left(\frac{S}{E_o}\right) dt$$

Thus, $\frac{A}{U_o}$ appears to be a logical approximation of r and $\frac{S}{E_o}$ an approximation of s.

The distinction between r and the hiring probability $(1 - e^{-r})$ may require clarification. Although $h(=1-e^{-r})$ and r are both ratios with U_o in the denominator, they represent different things. The hiring probability h, as defined in (1), has all the characteristics associated with the conventional probability concept. For example, it is always positive and cannot conceptually exceed unity. The quantity r on the other hand is a nominal hiring rate and although always positive, it may increase without limit. Similarly, s is a nominal firing rate, and may assume any positive value.

Consider a month with hiring rate h. Then

$1 - e^{-\frac{r}{2}} =$ the probability of workers unemployed at the beginning of the month being hired before the end of the first half of the month

$1 - e^{-\frac{r}{n}} =$ the probability of workers unemployed at the beginning of the month being hired before the end of the first $1/n$th part of the month

For an effective hiring probability of $1 - e^{-\frac{r}{n}}$ for $1/n$th part of the month, the corresponding nominal monthly hiring probability is

$$n\left(1 - e^{-\frac{r}{n}}\right)$$

and

$$\underset{n\to\infty}{\text{LIMIT}}\ n\left(1 - e^{-\frac{r}{n}}\right) = r$$

In the special case where the hiring probability is certainty, we have

$$\begin{aligned} 1 - e^{-r} &= 1 \\ e^{-r} &= 0 \\ e^{-\frac{r}{n}} &= 0 \\ 1 - e^{-\frac{r}{n}} &= 1 \end{aligned}$$

Hence, when the probability of a worker unemployed at the beginning being hired before the end of the interval is certainty, the probability of being hired before the end of any fraction of the year is also certainty in the particular model under consideration. The hiring probability $h = 1 - e^{-r}$ approaches certainty in this model only if r increases without limit, representing a situation wherein all unemployed are hired immediately after being laid off. In such a situation, if the volume of unemployment is assumed to be constant throughout interval and U_o is also the total number of hires in each infinitesimal interval and U_o is also the total number of hires in each infinitesimal interval.

It is clear that the hiring probability as defined in (1) will be certainty for a given period if all workers unemployed at the beginning of the period are hired before the end of it, and no separations occur during the period. Assuming that hires occur continuously, the nominal hiring rate for a sub-interval at the beginning of the year will not increase without limit as the length of the sub-interval approaches zero, yet the value of h is one. In this situation, however, the hiring probability is not constant throughout the interval as assumed in our model. Instead, the hiring probability for a sub-interval toward the end of the period is higher than for a similar sub-interval near the beginning.

A more realistic approach would be to recognize that h is not a constant and treat it as a function of t (time).

$$r = \phi(t)$$

$$dU_t = -U_t \cdot \phi(t)\, dt$$

$$(13) \quad U_t = U_o e^{-\int_o^t \phi(t)\, dt}$$

By fitting data to equation (13) adjustments could be made for the fact that a worker's chances for finding employment tend to decline with continuation of his unemployment status.

As discussed in a later section of this chapter, the results obtained from our model would have to be adjusted for the fact that unemployed workers are not a homogeneous group, particularly with respect to hiring probabilities. Equation (13) provides a basis for handling heterogeneity among unemployed workers.

The basic model can also be used to portray continuous shifting between employment and unemployment status.

Let U_t' represent unemployment at any point t in the interval and E_t' those employed at the point t. U_t' is composed of workers who may have been employed or unemployed at the beginning of the period. Since it is assumed in our model that all workers, whether initially employed or unemployed, have the same probability of being hired or of being fired in a neighborhood of every point in the interval, we have, for any point t,

$$(14) \quad dU_t' = -(rU_t' - sE_t')\,dt$$

$$(15) \quad dE_t' = -(sE_t' - rU_t')\,dt$$

Equation (14) is solved in the following manner.

$L = U_t' + E_t'$, where L is the constant labor force.

$$dU_t' = -(rU_t' - sL + sU_t')\,dt = [-U_t'(r+s) + sL]\,dt$$

$$\frac{dU_t'}{-U_t'(r+s) + sL} = dt$$

$$\frac{-(r+s)\,dU_t'}{-U_t'(r+s) + sL} = -(r+s)\,dt$$

$$-U_t'(r+s) + sL = Ke^{-(r+s)t}$$

At $t = o$, $K = -U_o(r+s) + sL$

$$-U_t'(r+s) + sL = \left[-U_o(r+s) + sL\right]e^{-(r+s)t}$$

$$U_t'(r+s) = sL - \left[sL - U_o(r+s)\right]e^{-(r+s)t}$$

$$(16) \quad U_t' = \frac{sL}{r+s} - \left[\frac{sL}{r+s} - U_o\right]e^{-(r+s)t}$$

Equation (16) may be simplified by defining U and E as proportions of the labor force, in which case $L=1$. Hence,

$$(17) \quad U'_t = \frac{s}{r+s} - \left[\frac{s}{r+s} - U_o\right] e^{-(r+s)t}$$

and when $t=1$

$$(18) \quad U'_t = \frac{s}{r+s} - \left[\frac{s}{r+s} - U_o\right] (1-h)(1-f)$$

Equation (16) may also be transformed so as to indicate what segment of U'_t was employed at the beginning of the interval, and what segment was unemployed. Since the labor force, L, was assumed to remain constant in both size and composition, it must be composed, at any point t, only of workers who were either employed or unemployed at the beginning of the period. Hence, at any point t,

$$L = E_o + U_o$$

Substituting in equation (16)

$$U'_t = \frac{s}{r+s}(U_o + E_o) - \left[\frac{s}{r+s}(U_o + E_o) - U_o\right] e^{-(r+s)t}$$

$$= U_o\left[\frac{s}{r+s} - \left(\frac{s}{r+s} - 1\right)e^{-(r+s)t}\right] + E_o\left[\frac{s}{r+s} - \frac{se^{-(r+s)t}}{r+s}\right]$$

$$(19) \quad U'_t = U_o \frac{s + re^{-(r+s)t}}{r+s} + E_o \frac{s - se^{-(r+s)t}}{r+s}$$

Thus, equation (19) shows the entire group U'_t broken down into two mutually exclusive segments. Of those unemployed at the point t, the group of workers that were unemployed at the beginning of the interval is represented by $U_o \frac{s + re^{-(r+s)t}}{r+s}$. The group that was employed at the beginning of the interval is represented by $E_o \frac{s - se^{-(r+s)t}}{r+s}$.

In (7), $U_t = U_o e^{-rt}$, represents only that portion of the unemployment at point t, which was unemployed at zero, and did not experience a spell of employment in the interval from zero to t. On the other hand,

$$U_o \frac{s + re^{-(r+s)t}}{r+s}$$

represents the workers in U_o, who are unemployed at t regardless of their status in the interim bounded by zero and t.

Equation (15) can be solved in a similar manner to obtain the volume of employment at the point t. Solving equation (15), it can be shown that

$$(20) \qquad E'_t = \frac{rL}{r+s} - \left[\frac{rL}{r+s} - E_o\right] e^{-(r+s)t}$$

$$(21) \qquad E'_t = U_o \frac{r - re^{-(r+s)t}}{r+s} + E_o \frac{r + se^{-(r+s)t}}{r+s}$$

DURATION MODELS

In order to estimate the volume of compensable unemployment in our postulated labor force model under assumed economic conditions, it is necessary to determine the distribution of unemployment by duration. If a duration distribution for a point in time is available, distributions for subsequent points can be derived by the application of hiring and firing probabilities.

One approach would be to select a suitable distribution obtained empirically from a one-time census or survey. Another would be to construct a hypothetical distribution under restrictive conditions. Such a hypothetical distribution can be constructed under the assumption of a constant level of unemployment and constant hiring and firing probabilities prevailing over a sufficiently long period.

So long as the volume of unemployment is constant, with no entrants into and withdrawals from the labor force, the accessions and separations must be in balance. For convenience, the four-week interval (lunar month) may be selected as the time-unit of duration. It has been shown that for assumed unemployment and turnover rates, approximations of the hiring and firing probabilities can be computed. Since $\hat{h}$ represents an estimate of the probability that a worker unemployed at the beginning of a lunar month will be hired before the end of it, $1 - \hat{h}$ is an estimate of the probability of such a worker not being hired during the lunar month. Hence, if U_o is the assumed constant level of unemployment at the beginning of a lunar month, $U_o(1 - \hat{h})$ represents the number unemployed at the beginning and still unemployed without interruption by the end of the lunar month. After a sufficient number of months with constant volume of unemployment have elapsed, $U_o(1 - \hat{h})$ represents the number continuously unemployed for four weeks or more, $U_o(1 - \hat{h})^2$ the number unemployed for at least eight weeks, $U_o(1 - \hat{h})^3$ for twelve weeks or

more, and so forth. The duration-distribution of unemployment will then be as follows:

Duration of Continuous Unemployment (Lunar Months)[3]	*Number Unemployed*[4]
1 or more	$U_o(1-\hat{h})$
2 or more	$U_o(1-\hat{h})^2$
3 or more	$U_o(1-\hat{h})^3$
4 or more	$U_o(1-\hat{h})^4$
5 or more	$U_o(1-\hat{h})^5$
6 or more	$U_o(1-\hat{h})^6$

[3] A four-week period is called here "lunar month."

[4] The procedure described yields expected values subject to random variability.

Given constant unemployment and turnover rates, which are assumed to have been prevailing for a sufficiently long time, a duration distribution for the labor force model can be constructed by the method shown above. The probability of not being hired over a two-week interval, or half of a lunar month is $(1-\hat{h})^{1/2}$. Hence, the number unemployed for at least two weeks will be equal to $U_o(1-\hat{h})^{1/2}$, and for at least six weeks to $U_o(1-\hat{h})^{1/2}$. In this model, the volume of unemployment will not change if the accessions and separations are in balance. An initial distribution may be constructed this way, if a suitable one cannot be obtained empirically.

A transition can be made from the initial distribution to the duration distribution prevailing as a result of subsequent variations in the level of unemployment. This transition can be effected by the application of hiring probabilities, or, more precisely, probabilities of not being hired to the cell frequencies of the initial distribution. These subsequent distributions are dependent upon the values assumed for the unemployment and turnover rates in subsequent months.

For example, consider a labor force of one hundred thousand subject to the restrictions in our basic model, with unemployment rate five percent and separation and accession rates of three percent.

$$\begin{aligned} L &= 100{,}000 \\ U_o &= \quad 5{,}000 \\ E_o &= \quad 95{,}000 \end{aligned}$$

$a = g = .03$, when a and g are the accession and separation rates, respectively, expressed as a percent of employment at the beginning of each lunar month. Then

$$A = aE_o = 2{,}850$$
$$S = gE_o = 2{,}850$$

$$\text{Let } \hat{h} = \frac{A}{U_o + \tfrac{1}{2}S} = 0.4436$$

$$1 - \hat{h} = 0.5564$$

The initial distribution in this model will be as follows:

Duration of Continuous Unemployment	*Number of Unemployed*
Total Unemployed	5,000
4 weeks or more	2,782
8 " " "	1,548
12 " " "	861
16 " " "	479
20 " " "	266
24 " " "	148
28 " " "	82

Beginning with this distribution, it is assumed that the number of unemployed in this hypothetical labor force of one hundred thousand will rise from five thousand at the beginning of the year to ten thousand by the end of the year. The computations involve three variables, the volume of unemployment at the beginning of the lunar month, U'_{x-1}[5], the number of accessions during the four-week period A_x, and the number of separations S_x. Since the labor force is assumed to be constant in both size and composition, independent values may be assigned only to two of the variables. The third will be uniquely determined thereby. Assuming that unemployment will increase by a uniform amount over each lunar month, it follows that the total increase of five thousand over the year will occur at the rate of 384.6 per month. Hence, the volume of employment and unemployment at the end of each four-week period of the first year during which this rise occurs will be as follows:

[5] The volume of unemployment at the beginning of the year has been denoted by U_o which is also the volume at the beginning of the first lunar month, U'_1 is the volume at the end the first or beginning of the second lunar month; U'_{x-1} is the volume at the end of month $(x-1)$ or beginning of month x and U'_x is the volume at end of month x; E'_x is the employment corresponding to U'_x.

End of Month	*Unemployment*	*Employment*
0	5,000	95,000
1	5,385	94,615
2	5,769	94,231
3	6,154	93,846
4	6,538	93,462
5	6,923	93,077
6	7,308	92,692
7	7,692	92,308
8	8,077	91,923
9	8,461	91,539
10	8,846	91,154
11	9,231	90,769
12	9,615	90,385
13	10,000	90,000

Because of the characteristics postulated with respect to the labor force model, it follows that

(22) $U'_x - U'_{x-1} = S_x - A_x$

With the volume of unemployment at the beginning and end of each month known, additional information is still needed regarding either the accessions or separations during each month. Expressing accession and separation rates for a four-week period as a percent of the employment at the beginning of the period, it follows that

$$S_x = gE_{x-1}$$
$$A_x = aE_{x-1}$$

For illustrative purposes, let us assume that $a = 3$ percent over each month of the year. At the beginning of the year, we have

$$L = 100{,}000$$
$$U_o = 5{,}000$$
$$E_o = 95{,}000$$

Over the course of the first lunar month, the total accession rate is three percent, and the total number of hires (aE_o) is 2,850. Substituting in (22), we find that the total number of separations, (sE_o), is 3,234.6. If $\hat{h}_x$ represents an approximation of the hiring probability in lunar month x

$$\hat{h}_1 = \frac{aE_o}{U_o + {}^1/_2\, gE_o} = 0.4307$$

$$1 - \hat{h}_1 = 0.5693$$

U'_x = the number of unemployed at the end of lunar month x.

$U'_{x:y}$ = the unemployed at the end of lunar month x who have been continuously out of work for y weeks or more

$U'_{x:y}(1 - \hat{h}_{x+1})$ = the unemployed who have been out of work y weeks or more by the end of lunar month x and who are not able to find employment by the end of lunar month, $x + 1$.

$$U'_{x+1:y+4} = U'_{x:y}(1 - \hat{h}_{x+1})$$

Thus far in our illustration, the values of U_o, U'_1, $\hat{h}_1$ and $(1-\hat{h}_1)$ have been computed. A cumulative distribution of U_o by weeks of unemployment has also been obtained as the initial distribution, so that we have values of $U_{o:y}$. A distribution of U'_1 can be obtained from the following relationship:

$$U_{o:y}(1 - \hat{h}_1) = U'_{1:y+4}$$

The duration-distributions in the hypothetical labor force of one hundred thousand for the beginning and end of the first lunar month are then as follows:

Duration of Unemployment	*Beginning of First Month*	*End of First Month*
All unemployed	5,000	5,385
4 weeks or more	2,782	2,846
8 weeks or more	1,548	1,584
12 weeks or more	861	881
16 weeks or more	479	490
20 weeks or more	266	273
24 weeks or more	148	151
28 weeks or more	82	84

Each cell frequency for the beginning of the first lunar month (or end of lunar month zero) was multiplied by 0.5693, the value of $(1-\hat{h}_1)$ to derive a cell frequency for the end of the first lunar month. A diagonal line connects each frequency in the second column to the one in the first from which it was derived.

The process is continued, and similar distributions are computed for the end-point of each of the thirteen lunar months. For each calendar year, therefore, there are fourteen distributions, one corresponding to the beginning of the year and the remainder for the end of each of the thirteen lunar months. These distributions are related to discrete and equally-spaced points in time. The number of workers unemployed y weeks or more in an average week of lunar month x is equal to $\frac{1}{2}(U'_{x-1:y} + U'_{x:y})$, and the number of unemployed y weeks or more in an average week of a calendar year is equal to:

$$\frac{\frac{1}{2}(U_{o:y} + U'_{1:y}) + \frac{1}{2}(U'_{1:y} + U'_{2:y}) + \ldots + \frac{1}{2}(U'_{12:y} + U'_{13:y})}{13}$$

$$= \frac{1}{13}\left[\frac{1}{2}U_{o:y} + \sum_{i=1}^{12} U'_{i:y} + \frac{1}{2}U'_{13:y}\right]$$

A duration distribution for an average week of the calendar year in duration intervals of four weeks can be derived in this manner. Smaller duration intervals can be obtained by interpolation. These distributions can be used to determine the number of unemployed in a compensable duration-of-unemployment interval.

Consider, for example, a plan for payment of benefits after a waiting period of one week, with benefits payable for twenty weeks of unemployment. In order to receive at least one benefit payment, a claimant must have been out of work long enough to have served his waiting period and to have experienced at least one additional week of wage loss; i.e. the claimant must have been out of work at least two weeks before he can receive an unemployment benefit payment. If benefits are payable for twenty weeks of unemployment, a beneficiary will receive the last weekly payment to which he is entitled at the end of his twenty-first week of unemployment. During an average week of the year, therefore, the workers in compensable status would be those who have been out of work at least two but less than twenty-two weeks.[6]

Let $\overline{U}:x$ = the number of unemployed in an average week of the year, who have been continuously out of work for x or more weeks.

[6] Only full weeks of wage loss are considered here. In practice, benefits are payable in some instances for partial weeks of wage loss, and cost estimates would have to be adjusted to reflect such payments.

$\overline{C}$ = the number of unemployed workers in the compensable duration-of-unemployment interval in an average week of the year.

$\overline{C}'$ = an estimate of $\overline{C}$

If the unemployment insurance program provides twenty weeks of benefit entitlement after a waiting period of one week,

$$\overline{C}' = \overline{U}{:}2 - \overline{U}{:}22$$

Under the assumed conditions depicted in the labor force model, it is possible to study the cost of an unemployment insurance plan just as economic relationships are studied under assumed conditions and by apriori reasoning. It would be desirable to bridge the chasm between the over-simplified labor market conditions depicted in this model and the actual labor market environment. However, such a transition has proved to be very difficult.

REALISTIC LABOR MARKET CONDITIONS

Estimates of the volume of compensable unemployment derived on the basis of hypothetical models must be adjusted for the following factors:

1. Heterogeneity in the labor force.
2. Incidence of multiple spells of unemployment in a benefit year.
3. Continuous variation in the composition of the labor force.
4. Miscellaneous administrative factors not depicted in the models.

These items represent the major differences for actuarial purposes between the hypothetical models and the actual labor market.

HETEROGENEITY IN THE LABOR FORCE

The labor force is not a homogeneous entity, and there is considerable variation among workers with regard to hiring and firing probabilities. During the depression phase of a business cycle, for example, there is a substantial proportion of the unemployed with practically no chance of finding jobs; this segment of unemployment is known as the "hard core." This hard core of unemployment exists even though continued hirings and layoffs occur in other segments of the labor force.

Some insight into the impact of heterogeneity on unemployment insurance costs may be derived by a study of the hypothetical labor force models. For example, it can be demonstrated mathematically that for a specified average level of unemployment differences in unemployment rate between two segments of the labor force will result in a lower volume of compensable unemployment than if the unemployment were evenly distributed over the labor force.[7]

[7] See Appendix Note C, *Principles of Cost Estimates in Unemployment Insurance,* by W. S. Woytinsky.

The hypothetical models can be used to illustrate the impact of varying degrees of heterogeneity on the level of compensable unemployment. For example, the volume of compensable unemployment in a homogeneous labor force with unemployment rate of 12.5 percent may be contrasted with a labor force subdivided into four segments of equal size with unemployment rates of five, ten, fifteen and twenty percent, respectively. Similarly, variations in turnover rate among these segments may be considered. A segment with hiring probability equal to zero would represent a hard core of unemployment.

The emergence of a hard core of unemployment during the depression phase of a business cycle has an important impact on unemployment benefit expenditures over a business cycle. One method of reflecting the effects of the hard core is as follows:

Assuming that unemployment is composed of two groups—turnover and hard core—

$$L = U'_t + E'_t$$

$U' = N'_t + \triangle$, where

N' = volume of turnover unemployment at the point t

N_t = the segment of N'_t composed of workers continuously unemployed from the point $t = 0$

$\triangle$ = the volume of hard-core unemployment

The hard core is generally assumed to be constant in size and composition over a unit time-interval such as a four-week period (lunar month) and each of the two groups—hard-core and turnover unemployment—is assumed to be homogeneous with respect to hiring probability. Instead of equations (6) and (14) we have

$$(23) \quad dN_t = -rN_t\,dt$$

$$(24) \quad dN'_t = -(rN'_\cdot - sE')\,dt$$

These equations are solved in the same way as (6) and (14). The derived hiring and firing probabilities will differ to the extent that unemployment subject to hiring is diminished by the exclusion of the hard core, $\triangle$. Thus, in approximating the hiring probabilities, we have

$$r \doteq \frac{A}{N_o}, \text{ or}$$

$$\hat{h} \doteq \frac{A}{N_o + \frac{1}{2}S} \text{ or } \frac{A}{N_o + S}$$

In constructing a duration distribution, the calculations are the same as shown for a homogeneous labor force (except for adjustments in the hiring probabilities), if the magnitude and composition of the

hard core remains constant. However, it would be desirable to take account of shifts into and out of the hard core.

For this purpose, the proportion of unemployment in the hard-core group may be treated as a function of the unemployment rate and the phase of the business cycle—i.e. the declining phase and the recovery phase. By means of such a functional relationship, we would be able to estimate the proportion of unemployment that should be in hard-core status under given conditions. The proportion of unemployment in hard-core status for a specified level of unemployment should be higher during depression and recovery phases than during the prosperity and declining phases. This is an area requiring further empirical study.

CHANGING COMPOSITION OF THE LABOR FORCE

A typical labor force is one that is continually changing in both size and composition. Withdrawals from the labor force occur because of superannuation, disability, death, retirement and numerous personal reasons. At the same time, decisions are being made by people outside the labor force either to seek employment or to accept job offers. Although the bulk of new entrants consists of those becoming of age, part consists of individuals who had previously withdrawn from the labor market and decided to reenter.

The hypothetical models depict a labor force constant in both size and composition. In these models, job vacancies are filled only by the hiring of workers from the available pool of unemployment, and every separation results in the transfer of a worker from the status of employment to that of unemployment. This type of model could conceivably describe a pool of workers possessing a rare skill, who are attached to a plant, occupation or industry, and are unable to accept employment in any other type of activity. In general, however, not all separations result in unemployment. Aside from voluntary quits to accept other jobs immediately, separations due to death, retirement or disability result in withdrawals from the labor force and not in unemployment. Also, not all job vacancies are filled by persons currently in unemployment status. Some openings are filled by persons entering the labor market for the first time or reentering after a long absence, others by persons shifting from one job to another. In an unemployment insurance program covering only part of the labor force it is also significant that some of the covered job openings may be filled by workers separated from jobs not covered by the unemployment insurance plan while some of the workers separated from covered jobs enter non-covered employment.

Some of the above factors may be partially reflected in the labor force models. For example, the turnover rates should be reduced in order to eliminate the hires and fires caused by voluntary shifts from job to job. Possibly, a continuous work-history study over a sufficient-

ly long period of time would yield satisfactory information for adjusting the actuarial estimates for the effects of changes in the composition of the labor force.

SUMMARY

There are relevant items, such as multiple spells of unemployment and administrative factors which are important, but cannot be treated adequately in a brief presentation.

Further experience with unemployment insurance will undoubtedly lead to the development of a more comprehensive theory and also to practical solution to problems confronting us at the present time.

DISCUSSIONS OF PAPERS READ AT THE NOVEMBER 1954 MEETING

PROLONGED ILLNESS INSURANCE

MARK KORMES

Volume XLI, Part II, Page 102

DISCUSSION BY J. R. BEVAN

The transactions of any self-respecting insurance organization encompassing the field of Accident and Health insurance would not be complete today without a treatise on some aspect of so-called Major-Medical coverage. Thanks to Mr. Kormes, we can now boast a creditable paper on the rate making approach to the Massachusetts Blue Cross-Blue Shield version of this catastrophic-type coverage called Prolonged Illness Insurance.

Unlike other carriers entering this field, the Massachusetts Blue Cross-Blue Shield elected an approach which is primarily scheduled in nature since it defines the diagnoses prerequisite to benefit payments. Having decided on the types of prolonged illnesses and serious conditions eligible for benefits as well as fixing more general conditions under which supplementary benefits would be payable, it apparently became the actuary's task to price the product. In so doing, Mr. Kormes has documented his item-by-item cost analysis in an orderly manner and has blended into useful statistical tables facts supportable by actual data and by judgment. Anyone who has addressed himself to the problem of establishing defensible accident and health rates for catastrophic coverages as evolved by his associates in the Underwriting and Sales Departments (particularly one who has been exposed to seemingly unlimited pure premium data in Workmen's Compensation insurance) will appreciate the complexity of the problem and recognize the time-consuming research which must have preceded the compilation of the numbers found in Mr. Kormes' tables.

For purposes of a more specific discussion, the pure premiums by selected coverages which comprise the total pure premiums are summarized below:

	Annual Pure Premium			
	Indiv.		*Family*	
	Amt.	*%*	*Amt.*	*%*
I. Cancer, Heart (Coronary & Heart Failure) Tuberculosis, Fractures, Rheumatic Fever, Cerebral Hemorrhage, and Mental	6.79	73%	11.72	69%
II. All Other Specific Conditions (10 Others)	.58	6	1.02	6
III. Unspecified Conditions				
—Nurses Benefits	1.38	15	3.35	19
—Extended Hosp. & Medical Benefits	.57	6	.97	6
TOTAL	9.32	100%	17.06	100%

In deriving the above figures, Mr. Kormes necessarily resorted to judgment in determining the estimated cost and incidence of specific conditions under Items I and II above but was able to rely on reasonably solid actuarial data in deriving costs for supplementary hospital and medical benefits for unspecified conditions under Item III. For example, a morbidity Table constructed from an analysis of about 9,200 individual and 59,000 family hospital claims and showing the number of cases by number of days' stay was used as a basis of forecasting the costs of extending room and board and medical benefits to claimants hospitalized beyond 21 and 60 days respectively. (This type of information is the actuary's delight and it is my selfish suggestion that the table which Mr. Kormes included in abbreviated form be included in its entirety in some future paper.) The point of discussing the methods of deriving costs for the categories of benefits shown above is only to underscore the fact that about 75% of the total pure premium (earmarked for specific conditions) was based primarily on judgment while the remaining 25% for supplementary benefits was based on statistical data of some substance. It was possibly this realization that led to the inclusion in the final family rate of a 12.5% contingency loading and the imposition of strict underwriting conditions, at least as measured by the more liberal underwriting conditions of other carriers writing this type of insurance. I refer specifically to the restrictions relating to the twelve months waiting period for all benefits (with a few enumerated exceptions) and to the blanket prohibition against paying benefits for pre-existing conditions. It is intended to discuss this aspect of the paper in more detail below.

Conspicuous by its absence in Mr. Kormes' rating approach, at least to those familiar with major-medical rating methods of other carriers, was any attempt to introduce rate differentials by age, by income, or by area. However, when it is considered that few Blue Cross-Blue Shield members are characteristically drawn from the executive level and since the Prolonged Illness Plan provides only nominal schedule benefits, i.e., benefits in most instances which are specific per service rendered as contrasted to the blanket variety of other carriers, the income problem is minimized. Area-wise, the Plan is limited to the State of Massachusetts and since the Plan is available only to members of Blue Cross groups of 100 or more where 75% of the total eligible personnel apply for this coverage or to groups of any size if underwriting requirements are met and the average age is 40 or less, it is reasonable to expect a sufficiently average age distribution such that actual experience results will not be distorted by a disproportionate number of older members.

Mr. Kormes' documentation of his techniques in pricing the product is straightforward, well-organized and beyond criticism. Yet, some conservative casualty actuaries will be slightly shocked to find that a pure premium to four decimal places can be obtained from what must have been a series of educated guessing games with hospitals

and doctors. However, this is the procedure that, of necessity, must be followed if actuaries are to assist the Accident and Health industry in substituting the facts of prolonged illness costs for the impressions thereof.

Quite apart from a discussion of Mr. Kormes' paper insofar as it concerns prolonged illness ratemaking, it is hoped that the writer will be allowed a few parenthetical remarks relating to the design of the product itself. It is my feeling that whereas most Accident and Health people may not question the fitness of the price for the product, they may question the fitness of the product for the insurance buying public. Such a reservation might logically stem from the schedule or specific condition approach of the Massachusetts Hospital Service Inc. An analysis of the table included above, for example, reveals that over 75% of the total cost is earmarked for 18 specific conditions and about 70% is for 8 conditions. Granted that such conditions occur with substantial frequency, nevertheless it would appear that we are dealing with something akin to a "Dread Disease" policy and it is doubted if the needs of the insurance buying public are best satisfied by such coverage. To offer one policyholder as much as $5000 for a cancer condition but to provide only nominal supplementary benefits to another who contracted a non-specified but equally expensive condition is an approach which has been rejected by most other carriers as not in the public interest, incompetent as most people are to foretell what prolonged illness may befall them. It was stated in the article that the schedule approach was followed among other reasons to prevent abuse. However, the coinsurance provisions and the nominal amounts scheduled for hospital benefits which have been built into the plan even for the specific conditions would appear sufficient for such control. Independent of price considerations, it would be a little difficult for me to foresee any serious abuse if the plan included benefits for *any* condition requiring a hospital stay beyond 22 days, given the same controls as for the specified conditions. It is questionable in my mind whether people malinger in the hospital and "ride" an insurance plan after a three weeks' internment.

My personal view (assuming that a $2.00 monthly rate for a family is as much as the traffic will bear for this coverage) is that a sounder insurance buy would be to offer to anyone meeting certain minimum standards relating to hospital confinement or out-of-pocket expenses, benefits scaled down to what they must be scaled down to for $2.00. In this way, eligibility for benefits would not depend on the happenstance occurrence of a particular condition but on the severity of the disability.

It is of interest to note that other Blue Cross organizations have resisted the specified condition approach in attempting to build a catastrophe plan. In an article appearing in the April 14, 1955 *Journal of Commerce,* a Blue Cross subcommittee headed by John Mannix of Cleveland reported as follows:

"Their early decision that it was impractical and undesirable

> to cover a limited listing of so-called catastrophic illness led to the extended benefits idea",

and further along in the article:

> "The subcommittee . . . emphasized it was desirable for the new extended health services to provide for all illnesses and accidents."

By way of further discussion of the product, I think it is appropriate to touch on the underwriting restrictions mentioned above relating to pre-existing conditions and waiting period. Specifically, the policy in question requires a waiting period of twelve months before the payment of any benefits except that immediate benefits are available for certain acute conditions such as infections, contagious diseases, traumatic conditions, inflammations unrelated to underlying pathology or defect, coronary or cerebral artery occlusions and certain primary malignant and benign neoplasms. Furthermore, no benefits will be payable for any condition which has exhibited signs or symptoms prior to the effective date of the coverage.

On these underwriting restrictions I would comment as follows:

(1) To the extent that Accident and Health rates are based on averages, it is elementary that underwriting results will be average only if there is a bona fide chance selection of persons covered. That is, if a hypothetical Utopia could be visualized composed of people known to be free from all signs or symptoms of any disease, an ideal group exposure (assuming proper age and sex rate loadings) would be composed of, let's say, 75% of such a group selected at random. To my mind, the prohibition of benefits on pre-existing conditions assures the selection of such an average group without the further necessity of a twelve month waiting period. Although the waiting period device is used to some extent on basic policies to assure that marginal and postponable surgical operations will be minimized and to control maternity claims, it is not felt that the presence of insurance will tend to increase the average frequency of the specified prolonged illnesses. As respects this coverage, I do not share the view of some cynical underwriters who feel that all the insured needs to become a claimant is a policy. Furthermore, I feel this restriction is overly severe if designed to control benefit payments on claimants who denied having signs or symptoms as of the effective date but were in fact and without their knowledge, going through the initial stages of one of the prolonged illnesses.

(2) Although I would not quarrel seriously with eliminating benefits on pre-existing conditions and accept the premise that caution should be the keynote in this venture, I would have some misgivings about the use of the phrase "exhibited signs or

symptoms" in the determination of pre-existing conditions. Possibly, the actual wording in the policy is more definite and provides a more explicit yardstick. If it does not, however, it would appear that the use of this phrase in the handling of claims spells potential difficulty on such questions as what signs and symptoms are associated with what prolonged illnesses and who reads the signs. Some carriers have attempted to word similar exclusions more objectively as follows:

"any illness for which the individual has received medical care within .... months prior to becoming insured."

I think such language can be used as a better separator, both from a company's and a claimant's point of view.

(3) The twelve month waiting period is waived for certain specific conditions. To be fully informed as to policy coverage, therefore, a policyholder must understand:

a) He is not covered after the effective date for any conditions which exhibited signs or symptoms prior to the effective date, and

b) Of the conditions contracted after the effective date or contracted prior to the effective date but which did not exhibit signs or symptoms at the time of the effective date, some conditions are eligible for benefit payments before the twelve month waiting period and some conditions are not eligible for benefit payments until after a twelve month waiting period.

Can prospective buyers be made to understand these benefits as readily as benefits offered under less restrictive blanket major medical policies, keeping in mind the importance of such comprehension in the eyes of Insurance Departments whose law is founded, in part, on the premise that the public is not competent to judge an insurance contract?

Note: In Table IX, Page 114, an apparent error in the final printing was noted. The Blue Shield Individual rate of $2.6113 for Specific Diagnoses-VIII should be $1.5786.

DISCUSSIONS

AUTHOR'S REVIEW OF DISCUSSION

MARK KORMES

Mr. Bevans' sympathetic discussion of my paper raises several questions which require some clarification as they touch upon a fundamental difference between the Blue Cross-Blue Shield approach and that of other carriers of this coverage.

The principal criticism of Mr. Bevan is the selection of a number

of specified diseases rather than a blanket coverage. In the first place it is the opinion of the medical profession that the specified illnesses are the only known illnesses where there is need for the coverage. In the second place, should a particular case arise where it would appear that such a condition should have been included in the coverage, due consideration will be given by the medical director and coverage might be well granted even though not specifically listed. This liberality of interpretation produces better underwriting results than a blanket coverage. Finally, under a standard Blue Cross-Blue Shield coverage, there is no need to provide blanket coverage. Thus, for example, a Blue Cross $12.00 a day Room and Board contract covers all extras and a Blue Shield contract is a service contract in most instances. A case hospitalized for 20 days in an $18.00 room where the extras (assuming no private duty nurse and no blood plasma) amounted to $800.00 and the surgeon's fee would be normally $500.00, would have to pay only $120.00. Under a standard insurance company contract with $12.00 Room and Board and $240.00 for extras allowance and a $300.00 surgical schedule, the assured would be faced with an additional bill of $880.00. Even with a major medical ($100.00 deductible and 75% coinsurance) payment of $585.00, the assured would still have to pay $295.00.

The question of public acceptance can be easily measured by the fact that at the end of a five-month period from the date the coverage became available, there were more than 60,000 persons covered with an annual premium of almost $600,000.00.* The present indications are that approximately 5,000 new contracts are written each month covering about 12,000 persons.

To continue with underwriting restrictions one must also bear in mind the fact that while an insurance company will not write a group unless there is a 75% participation and all new employees must be covered, Blue Cross groups of 100 or more may reflect a participation of as little as 50% of the total number of employees (new employees may join or not) and, therefore, much more strict precautions are needed to avoid anti-selection. The pre-existing conditions are also liberally interpreted by the medical director so that cases where the claimant would not have been aware of any such conditions would be in most instances covered.

To conclude this phase of the discussion, it was felt that with a new and experimental coverage, the best approach is that of caution and restriction so that when favorable experience develops it will be possible to reduce rates or increase the scope of benefits, or both.

Turning to other elements of the discussion, I have used four decimal places in the calculation, first in order to show some cost figures for certain low cost elements, and second to follow the established procedure of filings with the Massachusetts Insurance Department.

*At the end of August the annual premium was over $1,000,000.00.

It is readily seen that two or even one decimal place would produce identical final results.

I quite appreciate Mr. Bevans' desire to see a publication of duration tables. Perhaps this will be done at some future time as far as Massachusetts is concerned. In the meantime, I would like to refer an interested reader to the paper by Arthur Hunter and Alan Thompson in the Transactions of the Actuarial Society of America** where there are published rather extensive tables based on the experience of the New York Blue Cross.

**Vol. XLIV, Part 1, No. 109, May 1943.

Note: In Table IX on page 114 the individual Blue Shield Pure Premium on the first line should be $1.5786 instead of $2.6113.

GROUP ACCIDENT & HEALTH HOSPITAL THERAPEUTIC BENEFITS—MEASUREMENT OF LOSS COSTS FOR RATEMAKING PURPOSES

P. M. OTTESON

Volume XLI, Part II, Page 116

DISCUSSION BY HAROLD F. LACROIX, JR.

My first reaction to Mr. Otteson's paper is one of welcome. There have been too few papers on Group Insurance subjects presented for publication in the *Proceedings*, perhaps because, until the advent of compulsory disability benefit laws, Group Insurance was principally written by Life Insurance companies. I hope that this paper is only the first of many on this general subject which can well benefit from the attention of casualty actuaries.

Mr. Otteson's paper is certainly a fine introduction to the measurement of Group Accident and Health loss costs for ratemaking purposes. I do not intend to make any comment on Part II of this paper dealing with a "basic plan for developing ratemaking statistics" since this plan undoubtedly functions satisfactorily for Mr. Otteson's company. I believe each carrier must develop a statistical plan which is consistent with its rating and accounting practices, which seem to vary considerably from carrier to carrier. I might mention that The Travelers would find it difficult to adopt this statistical plan to its accounting and rating procedures.

I will confine my comments to Part III of this paper which considers "the analysis, interpretation and use of loss experience statistics for ratemaking purposes." Mr. Otteson suggests considering for ratemaking purposes loss statistics by geographical region, age, cause of hospitalization and "newness" of policy separately for male employees, female employees, adult dependents and children. We have found that the separate analysis of total experience by any one of these

factors, as outlined in this paper, is misleading since the variations in experience within the classifications of the factor being studied which are due to the other factors are not measured. For example, the variations in experience shown by geographical region in Tabulation C might be due to the variations in experience by age shown in Tabulation D unless the age distributions in the various regions are similar. Thus we have found it necessary in analyzing the effect on our experience of any one variable to eliminate the effect of the other principal variables as much as is possible through more detailed breakdowns of the experience and application of standard statistical procedures. In addition, we have found it necessary to recognize some variables which Mr. Otteson has ignored, such as the percentage of female exposure on the risk, the size of the risk, the level of the benefits, and the degree of coinsurance. For instance, we have found that the hospital claim frequency per female employee increases as the percentage of females exposed on the risk increases. Also, with respect to coinsurance, we have found that the frequency of short term hospitalization increases appreciably as the percentage of the total cost borne by the employee decreases. Because of the necessity of studying the experience in such detail, The Travelers, with over $150,000,000 in Group Accident and Health premiums, has found it difficult to develop a sufficient volume of experience in many categories. Therefore I question whether the experience of any one company with only a moderate volume of Group Accident and Health business can be used successfully for ratemaking.

I might add, although it does not bear directly on this paper, that the compilation of industrywide Group Accident and Health statistics might well be a subject for consideration of this Society, since, in my opinion, the only Group Accident and Health statistics now being published are not of an industrywide nature and are certainly not in a form suitable for determining experience differentials for ratemaking purposes.

THE BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN

ROBERT B. FOSTER

Volume XLI, Part II, Page 135

DISCUSSION BY RONALD L. BORNHUETTER*

Mr. Foster has done an excellent job of describing the intricate details of the Boiler and Machinery Premium Adjustment Rating Plan of the National Bureau of Casualty Underwriters. Although this plan has limited use, it is a very important part of the Boiler and Machinery line of insurance because, as Mr. Foster points out, at the present time this plan is the only type of formula rating plan

*By request.

offered, through which a risk may develop a premium more in keeping with the actual costs incurred under the policy. As this paper is explanatory by nature, any discussion must be limited to emphasizing various points made and, perhaps adding a little information which will help complete the study made of this plan.

During the discussion of the steps involved in determining the rating values, Mr. Foster states briefly that the loss element for Boiler and Machinery Direct Damage Insurance varies by type of object insured and, in order to facilitate the calculation of the expected losses for the risk, various expected loss factors are set forth in tabular forms as illustrated on pages 159 and 160. In this connection there is some question as to the adequacy of the provision that is now included in the fixed charge for the portion of the incurred losses between an accident limitation less than $25,000 and the $25,000 point. In effect, the only provision for such under the present plan is the loss portion of the location and portable object charges. This results from the method used in developing the expected loss factors. Although $5,000 is the basic limit for Boiler and Machinery Direct Damage Insurance, the loss pure premiums used for the development of revised expected loss factors in the latest revision reflect all incurred losses of $25,000 or less excluding that portion of such losses provided in the portable object and location charges. This procedure was followed throughout the rate revision as an alternative to the establishment of a number of separate excess limits tables varying by type of object for the range from $5,000 to $25,000. It should be noted that for accident years 1948-1952 approximately 14% of the modified direct damage incurred losses are between $5,000 and $25,000. Also 94% of the risks rated under the Premium Adjustment Rating Plan, which were filed with the National Bureau between January 1948 and June 1954, have direct damage accident limitations less than $25,000. These few facts indicate that the problem is not one to be passed over without some thorough examination.

Without entering into a detailed discussion several possible solutions are apparent after a cursory examination. One possibility, assuming the eligible risks purchase policy limits of $25,000 or higher, is to provide for a minimum direct damage accident limitation of $25,000. Under the present plan the combined limits for all coverages for any one accident cannot be greater than 80% of the selected maximum loss ratio multiplied by the Standard Premium, except that the Direct Damage limit must be at least $5,000 which is the basic limit. (As Mr. Foster points out, the purpose of the 80% limitation is to prevent any one loss from producing the Maximum Premium.) Approximately 66% of the risks rated are not eligible for a $25,000 accident limitation under the present 80% rule. For risks whose incurred losses are large but infrequent any increase in the minimum accident limitation would provide the carrier an opportunity for reflecting a greater portion of the loss under the plan.

Another possible solution would be to develop several tables of expected loss factors for the various accident limitations less than $25,000, i.e. $5,000, $10,000, $15,000 and $20,000. As a result of any change along this line of reasoning the present procedure for determining rating values would have to be modified in order to provide an increment in the fixed charge to cover the portion of direct damage incurred losses between the accident limitation and $25,000. This increment would not be easily calculated as the expected losses for the risk would have to be determined twice, once for the expected losses within the accident limitation and again for the expected losses contemplated by the manual object rates ($25,000 accident limitation). As an alternative to this possibility the expected losses could be determined as presently done and then this value could be reduced by an appropriate factor which would decrease the expected losses to the true value contemplated by the direct damage accident limitation. Separate factors for each accident limitation could be developed from an analysis of the incurred losses by size of loss for a given period of years. One drawback to this procedure would be the error introduced by the grouping of various objects in order to determine the appropriate factors. The reason for this error is that the probability of incurred losses over $5,000 will vary by object and any feasible set of factors would have to incorporate some large groupings of objects. These few ideas are by no means intended to exhaust all the possible solutions; however, they should serve as an introduction to this problem which should be resolved in order to provide a more balanced plan.

Mr. Foster mentions that one of the essential differences between this Plan and Plan D is one set of rating values as compared with three (or more) for Plan D. This is made possible because the Standard Premium can be accurately determined in advance. I would like to point out that relative accuracy in the Standard Premium for the objects initially insured under the plan can be obtained at the inception of the rating period; however, recognition is not given to the fact that the final Standard Premium may differ from the initial Standard Premium by a significant amount. One reason for this variation is that during the rating period large risks may add or subtract object or coverages which could alter the final Standard Premium considerably, which would be very significant during any expansion period. Another reason is that some forms of the Use and Occupancy coverage with daily indemnity and all forms with no daily indemnity provide for the annual adjustment of premium through the use of reporting forms. Having two or three sets of rating values would minimize the error in rating values resulting from the variation between initial and final Standard Premium. Another error, however, is introduced whenever a risk changes exposures or coverages, in that the expected loss factor under the plan for the risk may be altered considerably, which is due to the range of expected loss factors from 4% to 44%.

At the end of the paper Mr. Foster briefly mentions the possibility of adopting tabular plans for risks with Standard Premium less than the present eligibility point. Supplementing this point it would be well to note that, based on a standard premium distribution for calendar years 1948-1950 adjusted to the present level, less than one half of one percent of the total Boiler and Machinery risks written are eligible for the Plan. If a supplement to the Plan was made available to risks with Standard Premium sizes of $3,000 or more, this would provide opportunity for approximately three percent of the total number of risks written to reflect a premium that is more in keeping with the actual costs. At the present time Retrospective Rating Plan M, a loss ratio type of retrospective rating plan filed by one carrier in most states for Boiler and Machinery Insurance, has introduced an eligibility point of $3,000 Standard Premium for a three year policy. Besides the possibility of a retrospective rating plan with wider application, I believe the introduction of some form of an experience rating plan would be a worth-while supplement to the Boiler and Machinery line of insurance.

As the details of this retrospective rating plan are unfamiliar to many due to its limited use as compared to some other rating plans, the completeness of Mr. Foster's contribution will definitely aid in the future value placed upon his paper.

A CREDIBILITY FRAMEWORK FOR GAUGING FIRE CLASSIFICATION EXPERIENCE

ROBERT L. HURLEY

Volume LXI, Part II, Page 161

DISCUSSION BY C. H. GRAVES

Mr. Hurley in his paper "A Credibility Framework for Gauging Fire Classification Experience" which appeared in the 1954 Proceedings has made an important step forward on a very difficult problem. As he pointed out "the literature on this subject is scanty." This is somewhat an understatement. I would say the literature relative to credibility of fire insurance experience is non-existent.

In 1946, at the time the National Association of Insurance Commissioners adopted the "Uniform Statistical Plan" for Fire and Allied Lines Insurance, the report of the Fire and Marine Committee of the NAIC contained the following comment on the question of credibility of fire experience:

> "No exact standard for credibility of fire insurance experience has ever been established. Long and serious study has been given to the subject with the following conclusion. Any exact yardsticks established at this time, either as to the number of risks or the premium volume that would provide credibility, would be

arbitrary, and only after this classification system has been in operation for some time will it be possible to give consideration to the development of such standards.

"While in many states the classified fire experience over a five year period will possess credibility, particularly in the residential and mercantile classes, there may be conditions when the use of a longer period may be considered desirable. It should be emphasized that in perhaps an equal or larger number of states and classes single state credibility will not exist. With this thought in mind the classification plan here proposed will make available consolidated experience over broader territories by groups of states and nationally and also by groupings of similar classes of risks."

Although nine years have gone by since this NAIC report, there is still no standard for credibility of fire insurance experience. Mr. Hurley's paper makes a start towards establishing a standard. His definitions however of "100% credibility experience as a summary of loss experience based on such a number of independent risks that in fewer than 3 in 100 instances one would expect that the true loss ratio would be more than 10% above the indicated figure" is subject to the following objections:

(1) The definition is not related to objectives in considering fire experience. (Would the experience have, for example, 100% credibility for rate making, rate review, use by underwriters or use by management)? In other words, credibility for what purpose.

(2) The selection of "3 in 100" is admittedly arbitrary. But why the choice of 3 in 100? Why not 5 in 100, or 1 in 100? The reference in the paper to a need for "personal assurance" is not very helpful in justifying a rate revision.

(3) The credibility standard is geared to a restriction in the swing of the loss ratio on solely the "top" side of the "true" figure. Surely the fact that Mr. Hurley's formula produces a greater credibility because of this limitation to the top side only is no reason why one should be unconcerned with the "true" ratio being lower than that indicated by the experience. If the data was used for ratemaking, I would assume that the rate maker and rate reviewer would be just as concerned with the "under" side of the "true" ratio as with the "top" side.

As Mr. Hurley stated however, these standards can be varied, and different credibility tables established. I would refrain therefore from referring to the values of the parameters in the definition of 0% credibility and 100% credibility as "standards" until such time as they have been utilized by rate makers and "approved" by rate supervisors. Of course, one must realize that Mr. Hurley is thinking of the "underwriter" looking at some "loss ratios" and trying to figure out

what to do about it and he is not thinking of a rating bureau attempting to establish and justify rates.

Mr. Hurley is too apologetic for his use of mathematics. There is a need for credibility standards in fire insurance, and mathematics is a valuable tool to be used in determining credibility formulas and tables.

In the June 1953 issue of Best's Insurance News there is an article on "Classified Fire Experience" which lists the following objectives of a fire insurance statistical plan:

"a. To enable adjustment of class or tariff rates in accordance with actual loss experience.

b. To provide a measure by which supervisory authorities can judge whether rates are adequate, reasonable, and fairly discriminatory.

c. To provide a measure by which individual companies can judge their underwriting performances and practices and decide what changes may be needed.

d. To give some indication if rates produced by schedules are accurate and, to a very limited degree, to suggest necessary adjustments in the schedules."

I believe that in establishing credibility standards it is necesary to give consideration to the purposes for which the experience data is being collected.

As an illustration of the difficulty of the problem, what "credibility" should be given to the Extended Coverage loss experience due to Hurricanes *Edna* and *Carol?* In 1954, stock and mutual companies paid out on claims associated with these two hurricanes, more than had been received in extended coverage premiums for 10 years.

I hope that I am not giving an unjust criticism of Mr. Hurley's paper. He has made a valuable contribution towards solving an important problem but these first words on credibility should not be taken to be the last words on the subject.

DISCUSSION BY M. H. McCONNELL

Rarely do we find an article dealing with a mathematical subject that is written in such delightful English as Mr. Hurley's paper on fire insurance credibilities, but this is only an incidental benefit, an extra dividend, if you please. The truly significant aspect of the paper is that for the first time an attempt has been made to deal with fire insurance credibilities on a rational basis supported by mathematical reasoning.

The standard for minimum credibility adopted by Mr. Hurley is the point at which we would not expect the true loss ratio to exceed the incurred loss ratio by more than ten percent in more than one case out of three. The standard adopted for full credibility is the

point at which in not more than three cases in one hundred would the true loss ratio be expected to be more than ten percent above the indicated figure. Mr. Hurley points out that his methods will permit the adjustment of these standards, although it seems to me that few persons would be disposed to claim they were unreasonable. Between these selected minimum and maximum points, credibilities are obtained from a hyperbola of the type $\frac{P}{P+K}$ except that the upper values are taken from a straight line passing through the minimum and maximum. The results so obtained are perfectly satisfactory. Nevertheless, other interesting possibilities suggest themselves.

Prior to 1940, credibilities for the Compensation Experience Rating Plan were obtained from a hyperbola of the type $\frac{P}{P+K}$. At that time the upper values were obtained from the tangent to the curve from the point of self-rating since, of course, $\frac{P}{P+K}$ would never result in 100% credibility.

The determination of a similar tangent to Mr. Hurley's hyperbola has been worked out in the attached appendix.

It is only because we have chosen to use a hyperbola of the type $\frac{P}{P+K}$ that we must take the upper values from the tangent or some other straight line through the point of self-rating. A parabola of the type $Y = -X^2$ with its vortex at the point of self-rating would make this unnecessary. We can impose the further restriction that the parabola must intersect the "X" axis at N_o. The curve will then pass through the selected maximum and minimum and the result will be a smooth graduation from minimum to maximum. The equation of such a parabola is:

$$Z - 1 = \frac{(N - N_t)^2}{(N_o - N_t)^2}$$

There is a very simple curve that can be made to pass through the selected minimum and maximum points although its use is likely to horrify mathematical purists. It is an ellipse. If the center of the ellipse is place at N_t,0 its equation will be:

$$Z^2 - 1 = \frac{N^2}{(N_t - N_o)^2}$$

If it is desired to flatten the above curve so it will more nearly coincide with a straight line, this can be accomplished by moving the center of the ellipse to the right and dropping it below the "X" axis.

Mr. Hurley has taken his upper credibilities from a straight line passing through the minimum and maximum. It would be possible to take all the values from this line. One advantage of this method would be its simplicity. Furthermore, it might be argued that this method

is desirable since it will result in uniform increments in credibility for uniform increments in the exposure.

Values for all these possibilities are compared in Exhibit I for the case where p = .003 and the focal point is 66 2/3%. They have also been compared graphically in Chart A.

Mr. Hurley does not claim that his methods are appropriate for casualty insurance problems. Nevertheless, it would be an interesting experiment to apply these methods to a casualty line. Since there is in the same issue of the Proceedings an article on Workmen's Compensation Rate Making by Mr. Marshall, we have at hand a guinea pig. Of the classifications quoted by Mr. Marshall, the one with the largest exposure is Bakeries, Code 2003 for which the exposure (payroll) is $29,771,600.00. For this classification there were 289 non-serious losses or a frequency of .001 per $100 of payroll. Using this frequency and applying Mr. Hurley's methods, we find that the resulting credibility is 70% instead of the 90% which it received in the rate revision.

Classification 2003—Bakeries, was chosen for this comparison because it was the classification with the largest exposure and the non-serious portion of this classification was selected because it developed more losses than the serious portion. Our frequency of .001 was determined from the actual number of losses during the rate level period. It would have been better to have used the number of expected losses but this figure was not available.

In Exhibit II the credibilities for Bakeries, Code 2003 derived by Mr. Hurley's methods, based upon both the straight line and the tangent, have been compared with the credibilities actually used in the rate revision and quoted by Mr. Marshall in his paper. This comparison is for non-serious only.

One practical difficulty in applying Mr. Hurley's procedures to Workmen's Compensation rate making is that a separate credibility table must be computed for each classification whereas under the present procedure one table can be used for all classifications. On the other hand, it might be contended that different loss frequencies should require different credibility tables.

APPENDIX

Determination of Tangent to Hyperbola

The equation of the line which passes through the point where Credibility (Z) is unity and the number of risks is N_f (i.e. the point of self-rating) and which is tangent to the hyperbola

$$Z = \frac{N - N_o}{N - N_o + A}$$

is

$$Z - 1 = \frac{A}{(N - N_o + A)^2}(N - N_f)$$

Solving the equation of the tangent and the equation of the hyperbola simultaneously for N at the point of tangency gives

$$N = \frac{N_o + N_f - A}{2}$$

When chance of non-trivial loss (p) is .003

$$\begin{aligned} N_o &= 8{,}300 \\ N_f &= 132{,}800 \\ A &= 41{,}500 \end{aligned}$$

substituting we find

$$\begin{aligned} N &= 49{,}800 \\ \text{and } Z &= .50 \end{aligned}$$

at the point of tangency.

EXHIBIT I

COMPARISON OF CREDIBILITIES

Z	N *from straight line*	N *from hyperbola & st. line*	N *from hyperbola & tangent*	N *from hyperbola with vortex at* N_1	N *from quadrant of ellipse thru* N_0 *&* N_1
0	8,300	8,300	8,300	8,300	8,300
10	20,750	12,911	12,911	14,687	8,922
20	33,200	18,675	18,675	21,447	10,815
30	45,650	26,086	26,086	28,632	14,039
40	58,100	35,967	35,967	36,362	18,696
50	70,550	49,800	49,800	44,766	24,983
60	83,000	70,550	66,400	54,054	33,200
70	95,450	95,450	83,000	64,611	45,600
80	107,900	107,900	99,600	77,124	58,100
90	120,350	120,350	116,200	93,433	78,530
100	132,800	132,800	132,800	132,800	132,800

p = .003 and the focal point is 66⅔% in all cases.

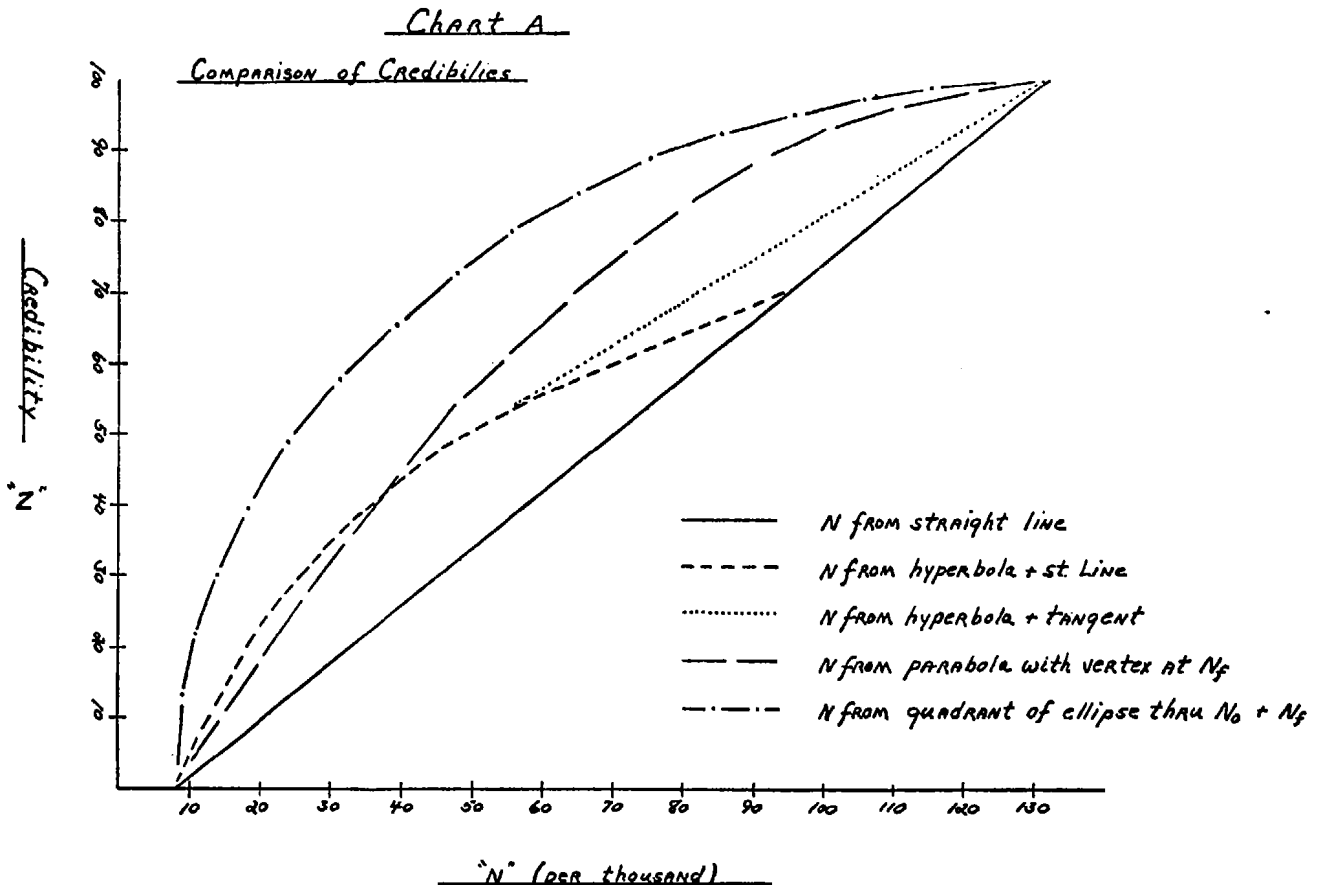
Chart A
Comparison of Credibilities
Credibility "Z"
100
90
80
70
60
50
40
30
20
10
10 20 30 40 50 60 70 80 90 100 110 120 130
"N" (per thousand)
N from straight line
N from hyperbola + st. Line
N from hyperbola + tangent
N from parabola with vertex at Nf
N from quadrant of ellipse thru No + Nf

EXHIBIT II

COMPARISON OF CREDIBILITIES

Bakeries — Code 2003
(*Non-Serious Pure Premium*)

	Loss Frequency .001, *Focal Point* 66⅔%				*Nat. Council Expected Losses*
	Hyperbola & st. line		*Hyperbola & tangent*		*P.C.A.S.*
Credibility	*Payroll* 00 *omitted*	*Expected Losses**	*Payroll* 00 *omitted*	*Expected Losses**	*Vol. XLI page* 39
0	2,497,5	11,239	2,497,5	11,239	13,800
10%	3,383,6	17,476	3,383,6	17,476	13,800
20%	5,619,4	25,287	5,619,4	25,287	13,800
30%	7,854,6	35,346	7,854,6	35,346	25,400
40%	10,826,7	48,720	10,826,7	48,720	39,200
50%	14,985,0	67,433	14,985,0	67,433	54,800
60%	21,228,7	95,529	19,980,0	89,910	72,000
70%	28,721,5	129,247	24,975,0	112,388	90,700
80%	32,467,8	146,105	29,970,0	134,865	110,800
90%	36,214,1	162,963	34,965,0	157,343	132,200
100%	39,960,0	179,820	39,960,0	179,820	154,700

*Payroll x .45 (the pure premium underlying the present rate for code 2003)

GRADUATION OF CREDIBILITIES

Hyperbola with vortex at Point of Self-Rating								Quadrant of Ellipse with Center at N_t, O				
Z	N_t	N_o	N_o-N_t	$1-Z$	$\sqrt{1-Z}$	$(N_o-N_t)\sqrt{1-Z}$	N = $N_t+(N_o-N_t)\sqrt{1-Z}$	Z^2	$1-Z^2$	$\sqrt{1-Z^2}$	$(N_t-N_o)\sqrt{1-Z^2}$	N = $N_t-(N_t-N_o)\sqrt{1-}$
.0	132,800	8300	–124,500	1.00	1.0000	–124,500	8,300	0	1.00	1.0000	124,500	8,300
.10	"	"	"	.90	.9487	–118,113	14,687	.01	.99	.9950	123,878	8,922
.20	"	"	"	.80	.8944	–111,353	21,447	.04	.96	.9798	121,985	10,815
.30	"	"	"	.70	.8367	–104,168	28,632	.09	.91	.9539	118,761	14,039
.40	"	"	"	.60	.7746	– 96,438	36,362	.16	.84	.9165	114,104	18,696
.50	"	"	"	.50	.7071	– 88,034	44,766	.25	.75	.8660	107,817	24,983
.60	"	"	"	.40	.6325	– 78,746	54,054	.36	.64	.8000	99,600	33,200
.70	"	"	"	.30	.5477	– 68,189	64,611	.49	.51	.7000	87,150	45,650
.80	"	"	"	.20	.4472	– 55,676	77,124	.64	.36	.6000	74,700	58,100
.90	"	"	"	.10	.3162	– 39,367	93,433	.81	.19	.4359	54,270	78,530
1.00	"	"	"	0	0	0	132,800	1.00	0	0	0	132,800

AUTHOR'S REVIEW OF DISCUSSION

ROBERT L. HURLEY

The reviews by Mr. Graves and Mr. McConnell treat of two different but equally significant criticisms of the paper on Fire Credibilities. Mr. Graves has noted that the paper is oriented more from the point of view of an underwriting evaluation of fire experience rather than from the attitude which the Industry must take in discharging its responsibility for official standards for credibility.

This is a perfectly logical and just observation and reminds the writer that it is through the exchange of different points of view, as in the *Proceedings* of the Casualty Actuarial Society, that formal standards for fire credibilities will ultimately be founded.

Mr. McConnell's review has afforded a number of very pertinent comments on the graduation methods. The suggestions which he has made on the mathematics will be very helpful since he has shown with precise examples how alternative approaches might work.

WORKMEN'S COMPENSATION INSURANCE RATEMAKING

RALPH M. MARSHALL

Vol. XLI, Part II, P. 12

DISCUSSION BY J. J. SMICK

This article gives in great detail the actual procedures followed by the National Council on Compensation Insurance in the making of a set of rates for workmen's compensation insurance. For illustrative purposes, the most recent filing for Connecticut rates has been used, and throughout, the data applicable to this state and this revision are consistently followed.

In many ways the article is praiseworthy. I could find no important omission of any salient step or procedure. Throughout the article there are brief notes explaining steps, there is a glossary of terms, there are actual working sheets, there are actuarial formulae explaining the derivation of factors and values. The article could easily serve as a manual on the current ratemaking process.

Those who know and have worked with Mr. Marshall, will realize that he has presented the matter in the self-effacing manner typical of him. From reading the article it would be almost impossible to gather that many of the procedures, many of the niceties of calculation have been developed by him during the approximately 30 years he has been with the Council. The method of explaining the distribution of business over calendar year and policy year periods by means of parallelograms is the same method he explained to me in 1929,

when first I started as an actuary. Many other steps I know were personally evolved by him.

I find fault with the article, not for what it says, but for what it leaves unsaid. Perhaps, this statement is not a valid criticism. Nevertheless, this is what I find deficient in the article.

The article does not emphasize the fact that this is the current method of making rates by the National Council. It does not give the evolution of some of the steps, nor the background. The article, as written, is excellent for the purpose of explaining the specific details of a current rate filing. The raising of issues as to alternate methods of procedure, either in general, for the specific state or for the specific revision are carefully avoided.

The article clearly specifies that this is the way it is done. Often it also gives a reason for the procedure, but there is never an indication that there may be a better method, that the reason is often a rationalization, that exactness is sometimes sacrificed in the interest of expediency.

To consider only one of these steps, let us examine the correction for off-balance due to the experience rating plan. In this revision this factor accounts for 8.7% of the manual rates. The total annual premium volume for the latest policy year at manual was close to $23,000,000. The correction for off-balance of 8.7% can therefore be considered as equivalent to approximately $2,000,000 (not all of it realized, to be sure) due to an imbalance in the experience rating plan. Yet the statement (p. 27) is made, "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."

The correction for off-balance program has been in effect over 25 years. It seems to me that an amount of $2,000,000 a year in one state should be given more careful consideration. It would appear to me that this aspect would be of particular importance to companies specializing in large risks.

In connection with this subject it seems to me that every special rating plan, either experience or schedule has always developed a credit off-balance and required a correction. What about the Retrospective Rating Plan? Does that develop premium exactly as anticipated and if not, why are no correction factors imposed?

Again development factors are obtained for indemnity and medical losses separately, using a third reporting as ultimate. Yet in New York a much longer period has been found necessary. Also, it seems to me that as far as death and permanent total cases are concerned development occurs mainly as a result of the effect of discounting reserves and that the real development can be allocated to the permanent partial cases, and the medical connected with them. While in the current Connecticut revision the factors are relatively slight, only some 4%, they are none the less important.

Again, are expenses really equitably apportioned? The employer, who pays the premium is accustomed to compute labor and related

costs on a man or a cents per hour basis. On the basis of the data shown on page 41 for code 2070, Creameries and code 2157, Bottling, it can be easily computed that the annual premium for an employee working 2000 hours a year at an hourly rate of $2.50, which is typical of skilled or strongly unionized labor will be about $100 for code 2070 and about $200 for code 2157. Translated into costs per man per year the major insurance expense groupings are as follows:

	Code 2070	Code 2157
Acquisition and Taxes	$20.00	$40.00
Claim Adj. Expense	8.20	16.40
All Other Co. Expense	10.30	20.60
Profit and Contingencies	2.50	5.00
Total Expense	$41.00	$82.00

The allocation of loss costs are in the main equitable and can be justified. The allocation of expenses follow standard and recognized insurance practices, but are they equitable, and can they really be justified? Why should an employer in the bottling industry contribute $40 a year per man for acquisition and taxes, and $5 for profits and contingencies, while an employer in the dairy industry need contribute only half these amounts?

Furthermore, is the expense loading really adequate for low rated classes? I doubt it.

It has been found that the experience of large risks and especially so called self-rated risks have a very marked effect both on manual rates and rating factors. In some jurisdictions such experience is excluded from the compilations.

No mention is made of this aspect of rate-making.

It appears to me that this article is an excellent one if its purpose is to show how rates are currently made. However, if it is aimed at the candidates for membership, it could be accompanied by a critique and an appraisal, by comparisons with alternative procedures, by an explanation of the compromises that have led to the current method. I know very well that Mr. Marshall could give a fine analysis of alternative methods, of improvements, of the background leading to some of the procedures. Maybe he will do it in a subsequent article.

AUTHOR'S REVIEW OF DISCUSSION

RALPH M. MARSHALL

My paper, by request, was designed to be no more than a factual description of the current ratemaking program of the National Council on Compensation Insurance, with the thought that such paper

would be of interest to the membership generally, and of value, in particular, to students studying for Part IVb of the Society examinations dealing with "General Principles of Ratemaking."

With this background as to the genesis of my paper, I am of the opinion that the inclusion of any discussion of alternate methods, exploration of weaknesses, the use of judgement, etc. should only come after the student has gained some knowledge of current procedures, and therefore that the inclusion of such material in this paper would have been out of place as this paper was intended.

Mr. Smick has suggested several phases of the ratemaking procedure which might be expanded into an additional article, or several. I have no intention of doing so here, but brief comments on some of these features may be in order.

Mr. Smick touches on the question of special procedures for certain states. When it is considered that the National Council works on rate revisions for approximately 38 states each year, I believe it will be understood why our goal is uniformity. However, recognition of special industries peculiar to a state is given by establishing special industry groups for ratemaking purposes, as for example "Mining" in Colorado, and "Oil" in Texas.

In the discussion regarding the correction for off-balance, it was pointed out that for a risk large enough so that its own experience receives 100% credibility in the ratemaking procedure, none of the corrections for off-balance will be reflected in the premium collected for the risk. Under these circumstances it would seem that the carriers specializing in large risks would be less concerned regarding the correction for off-balance factor than carriers writing mostly small risks where the factor is reflected almost 100% in the adjusted rates. Experience by size of risk has demonstrated that in general they "need the money" for the small risks. Without the correction for off-balance the loss constants would have to be greater.

Another observation of Mr. Smick's is the lack of any correction factor for the effect of retrospective rating. Actually (and this is a rationalization) retrospective rating serves as a correction on the adopted rate level. Our ratemaking procedure says if the exposure, accident frequency and accident costs continue as in the past, we will need so much premium. The retrospective rating procedure says we will wait until the policy expires and then see how much premium we actually did need. This of course is a broad generalization — a portion of a retrospective premium, required for expenses (except claim expense), is established as a percentage of the predetermined risk's standard premium, and the remainder varies with the actual incurred losses, subject of course to the stop limits provided by the minimum and maximum retrospective premium ratios. As a result of studies extending over a period of more than a year, action was taken recently to increase the insurance charge of the retrospective rating plans, that is the loading included in the basic premium ratio to compensate for the excess of loss and claim expense incurred by

the carrier over the provisions for such losses and expenses in the maximum retrospective premium ratio.

The reviewer also touches on the question of adequacy of the expense allowance for small risks. Studies of expenses by size of risk, as described by Mr. McConnell in his paper in volume 39 of the Proceedings, have shown that the $10 expense constant is seriously inadequate for risks below $100 annual premium size. However, rather than increase the expense constant on the small risks, which are estimated to represent about 50% of the number of risks but less less than 5% of the premium volume, it has been decided to try to work out more economical methods of handling these risks. The Council's committees are currently considering the possibility of allowing a three-year fixed rate policy to be written for these small risks, and of permitting the experience to be reported on a block basis.

Finally, reference was made to the New York procedure of eliminating the experience for self-rated risks from the ratemaking procedure. Up to the present time this procedure has only been talked about in the Council states. There are a number of aspects to this procedure, particularly for states with only moderate premium volume.

It would seem that these would be problems for the advanced student rather than the freshmen for whom my paper was designed. The student can hardly judge the merits of the present or alternate procedures without knowledge of the present procedures. As previously stated the author's purpose was merly to set forth the details of the present procedure.

DISCUSSIONS OF PAPERS READ AT THE MAY 1955 MEETING

NEW YORK DISABILITY BENEFITS LAW INSURANCE EXPERIENCE 1951-1954

MAX J. SCHWARTZ

Volume XLII, Part I, Page 8

DISCUSSION BY MATTHEW RODERMUND

Mr. Schwartz's paper is a sequel to his thorough review of the New York Disability Benefits Law presented to this Society in November 1950. Equally thorough, this paper describes changes in the Law since 1950, explains the New York Insurance Department's recommendations regarding minimum reserves for assessments for the Special Fund for the Disabled Unemployed, presents the combined experience of all companies under statutory coverage as reported to the New York Department, and speculates as to why the experience was so much better than expected.

The factual material in the paper needs no comment. Mr. Schwartz's speculations on the experience have more than routine interest, however, because the male morbidity rate developed under statutory coverage (.284 weeks) is 40% lower than the lowest group rate (.48 weeks) assumed at the inception of the Law. The male rate of .284 is calculated by Mr. Schwartz from the indicated male and female rate of .326, using the reasonable assumptions that female exposure is about 22% of the total and that the ratio of female morbidity to male is about 1.7.

The reasons for the remarkably low morbidity are thought by Mr. Schwartz to be as follows:

(1) 8-8-13 plans under group insurance policies provide slightly broader coverage than under statutory policies.

(2) Group plans, because they generally do not require 100% participation, invite a certain amount of adverse selection.

(3) Groups of fewer than 50 employees, relatively scarce prior to the compulsory law, seem to develop more favorable experience than larger groups. Employers of very small groups generally provided only the statutory coverage, whereas large groups more often had Plan coverage, the experience of which is not included in Mr. Schwartz's compilation.

The reader is left free to indulge in his own speculations as to why small groups develop better morbidity experience than large groups. The best answer lies probably in the realm of philosophy, and this reviewer is not inclined here to venture into that realm. It is to be hoped, however, that Mr. Schwartz, if he continues to keep us informed on the progress of New York disability benefits insurance, will give us the benefit of his thinking on the philosophy of disability benefits claims.

Interesting implications and equally interesting portents are to be found in the average male and female morbidity rate of .326 weeks derived from the experience under statutory coverage (the disability benefits experience called for by the New York Department and summarized by Mr. Schwartz does not show male and female experience separately).

For, using the indicated average weekly benefit rate of $24.69 for 1954, and the 1954 average taxable annual payroll of $2,577, an average male and female pure premium of .31% of taxable payrolls is obtained. If this pure premium is used, it is not likely that a reasonable loading for industry hazard, expenses, or statutory assessments will bring the final average rate up to .50% of taxable payrolls, except perhaps for groups with a high percentage of females or in hazardous industries.

It is clear therefore that under the present law, if the rates are to reflect prevailing experience, many carriers will be able to charge less than .50% of payroll, and many employers who are unwilling to provide more than statutory benefits will be faced with the problem of returning to their employees a portion of the employees' contribution.

To most employers, probably, such a complication would be intolerable, even though the elimination of their share of the expense might be welcome. But the elimination of the employer's share of the expense is contrary to an enlightened public policy in insurance of this type. The alternative, of course, is for the Legislature to increase the statutory benefits. At this writing it has already been proposed that the maximum weekly benefit be increased to $36 and the maximum benefit period be extended to 26 weeks.

If the proposal is adopted, and it seems likely to be, the developed 8-8-13 male morbidity rate of .284 might be about 20% higher, or .341. (The 20% is taken from the New York Labor Department's 1949 "Studies in Disability Insurance," which cites 120 as the probable percentage relationship between male morbidity rates on an 8-8-26 plan and those on an 8-8-13 plan.* However, the excellent New York statutory 8-8-13 experience suggests that the 120 relationship for a statutory 8-8-26 plan may be too high.) Estimating that under a 26-week plan the female morbidity would be about twice that of the male, and taking Mr. Schwartz's assumption of 22% for female exposure, it is possible to convert the estimated male rate of .341 under a 26-week plan to a rate of .416 for males and females combined. The average weekly benefit under a $36 maximum probably would be less than $26.00. Neverthless, the $26.00 figure and the average annual payroll of $2,577 mentioned above would produce an average male and female pure premium as low as .42% of taxable payrolls.

Loadings for industry hazard and expenses and contingencies will vary, of course; but, unless the national economic picture changes, the loading for assessments for the disabled unemployed, for most carriers, will be considerably less than it was in 1950. In any case, the average payroll rate is not likely to be a great deal higher than the employees' contribution. Thus the share of many employers in the cost of this social benefit might be considerably less than the public would regard as desirable.

It is apparent that the experience during the first years of the New York Disability Benefits Law, as revealed by Mr. Schwartz's excellent paper, could have considerable influence on future legislation.

In his conclusion Mr. Schwartz hopes "that members of the Society will furnish experience to confirm or refute some of the assumptions made." This reviewer echoes that hope.

*In a personal communication, Mr. Schwartz informed this reviewer that current thinking sets this percentage relationship nearer to 125.

COMPULSORY AUTOMOBILE INSURANCE RATE MAKING IN MASSACHUSETTS

BY M. G. McDONALD

Volume XLII, Part I, Page 19

DISCUSSION BY L. W. SCAMMON

The important thing which Mr. McDonald's paper reveals is the very great difficulty encountered by an actuary in fulfilling the rate making requirements of a compulsory law which arouses as much ill-informed public discussion as the Massachusetts Compulsory Insurance Law. We see portrayed a whole series of attempts to do a rate-making job which as far as possible relies on indisputable loss data and probably more accurate expense data than are available elsewhere, by applying to these data a series of actuarial formulae which make for as much mechanical precision as possible. This method is one which obviously he feels, in the face of criticism from every direction, reduces the area of judgment to a minimum. But the unhappy fact which he has discovered over a period of years is that a purely mechanical application of formulae just won't work. He has had to abandon the traditional three-year average loss level and has had to reflect into his loss level data which are much more nearly up to date. He has felt it necessary (although the insurance industry does not like it) to take a new look at traditional expense ratios. Whether insurance companies will fare better in the long run by purely mechanical application of the same formula year in and year out or whether some tempering of mathematical precision with judgment is better can only be told by the unfolding problems and pressures of the future.

In breaking the ice with a paper on compulsory automobile insurance rate making in Massachusetts, light is shed by Mr. McDonald on what is going on in rating matters in a very important state—the only one where compulsory automobile insurance is law—and the door is thereby opened to other possible papers to follow. To some of us who might write in this area it is much better to have the public official rate maker move first.

In embarking on my task of reviewing Mr. McDonald's paper, I will criticize only to a minor extent. I will not participate in extensive technical discussion because much of the exact rate making technique which he describes has been made obsolete by the changes he has made in preparing 1956 rates. The paper covers so much ground and variety of subject that I will only try to point out a few highlights. I will emphasize broad methods used by Mr. McDonald in a very difficult field which become guides to successful ways and means of doing a job acceptably to both public and private interests.

The rate maker of the private organization may by second nature completely take for granted that the way to make provision for expenses in rate is to make them a direct function of the losses. Mr.

McDonald has had to justify completely this method as against a "flatting" method advanced by spokesmen for high rate territories as a means of producing lower rates. I commend his careful analysis of each of the items of expense in justification for what the industry regards as customary procedure.

One of the touchiest subjects, the matter of company reserves in rate making, is handled via the application of development factors. The clinching proof is his exhibit of the test of results of development factors applied to incurred losses at first reporting vs. actual losses after ten reportings. No one could ask for a more convincing test that use of company reserves with properly computed development factors applied deflates any charges of over reserving. The justifiable pride shown by Mr. McDonald in this test indicates how hard he is striving for the right answer.

When you work closely with public rate making authorities you begin to realize how tremendous is the force of inertia, the tendency not to make changes, the relative ease of doing again that which has been done before simply because to do a "repeat" on an acceptable procedure is fraught with less danger. Let me say that one of Mr. McDonald's strong points, as is plainly visible in his paper, is his open-mindedness and susceptibility to change.

In his discussion of rate level and trend factors, Mr. McDonald cites the reluctance of the Department to adopt trend factors until the unfavorable underwriting results of 1951 and 1952 and the tight market, as evidenced by very greatly increased numbers of assigned risks, forced modification of the rate making procedure. Perhaps it was inevitable that first use of trend devices by the Massachusetts Insurance Department would be on the conservative side. Certainly with the best insurance statistics available anywhere one might ask why there has not been a more realistic use of these statistics in Massachusetts, especially those showing trends in average claim costs. In making 1956 rates Mr. McDonald has been much more realistic in his recognition of recent statistics. He has had to scrutinize latest experience very closely to note what trends may be developing.

In Exhibits I-1 and I-2 Mr. McDonald sets forth separately the experience of the stock and non-stock companies under the compulsory law from 1927 through 1948. These exhibits will come in for a good deal of attention and study by interested parties everywhere. Many will wish that the picture was more nearly brought up to date.

Exhibit I-1 clearly shows that the Stock Companies, taken as a whole, have lost money consistently on Compulsory Automobile Insurance in Massachusetts since the inception of the law. Very much more money was lost in the six years, 1949-1954, immediately following this exhibit especially in the early 1950's. The way that losses have consistently outdistanced provision for losses, in sixteen of the twenty-two years exhibited, and the way that the sum of losses and expenses have exceeded premiums in nineteen of the twenty-two years hardly makes exciting reading to Stock Company executives. It may well be

asked why there hasn't been a provision for contingencies in Compulsory rate making?

From Exhibit I-2 we find that the Non-Stock companies, writing just under one-third of the business, have experienced favorable loss ratios but why should the spread here between the sum of losses and expenses, and premiums be classed as profit when large amounts are returned to policyholders in the form of dividends?

Also many will consider Exhibit I-3 to be both subject to misconstruction and unnecessary. This is because it combines Stock and Non-Stock Company expenses in a manner not valid for rate making purposes. It not only takes no account of the dividends paid back to policyholders in reduction of premiums, but also any such combination, at best an approximation, requires careful explanation if it is not to be misused.

The explanation of the development and testing of formulae for the selection of territories shows the manner in which Mr. McDonald is constantly striving for improvement. He inherited methods which contained certain weaknesses. The territorial formula for private passenger car territorial adjustment I consider contained a makeshift arrangement adopted under wartime conditions for limiting the number of towns which would be subject to change of territory in accordance with credibility groups and varying percentage deviations of these credibility groups. The experience of war-time years was not considered acceptable for territorial changes, but successive reportings of prewar years would have caused some towns to be moved if the limiting device had not been hit upon. But once a part of the formula, the limitation stayed in long after the original purpose it served was accomplished. Suggested changes to improve this weakness in the formula he turned aside, but he was open-minded to complete revision of the formula. He explains in his paper that initial studies of a new formula method disclosed weaknesses of too much emphasis being placed upon each town's latest year of experience, 60% of the losses of which were reserves and subject to considerable change on settlement. In place of the latest year the average of the two latest years tended to stabilize the experience of the cities and towns and with this improvment he tried out a revised formula on commercial cars first in 1953 then as soon as he was satisfied that its application to this smaller classification was satisfactory he applied it to private passenger cars. Actually that opportunity presented itself this fall and territorial changes for 1956 are predicated on this new formula. It is a distinct step forward and provides an eminently satisfactory formula basis of fairly realigning the cities and towns of the Commonwealth into proper relativity if the experience of these cities and towns develop sufficient credibility to warrant recognition. Those of us working close to this problem expect continued use of this new formula method in the years ahead thus insuring uniform market conditions throughout the Commonwealth.

The age involvement graphs given in Exhibits K and L shed light

on an area extremely vital to current underwriting. It is quite obvious that the several samplings of Massachusetts data have given somewhat varying results when attempt has been made to pinpoint year by year age involvements and that further studies may point to the need for other age groupings. I believe that we all must be open-minded to these statistical indications.

Of his reference to the electronic computer and real machine rate making, I can only suggest that many of us with a welter of compilations to perform once each year probably will continue to perform them with hand methods in the foreseeable future with electronic computer costs where they are.

One of the most interesting parts of the paper relates to the innovations of the Massachusetts Demerit Rating Law. While I could add some material on this subject, the law is still in a formative stage and I prefer to wait to see if a paper may not be forthcoming completely covering the subject if the law proves effective.

Automobile rate making in the compulsory law Commonwealth of Massachusetts is an extremely difficult task. That the man responsible in this area of rate making is willing to commit to writing an explanation of problems he faces and methods used in making the automobile rates speaks highly of his courage and fundamental honesty and integrity. Those who work with him do not always agree with his decisions but they invariably respect his independence, objectivity and constant purpose to be wholly fair and accurate.

REVIEWS OF PUBLICATIONS

CLARENCE A. KULP, Book Review Editor

The Business of Reinsurance. William J. Langler. Northeastern Insurance Company of Hartford, Hartford, 1954. Pp. xxii, 460.

This book is much more limited in scope than its title indicates. The author warns, in the *Introduction,* that the discussion will be confined to reinsurance of lines ordinarily written by fire and marine insurers, and will not consider insurances which fall in the category of the casualty lines. He states also that there will be no treatment of the history of reinsurance or the "law or interpretations of any feature of the transactions or materials [included]."

A more serious limitation of the work is not referred to by the author. There is no introductory discussion of the principles or purposes of reinsurance, although the stated purpose of the book is "to provide the student, or the inexperienced in the subject, with material related to reinsurance transactions. . . ." Technical terms are used without prior definition and practices are referred to which are not self-explanatory, so that a considerable knowledge of the field of reinsurance is required if one is to comprehend a large portion of the book. This limitation is particularly apparent in a prefatory section entitled, *Preparatory Notes on the Acquisition and Appraisal of Fire Treaties.* Here the author discusses the importance of the character, reputation and experience of the direct writer's management, the territory to be covered by a reinsurance agreement, the direct writer's retention in relation to the liability to be assumed by reinsurers, and the commissions to be paid by the reinsurer to the direct writer. The latter two areas would be much easier to understand if background had been provided for those for whom the book is intended.

This is not to say that the author neglects completely consideration of the principles and purposes of reinsurance. The latter become evident in the presentation of the various types of reinsurance contracts around which the book centers; the former are included in the first of three lectures which are reproduced as the concluding chapter of the book. It would have been better if this lecture had been presented in the introduction, to be read even before the prefatory section referred to earlier.

The body of the text includes, in a separate chapter for each, the various types of reinsurance and retrocession agreements used in fire, automobile material damage, hail, inland marine and ocean marine insurance. The particular value of the book lies in the fact that a copy of a specimen agreement which has been successfully used in recent years is appended to each of the chapters. In fact, considerably more space is devoted to the text of these agreements than to the author's comments regarding them. The agreements, of course, do not identify the particular companies involved, the precise premium charged nor the specific commission allowed. The author, however, discusses the factors considered in setting premium charges or commission allowances.

Subsequent chapters are concerned with the underwriting results experi-

enced by professional reinsurance companies, their investment policies and their financial structure. Some interesting contrasts with direct writers are made in these areas. The illustration of the depletion of a reinsurer's surplus involved in assuming reinsurance producing $1,000,000 of premium volume, however, is greatly exaggerated through an error in calculation of the unearned premium reserve unless the author is assuming a distribution of business by term which is not stated or apparent.

The book concludes with chapters on unlicensed reinsurance, the reinsurance of mutual companies, reinsurance intermediaries and brokers, and the three lectures previously mentioned. An appendix includes some sixty pages of statistics, the major portion of which are not concerned with reinsurance, and some specimen forms used by direct writers in submitting information to reinsurers.

C. M. KAHLER*

*Guest reviewer.

History of Accident Insurance in Great Britain. W. A. Dinsdale. Stone and Cox, London, 1954. pp xi, 362.

The first reaction of the transatlantic reader of this latest publication of the indefatigable Dinsdale is that there are at least as many British-American parallels between what they call accident and we casualty insurance as there are differences. How familiar for example the sound of this; it is the very first paragraph of Chapter 1:

> The term *accident insurance* has now taken root in insurance nomenclature and to those in the business its meaning is clear. To those who are not so intimately concerned, however, there may be need of explanation.

There may be indeed. The first parallel one strikes is that, allowing for difference in language, the British list of accident-casualty insurances is almost identical with ours:

> Public including automobile liability
> Personal accident and sickness
> Material damage (automobile, burglary, glass, power plant, credit, live stock, and a few others)
> Corporate bonding

The reasons for this heterogeneity abroad are the same as here: "The accident department has always been prepared to pioneer [as] demand arose for other classes of insurance by reason of the far-reaching economic, legal and social changes that were taking place" (p 1). Sometimes the parallel comes right down to such a current American question as that of the impact of multiple-line powers on casualty and fire insurance; when the British Workmen's Compensation Act was passed in 1906 "practically all fire insurance companies obtained powers to write accident insurance . . . in order to retain control of their fire business" (p 8). There are parallels also in individual casualty lines. The best example is personal accident and sickness. Like we the British issue insurance principally to middle- and upper-class males, in their case with much the greater justi-

fication since they are restricted to providing benefit supplementary to compulsory national insurance which covers everyone. In 1948 Dinsdale discovers the pioneer insurer, Railway Passengers, charging "substantially" the same premium rates as in 1855. And finally, British heterogeneity of accident and sickness policy contracts and rates is at least as great as ours.

Differences between the two countries are not as numerous; on reflection one must conclude however that while they are fewer in number they are more important than the parallels. The British for example make much wider use of knock-for-knock and analagous agreements to eliminate on inter-insurer claims the expense and delay of the subrogation remedy. They have learned to live with the fact of compulsory automobile insurance, which in Britain covers all automobiles. British insurers finance voluntarily not only a Central Fund out of which third parties injured by negligent motorists insured with an insolvent insurer are paid; in the Motor Insurers Bureau, which includes all insurers, whether tariff association member or not, they finance the payment of personal injury damages to third parties on behalf of motorists (1) whose policies do not cover the claim, as for breach of policy contract, or (2) who have no policies at all. But the most important difference between the countries lies in the difference in degree and scope of insurer regulation both by government and industry trade association. This difference has impacts and repercussions on every phase of the business. Dr. Dinsdale has written a book of history, and has naturally not emphasized the materials required to make detailed comparisons; but one cannot possibly miss the significance of the almost exclusive emphasis in British public regulation on standards of financial strength and the nearly complete omission of regulation of policy contract, rates and reserves. Amendment of the Assurance Companies Act 1909 in 1946 incidentally provides a financial control that for the first time in either country permits direct and *continuous* check on insurer solvency. The insurer must maintain at all times surplus equal to the greater of these two amounts: £50,000 or one-tenth of annual premium income in the latest completed year. It is an idea that, even though we unlike the British have supplementary financial safeguards of insurer solvency in the form of rate and reserve standards, we could examine with advantage. Incidentally, the British have eliminated their requirement of insurer deposits, which as with us "was becoming a nuisance" (p 325).

British casualty insurers are nearly as free of regulation self-imposed by trade association agreement as of the public variety. The Home Office Agreement of 1923 on the limitation of profit that developed from the Holman Gregory Committee criticisms of the high proportion of administrative expense and profit to premium ended with repeal of the Workmen's Compensation Acts and the end of privately insured workmen's compensation. Tariffs, or insurer rate agreements, are effective only for employers' liability, automobile liability, live stock and a few bonds; they set minimum rates only; many insurers choose not to come in the agreement at all. This is indeed different from us. The lightness of the guiding hand of the insurance industry on individual insurer practice is the more remarkable when one recalls that the hand of the state is even lighter. The Accident

Offices Association has also statistical and legislative functions, and — an interesting touch — occasionally is the vehicle for arranging pool reinsurance.

It is tempting, particularly when self-interest is involved, to extract from the experience of others that which seems immediately advantageous to ourselves and to ignore the rest. The temptation in this instance should be sternly resisted. Someone has said that the difference between the British and us is not that they have so few laws and we so many but that their laws do not need to be written. To ignore this, the most fundamental of all differences between us; to attempt to transplant to this soil and clime, institutions and practices indigenous to theirs, would be worse than error. It would be folly.

C. A. KULP

Introduction to Demography. Mortimer Spiegelman. The Society of Actuaries, Chicago, 1955. Pp. xxi, 309.

It has been only in recent years that actuaries have shown much interest in the subject of demography which may be briefly described as the study of populations by statistical methods. It has been usual to require, in the examinations for life actuaries, some knowledge of the construction of the national life tables, but little further knowledge of the methods of demography has been expected.

Demography is concerned, not only with the construction of national life tables but with the general problem of the measurement of mortality, fertility, marriage, morbidity and migration for any territory which may vary from a township to the whole world. In 1950, the British Institute of Actuaries issued an official textbook on demography and this has now been followed by the Mortimer Spiegelman's *Introduction to Demography* published by the Society of Actuaries.

We do not have to look far to find at least one reason for the increased interest actuaries are taking in the subject of demography. Since the days of Thomas Malthus, the subject of population trends has been a matter of speculative interest but in recent years many aspects of the changing size and age distribution of the population have had an important influence on many economic problems. The increasing proportion of the population over age 65 is most important to anyone concerned with the problems of social security and pension funds. The sudden increase in the number of children of school age affects our whole educational program, and the increase in the number of young families, partly due to changes in the birth rate, partly due to improved infantile mortality, and partly due to lowering of the average age of marriage, has contributed greatly to the economic prosperity of recent years. Population trends from farm to cities and from cities to suburbs have had great economic repercussions.

Mortimer Spiegelman is a Fellow of the Society of Actuaries and an accepted authority on demography. He contributed an outstanding paper on mortality trends to the World Population Conference held in Rome in 1954 under the auspices of the United Nations. The book he has now written

for the Society of Actuaries provides an excellent introduction to demography and is well worth reading, even by those not interested in the techniques of the subject, for the information on population trends which it sets out. The techniques of sample investigation and the methods used to reduce the errors arising in census returns will be of special interest to casualty actuaries. Those concerned with accident and health insurance will find the chapter on morbidity statistics will repay study. The very full bibliography is most valuable. The book can be thoroughly recommended to anyone who is interested in any aspect of population measurement and trends.

LAURENCE H. LONGLEY-COOK

Workmen's Compensation. Herman Miles Somers and Anne Ramsay Somers. John Wiley and Sons, Inc., New York. Chapman and Hall, Ltd., London. 1954. Pp. xv, 341.

The opening sentence of the preface to this volume reads: "We had to write this book in order to learn what had happened to workmen's compensation in the United States." Upon completion of the 8 chapters which follow, the reader will probably agree that the authors have made an excellent appraisal of the program as a whole from its early days to the present time.

After discussing the challenge of occupational disability during the early part of this century, they proceed to trace the evolution of workmen's compensation from its early days to the present time. Coverage and benefits are thoroughly discussed as is the meeting of the employer's obligation by various types of insurance.

Of particular interest to actuaries is the chapter on insurance, where a section is devoted to rate-making. Here the authors present a table (IV-E) showing the variation in manual rates, as illustrated by 6 representative occupations in 10 states. They point out that rates for identical classifications may be 6 times as high in one jurisdiction as in another, even though benefit levels show no such wide disparity. What the authors do not appear to appreciate is that, even with identical benefit levels, there could still be sizable variation. A manual class represents a composite hazard and within one jurisdiction the hazards of sections within a class may vary even more than the composite hazards in different jurisdictions. Blast furnace operations in California, for example, could present an entirely different composite hazard than that of blast furnace operations in Alabama, even if these two states had identical benefit levels, not to mention identical safety standards, identical claim administration, etc. Also criticism may be made of Table IV-F, which presents comparative insurance costs and benefit costs, ranked by states. The value of this table, which compares average insurance costs and average benefit costs to New York, is questionable even with the statement in a note that the "index numbers are subject to many qualifications and limitations." It is mathematically possible to have an index number of 1.000 for average benefit costs in each state, even though there is wide variation between benefit costs in the various states.

The whole question of administration, including what appears to be an appalling amount of litigation, is also gone into. Separate chapters are devoted to prevention and rehabilitation.

In the final chapter, the authors strike a balance sheet as of current date. The structure which has come about is an exceedingly complex one and the solution to the issues as the authors see them—income maintenance, medical care and rehabilitation, prevention, economy of operation, etc.—is anything but simple. The authors also state that the workmen's compensation problem should be considered in terms of present-day environment, including the relationship of workmen's compensation to other social insurances. This reviewer is unable to agree that workmen's compensation, even in today's environment, is a social insurance. While social benefits undoubtedly accrue, it is still a liability law for occupational injuries, with the doctrine of fault so greatly modified that for all practical purposes, it has been eliminated.

The workmen's compensation principle has had a long and tortuous road to travel and many compromises were necessary in order to gain acceptance and to meet the question of constitutionality. Unfortunately, many of our laws still reflect these early compromises, even though the principle has been generally accepted and there no longer appears to be any basic constitutional question involved. While we have come a long way, many problems of administration still appear to be with us. Claim administration is frequently costly or ineffective and occasionally both. The amount of litigation, part of the cost of which can only be estimated, appears to be entirely too high. Also, we are still awaiting a reasonable solution to the whole problem of medical care (and rehabilitation).

In this volume of less than 400 pages, a highly competent job has been done of covering in readable fashion practically all of the fundamentals of the problem from its inception to the present time. Not the least valuable are the many notes and references which supplement the textual material. Appendices discuss the Federal Employees' Compensation Act, The British Industrial Injuries Insurance system, The Ontario Workmen's Compensation system, and the status of railway workers and seamen under Federal Employers' Liability Acts.

JOSEPH LINDER

PUBLICATIONS RECEIVED

Life and Other Contingencies.
Volume I. Hooker and Longley-Cook. Cambridge University Press, 1953.

OBITUARY

ERNEST HOLZINGER

1901–1956

Ernest Holzinger, an Associate of the Society of Actuaries, and an Associate of the Casualty Actuarial Society, died suddenly in New York as a result of a heart attack on February 10, 1956.

Dr. Holzinger became an Associate of the Casualty Actuarial Society in 1945, and an Associate of the Society of Actuaries in 1953.

Born in Munich, Germany in 1901 he was graduated from the Ludwigs-Gymnasium in Munich, and completed his undergraduate studies at the Universities of Munich and Goettingen receiving his Diploma as Actuary from the latter institution in 1924. He received a degree of Doctor of Philosophy from the University of Goettingen in 1927 based on his extensive post-graduate research into mathematical statistics.

He entered his professional career in the same year as Associate Actuary for the Westdeutsche Versicherungsanstalt in Dortmund. From 1929 to 1933 he was Actuary for the Vorsorge and Muenchener Lebensversicherungsbank, and from 1933 to 1939 served in the same capacity for the Riunione Adriatica di Sicurta', Trieste, Italy, an associate of the foregoing German insurance companies.

In addition to his professional qualifications Dr. Holzinger was an accomplished linguist and had a thorough insight into the basic economic problems of the various national groups with which he worked. As a result his services were widely used in settling various inter-company negotiations arising from the rapid political changes of the period.

Dr. Holzinger came to the United States in 1939 and became an American citizen in 1944.

From 1941 until his untimely death he was Actuary for the Pension Planning Company in New York. To the specialized field of employee benefit plans he brought the same high level of professional ability that had always been characteristic of his many previous accomplishments in broader areas of actuarial service. In addition to the respect and esteem he earned from those he served directly, his experience and advice on the technical problems of pension funds was generously shared with his many colleagues.

His leisure time was spent tramping over the beautiful countryside of his new homeland. He was a great art and music lover and an accomplished violinist. He had a quiet humor and brilliant wit.

He is survived by his wife, the former Cecile Graeber of Dortmund, whom he married in 1933.

Ernest was loved and admired by all who knew him. His death is a profound loss to his family and friends and the entire actuarial profession.

OBITUARY

FREDERICK RICHARDSON

1876–1955

Frederick Richardson, for many years United States Manager of the General Accident Fire and Life Assurance Corporation, died on July 22, 1955 at his home in Sherborne, England.

Mr. Richardson was born in Newcastle-on-Tyne, England, on December 29, 1876, and educated in Nottingham and Liverpool. He started his career with the General Accident in 1893 as a 16 year old office boy in the Liverpool office. From that time to his retirement he served the General Accident almost continuously.

In 1898 he became chief clerk of the London office from which post he went to Australia for a time. He returned to the General in London as its assistant manager, and in 1915 was sent to the United States branch. He was appointed United States Manager in 1916. Under his management the U. S. branch of the General Accident embarked upon a long and unbroken period of prosperity. Mr. Richardson served as chief executive in the United States until April 30, 1938, when he returned to England and became deputy chairman of the board. In 1944 he became chairman of the board and continued in this capacity until his retirement.

Mr. Richardson was a keen student of the business and a strong believer in insurance education, serving for four terms as president of the Insurance Institute of America, of which he was elected an honorary member in recognition of his valued services. One of the most articulate insurance executives of his generation, he was always in great demand as a public speaker and contributed many interesting articles to insurance journals. His style and scope of literary quotation were the admiration of all who heard or read him.

He became a fellow of the Casualty Actuarial Society on May 23, 1919 and maintained his membership until his death.

MINUTES OF THE MEETING

May 26 and 27, 1955

EDGEWATER BEACH HOTEL, CHICAGO, ILLINOIS

The Spring meeting of the Society convened at 10:50 A.M., May 26, 1955 at the Edgewater Beach Hotel, Chicago, Illinois with President Seymour E. Smith presiding. The following 47 Fellows and 21 Associates were present:

FELLOWS

ALLEN, E. S.
BARBER, H. T.
BERKELEY, E. T.
BEVAN, J. R.
BRINDISE, R. S.
BROWN, F. S.
CAHILL, J. M.
CARLSON, T. O.
COATES, C. S.
FULLER, G. V.
GODDARD, R. P.
GRAHAM, C. M.
GRAVES, C. H.
GREENE, W. W.
HARWAYNE, F.
HEWITT, C. C.
HUGHEY, M. S.
JOHNSON, R. A.
KELTON, W. H.
KUENKLER, A. S.
LACROIX, H. F.
LINDER, J.
LIVINGSTON, G. R.
LONGLEY-COOK, L. H.
MCCONNELL, M. H.
MACKEEN, H. E.
MASTERSON, N. E.
MAYCRINK, E. C.
MILLS, J. A.
MURRIN, T. E.
MUNTERICH, G.
OUTWATER, O. E.
PERRYMAN, F. S.
PETZ, E. F.
PRUITT, D. M.
RODERMUND, M.
RICHTER, O. C.
ROWELL, J. H.
SALZMANN, R.
SCHLOSS, H. W.
SIMON, L. J.
SKELDING, A. Z.
SKILLINGS, E. S.
SMITH, S. E.
TRIST, J. A. W.
UHTHOFF, D. R.
VALERIUS, N. M.

ASSOCIATES

EATON, K. F.
FOSTER, R. B.
FOWLER, T. W.
FRANKLIN, N. M.
GIBSON, J. P. JR.
GILDEA, J. F.
HARACK, J.
HURLEY, R. L.
KALLOP, R. H.
MCIVER, R. A.
MILLS, R. J.
NELSON, S. T.
NICHOLSON, E.
OTTESON, P.
RESONY, A. V.
SCAMMON, L. W.
SCHWARTZ, M. J.
SOMMER, A.
STOKE, K.
THOMAS, J. W.
WOOD, D. M., JR.

Following the roll call, Associate Max J. Schwartz presented a paper on New York Disability Insurance.

It was then announced that the Council, at the meeting held on May 25, had voted that Mr. M. G. McDonald, Casualty Actuary of the Massachusetts Insurance Department, be enrolled an Associate of the Society as of May 26, 1955, Mr. McDonald's thesis "Compulsory Automobile Insurance Ratemaking in Massachusetts" having been accepted by the Committee on Papers as fully meeting the standard for Full Waiver of Associateship Examinations under rule (7), paragraph 2 of the By-Laws. As Mr. McDonald was unable to be present

at the meeting, Mr. L. W. Scammon presented to the membership a digest of Mr. McDonald's paper.

President Seymour E. Smith presented an address "Some Random Comments on Electronics."

Written Discussion of Previous Papers:

(a) "Prolonged Illness Insurance" by Mark Kormes reviewed by John R. Bevan. In the absence of Mr. Kormes, D. M. Pruitt read additional comments prepared by Mr. Kormes.

(b) "Group Accident and Health Therapeutic Benefits" by Paul M. Otteson reviewed by Harold F. LaCroix. Mr. Otteson commented on Mr. LaCroix's remarks.

(c) "A Credibility framework for Gauging Fire Classification Experience" by Robert L. Hurley reviewed by C. H. Graves and M. H. McConnell with additional comments by Mr. Hurley.

(d) "The Boiler and Machinery Adjustment Rating Plan" by R. B. Foster reviewed, by invitation of the Council, by non-member R. L. Bornhuetter who was introduced by G. R. Livingston.

The meeting then recessed for lunch and reconvened at 2:20 P.M. with Vice President J. A. Mills conducting the program.

There followed a panel discussion on

"Would expense provisions under casualty policies consisting of a constant per policy plus a constant per dollar of pure premium be more desirable than present expense provisions?" with H. T. Barber as moderator assisted by panel members C. H. Graves, S. M. Hughey, L. H. Longley-Cook and T. E. Murrin.

This was succeeded by an informal discussion, from the floor among the members present, on "Windstorm Territorial Differentials."

The meeting recessed at 4:30 P.M. followed, in the evening, by a brief social hour and dinner. At the banquet, Mr. G. V. Fuller presided as Master of Ceremonies and presented the guest speaker, Mr. Henry S. Moser, Vice President and General Counsel of the Allstate Insurance Company who gave a most interesting talk on the theme that price competition in the insurance industry is in the public interest.

The meeting reconvened at 10:00 A.M. on May 27, with Vice President Mills again conducting the program.

Mr. F. S. Perryman, as moderator, with the assistance of C. S. Coates, A. S. Kuenkler, J. Linder and P. M. Otteson conducted a lively panel discussion "What Principles Are Useful In The Establishment Of Investment Fluctuation Reserves."

Upon conclusion of this discussion, the meeting expressed its thanks and appreciation to Mr. Mills, Vice President in charge of program and to the Committee on Local Arrangements for their very fine work in planning a most successful meeting. Also, upon motion by the President, the Society voted its sincere thanks to the carriers who had

contributed to the very enjoyable social hour on Thursday evening, namely, Allstate Insurance, American Reinsurance, Employers Mutual Liability Insurance of Wisconsin, Hardware Mutual, (American) Lumbermens Mutual, State Farm Mutual Automobile, and Zurich.

Thereupon the meeting, upon motion, was adjourned.

Respectfully submitted,

A. Z. SKELDING,
Secretary-Treasurer.

MINUTES OF THE MEETING

November 17 and 18, 1955

HOTEL STATLER, HARTFORD, CONN.

The annual meeting of the Society was held at the Hotel Statler, Hartford, Connecticut on November 17, and 18, 1955.

The meeting convened at 2:30 P.M., with President Seymour Smith presiding. The following 71 Fellows and 26 Associates were in attendance:

FELLOWS

AINLEY, J. W.
ALLEN, E. S.
BAILEY, R. A.
BARBER, H. T.
BARKER, G. M.
BARKER, L. M.
BARTER, J. L.
BERKELEY, E. T.
BEVAN, J. R.
BLANCHARD, R. H.
CAHILL, J. M.
CARLSON, T. O.
COATES, C. S.
CROUSE, C. W.
CURRY, H. E.
DAVIES, E. A.
DORWEILER, P.
ELLIOTT, G. B.
ELSTON, J. S.
FAIRBANKS, A. V.
FOSTER, R. B.
GINSBURGH, H. J.
GODDARD, R. P.
GRAHAM, C. M.
GRAVES, C. H.
GREENE, W. W.
HARWAYNE, F.
HAZAM, W. J.
HEWITT, C. C.
HOPE, F. J.
HUGHEY, S.
HURLEY, R. L.
JOHE, R. L.
JOHNSON, R. A.
KELTON, W. H.
KORMES, M.
KUENKLER, A. S.
KULP, C. A.
LA CROIX, H.
LESLIE, W., JR.
LINDER, J.
LISCORD, P. S.
LIVINGSTON, G. R.
LONGLEY-COOK, L. H.
MACKEEN, H. E.
MASTERSON, N. E.
MATTHEWS, A. N.
MAYCRINK, E. C.
MCCONNELL, M. H.
MENZEL, H. W.
MUNTERICH, G.
MURRIN, T. E.
OBERHAUS, T. M.
PERRYMAN, F. S.
PINNEY, S. D.
PRUITT, D. M.
RESONY, A. V.
RESONY, J. A.
RODERMUND, M.
SALZMANN, R.
SCHLOSS, H. W.
SKELDING, A. Z.
SKILLINGS, E. S.
SMICK, J. J.
SMITH, S. E.
TARBELL, T. F.
VALERIUS, N. M.
WAITE, A. W.
WIEDER, J. W., JR.
WILLIAMS, H. V.
WOLFRUM, R. J.

ASSOCIATES

ANDREWS, E. C.
BENNETT, N. J.
BERQUIST, J. R.
BLACK, N. C.
BONDY, M.
COATES, W. D.
DANIEL, C. M.
FRANKLIN, N. M.
FURNIVALL, M. L.
GAINES, N.
GETMAN, R. A.
GILDEA, J. F.
GROSSMAN, E. A.
HALL, H. L.
HART, W. VAN BUREN, SR.
HART, W. VAN BUREN, JR.
KALLOP, R. H.
MCDONALD, M. G.
OTTESON, P.
ROBERTS, J.
SCAMMON, L. W.
SCHULMAN, J.
SCHWARTZ, M. J.
STOKE, K.
THOMAS, J. W.
WILSON, J. C.

In addition, there were also present a number of invited guests.

President Smith, after welcoming the members, their wives and invited guests to the fair city of Hartford, introduced the guest speaker, Dr. Thomas F. Malone, Director of the Weather Research Center of the Travelers Insurance Company. Dr. Malone's topic was "Our Changing Weather Patterns; What Is Known About Hurricanes; Why Are They Coming To This Part Of The Country?"

Following the conclusion of his most informative talk, which was of particularly timely interest to the members because of the relatively recent disastrous weather conditions in New England, Dr. Malone graciously agreed to supplement his remarks by answering numerous questions from the floor.

The session was then recessed at 4:00 P.M.

Preceding the banquet in the ballroom of the Statler on the evening of November 17 there was a brief social hour. At the banquet Matthew H. McConnell acted as Master of Ceremonies and introduced the guest speaker, Mr. George Malcolm-Smith, author of the popular book of some years back "Slightly Perfect" dealing with the trials and tribulations of a young actuary under the supervision of a somewhat unsympathetic Executive Vice President. It was quite evident that the audience greatly enjoyed the subtle humor of Mr. Smith's informal talk which, in a good-natured vein, expounded upon the vagaries of that creature commonly referred to as an Actuary.

The meeting reconvened at 9:30 A.M. for a business session with President Smith again presiding.

(1) MINUTES OF LAST MEETING

Upon motion it was voted to dispense with the reading of the Minutes of the preceding meeting of the Society which will appear in the next issue of the Proceedings together with the Minutes of the current meeting.

(2) REPORT OF THE SECRETARY-TREASURER

The Secretary-Treasurer reported on the activities of the Council as follows:

Council Meeting of March 15, 1955

(a) The Council confirmed the action of the President in appointing Ed Allen as Assistant Editor to cooperate with Editor Maycrink.

(b) The Council authorized the printing, in pamphlet form, of the paper by R. M. Marshall "National Council Procedure for Making Workmen's Compensation Rates." [Note: This paper aroused a great deal of interest and the reprint has been completely sold out.]

Council Meeting of May 25, 1955

(a) The Council voted that the May 1956 Spring Meeting of the Society be held in Massachusetts in the Berkshire section.

(b) The Committee on Compensation and Liability Loss Expense Reserves having raised the question of a further study to supplement the Report on that subject appearing in Volume XXXV of the "Proceedings" the Council indicated there was no reason why the Committee should not explore that question further.

(c) Mr. M. G. McDonald, Casualty Actuary of the Massachusetts Department, having fully met the requirements for membership was designated an Associate to be enrolled as of May 26, 1955.

(d) The Council approved the preparation by the American Mutual Alliance and the Association of Casualty and Surety Companies of a supplement to the booklet "The Fire and Casualty Actuarial Profession," the preparation and distribution of such supplement to be at no cost to the Casualty Actuarial Society.

Council Meeting of October 21, 1955

(a) The Council authorized a local committee to make the necessary arrangements to reserve May 24 and 25 for the Spring 1956 meeting at the Curtis Hotel in Lenox, Massachusetts.

(b) The Council voted that a local committee be appointed by the President to explore the New York City area as respects possible sites for the November 1956 meeting of the C A S.

(c) The plans having been perfected to the satisfaction of the Council, the Council voted that the American Mutual Alliance and the Association of Casualty and Surety Companies be authorized to proceed with the distribution of the Supplement to the "Fire and Casualty Actuarial Profession" voted at the Council meeting of May 25, 1955.

(d) The Council accepted the report of the Committee on Compensation Loss and Liability Loss and Expense Reserves to the effect that, subsequent to the Council meeting of May 25, 1955, the Committee had met and had decided to take no action with respect to preparing a supplement to the Report of the Committee which had appeared in Volume XXXV of the "Proceedings."

(e) The Council requested that Messrs. Pruitt and McConnell investigate the possibility of holding the November 1957 meeting of the C A S at the new Sheraton Hotel in Philadelphia.

(f) It was voted that the 1956 examinations of the Society be held on May 14 and 15.

Council Meeting of November 17, 1955

(a) Subject to confirmation by the Society at the meeting of November 18, 1955, the Council as empowered by Article V of the Constitution elected the following officers:

Editor.....E. S. Allen
Librarian.....G. R. Livingston
General Chairman —
Examination Committee .....J. W. Wieder, Jr.

(b) The Council accepted the recommendations of the Secretary-Treasurer for continuation of the present schedule of dues for the next fiscal year, namely,

Fellows $20.00*
Associates (first five years).....$10.00
Associates (after five years).....$20.00*
Dues waived for members in the Service.
* $10. for other than residents of U. S. or Canada.

(c) The following candidates, having fully met the requirements for membership were designated as Associates to be enrolled as of November 18, 1955.

Andrews, E. C. Coates, W. D.
Berquist, J. R. Muetterties, J. H.
Wilson, J. C.

(d) The Council voted to accept the financial report of the Secretary-Treasurer for the fiscal period October 1, 1954 through September 30, 1955. (That report is attached to the Minutes of the November 1955 meeting of the Society).

(e) A Fellow of the Society had requested that the Council consider the possibility of the Society arranging courses covering the Associateship examinations. The Council agreed that the suggested program was not feasible because

(1) The main need for such courses seemed to be in connection with the mathematical parts of the examinations and, on the basis of past experience, it seemed impossible to get together enough candidates to insure that the expenses entailed in this project could be covered by any reasonable per capita fee.

(2) Courses on other phases of the examinations were already available through educational groups such as the Insurance Society.

(f) A request had been received from Major General Bran-

non, Chairman of the President's Commission on Veteran's Pensions, for a pertinent bibliography relating to these matters. The Council voted to request W. Rulon Williamson to review with the General the material which had been assembled by Mr. Williamson and other members of the Committee on Social Insurance.

The meeting voted to accept the Report of the Secretary-Treasurer, with the understanding that separate action would be taken, as required by Article V of the Constitution, on filling the offices of Editor, Librarian and General Chairman of the Examination Committee (See item (a) above of November 17, 1955 Council Meeting.)

(3) OBITUARIES

The President announced the deaths during the past year of two Fellows Frederick Richardson and Henry Hollister Jackson. Before retirement Mr. Richardson was Chairman of the Board, General Accident Fire and Life Assurance Corporation and Mr. Jackson was Vice President and Actuary of the National Life Insurance Company of Vermont. Obituary notices will appear in Volume XLII of the Proceedings.

(4) NEW FELLOWS AND ASSOCIATES

The President presented diplomas to the new Fellows:

R. A. Bailey	T. W. Fowler	P. S. Liscord
A. V. Fairbanks	R. L. Hurley	H. W. Menzel
R. B. Foster		A. V. Resony

The new Associates were then introduced to the gathering:

E. C. Andrews	J. A. Muetterties
J. R. Berquist	J. C. Wilson
W. D. Coates	

(5) PRESIDENTIAL ADDRESS

The President's Address "The Contribution of Our Society" will be printed in Volume XLII of the Society.

(6) ELECTION OF OFFICERS

Under date of October 14, 1955, the Fellows of the Society were mailed a ballot with respect to nominations for President, Two Vice-Presidents, Secretary-Treasurer and three members of the Council, to be returned to the Secretary-Treasurer in a sealed envelope for forwarding to the Nominating Committee, Messrs. J. M. Cahill, H. J. Ginsburgh and C. J. Haugh.

The Nominating Committee announced that following a tabulation and review of the ballots, the following were placed in nomination:

President — J. Linder and N. E. Masterson

Vice-Presidents — J. W. Carleton, C. A. Kulp and A. N. Matthews

Secretary-Treasurer — A. Z. Skelding

Members of the Council — G. B. Elliott, R. P. Goddard. L. H. Longley-Cook and J. A. Resony

There being no further nominations from the floor, upon motion, nominations were declared closed and each office was voted upon separately with Messrs. M. Kormes and M. H. McConnell acting as tellers. The balloting resulted in the following elections:

President.....Mr. N. E. Masterson

Vice-Presidents.....Mr. C. A. Kulp & Mr. A. N. Matthews

Secretary-Treasurer...Mr. A. Z. Skelding

Members of Council....Mr. G. B. Elliott, Mr. R. P. Goddard, Mr. L. H. Longley-Cook

The Fellows present then voted to confirm the action of the Council at the meeting of November 17, 1955 with respect to election of the Editor, Librarian and General Chairman of the Examination Committee, namely,

Editor.....Mr. E. S. Allen

Librarian.....Mr. G. R. Livingston

General Chairman,
Examination Comm.....Mr. J. W. Wieder, Jr.

(7) WRITTEN DISCUSSION OF PREVIOUS PAPERS

(a) J. J. Smick on paper by R. M. Marshall "Workmen's Compensation Insurance Ratemaking." Mr. Marshall (read by R. H. Kallop) presented his comments on Mr. Smick's review.

(b) M. Rodermund on paper by M. J. Schwartz "Disability Insurance."

(c) L. W. Scammon on paper by M. G. McDonald "Compulsory Automobile Insurance Rate-Making In Massachusetts."

The President then expressed to Miss Maycrink, who had indicated a desire to be relieved of her duties as Editor, the sincere thanks of the Society for the splendid job she had done over a period of years. The members present supported the President's remarks with applause and a standing vote of thanks for a job well done by our Emma.

(8) PRESENTATION OF NEW PAPERS

(a) G. F. Michelbacher — "The Multiple-line Principle"

(b) A. V. Fairbanks — "Notes on Non-cancellable Health and Accident Ratemaking"

(c) E. C. Andrews — "Observations on State Taxation of Casualty and Fire Insurance Companies"

(d) B. Fratello (by invitation) "The Workmen's Compensation Injury Table and Standard Wage Distribution — Their Development and Use in Workmen's Compensation Insurance Ratemaking"

(e) N. Gaines — "Actuarial Aspects of Unemployment Insurance"

(9) PANEL DISCUSSION

After a brief recess for luncheon the meeting reconvened at 2:00 P.M. with Dudley Pruitt presiding.

The gathering then enjoyed a lively panel discussion on the topic "What Functions Should a Casualty or Fire Actuary Perform." Professor C. A. Kulp acted as moderator and was assisted by panel members H. J. Ginsburgh, M. S. Hughey, V. Lemmon and F. S. Perryman.

(10) ADJOURNMENT

The President declared the meeting adjourned at 3:45 P.M.

(11) EXAMINATIONS

Attached is a list of the successful candidates for the 1955 examinations.

1955 EXAMINATIONS — SUCCESSFUL CANDIDATES

Following is a list of those who passed the examinations held by the Society on May 12 and 13, 1955:

ASSOCIATESHIP EXAMINATIONS

PART I (a) and (b)	Bentzin, C. G.	Dorf, S.	Klaassen, E. J.
	Bilisoly, R. S.	Feldman, M. F.	Ury, H. K.
	Boyle, J. I.		Willsey, L. W.
PART I (b)*	Amlie, W. P.	Bornhuetter, R. L.	Roberts, L. H.
	Berg, R. A., Jr.	Dropkin, L. B.	Schneiker, H. C.
	Bernat, L. A.	Gottesfeld, J.	Smith, E. M.
	Bernath, O. F.	Leahey, W. L.	Tarbell, L. L., Jr.
	Berquist, J. R.	Pinney, A. D.	Williams, P. A.
PART II (a) and (b)	Bentzin, C. G.	Klaassen, E. J.	Van Cleave, M. E.
	Dorf, S.	Miller, J. D.	Wasserzug, L.
PART II (a)*	Alexander, L. M.	Dropkin, L. B.	Schneiker, H. C.
	Berg, R. A., Jr.	Gottesfeld, J.	Smith, E. M.
	Bernat, L. A.	McLean, G. E.	Tarbell, L. L., Jr.
	Berquist, J. R.	Muhlstock, H.	Williams, P. A.
	Bornhuetter, R. L.	Pinney, A. D.	Woodworth, J. H.
PART III	Abel, F. E.	Pinney, A. D.	Smith, E. M.
	Flack, P. R.	Rosser, H.	Tucker, T. F.
	Muetterties, J. H.		Williams, P. A.
PART IV	Berkman, J. M.	Dropkin, L. B.	Kapsales, H.
	Bornhuetter, R. L.	Hanssler, H. W.	Mathwick, L. F.
	Coates, W. D.	Jamieson, J. H. S.	Roberts, L. A.
	DeMelio, J. J.	Jones, C. J.	Wilson, J. C.

*Credit for other section previously granted.

FELLOWSHIP EXAMINATIONS

PART I (a) and (b)	Bailey, R. A. Bennett, N. J. Berquist, J. R. Bondy, M. Crofts, G. Drobisch, M. R. Eide, K. A.	Fairbanks, A. V. Harack, J. Head, G. O. Kallop, R. H. Kates, P. B. Mills, R. J. Muetterties, J. H.	Otteson, P. Perkins, W. J. Resony, A. V. Thomas, J. W. Williams, D. G. Wilson, J. C. Wright, B.
PART I (a)*	Boyajian, J. H. Foster, R. B.	Fowler, T. W. Lino, R.	Liscord, P. S. Menzel, H. W.
PART I (b)*	Hurley, R. L.		
PART II (a) and (b)	Bailey, R. A. Bennett, N. J.	Fairbanks, A. V. Gillam, W. S. Hart, W. V. B., Jr.	Pennycook, R. B. Woodworth, J. H.
PART II (a)*	Lino, R.		
PART II (b)*	Bondy, M.	Hurley, R. L.	Resony, A. V.
PART III (a) and (b)	Bailey, R. A.		Thomas, J. W.
PART III (b)*	Daniel, C. M. Foster, R. B.	Fowler, T. W. Kallop, R. H. Liscord, P. S.	Menzel, H. W. Resony, A. V.
PART IV (a) and (b)	Drobisch, M. R.	Lino, R.	Muetterties, J. H.

*Credit for other section previously granted.

NEW ASSOCIATES

The following candidates, having been successful in completing the examinations, will be admitted as Associates of the Society as of the date of the annual meeting in November, 1955:

Andrews, E. C.
Berquist, J. R.
Coates, W. D.
*McDonald, M. G.
Muetterties, J. H.
Wilson, J. C.

*Enrolled as Associate as of May 26, 1955

NEW FELLOWS

The following Associates, having been successful in completing the examinations, will be admitted as Fellows of the Society as of the date of the annual meeting in November, 1955:

Bailey, R. A.
Fairbanks, A. V.
Foster, R. B.
Fowler, T. W.
Hurley, R. L.
Liscord, P. S.
Menzel, H. W.
Resony, A. V.

A. Z. Skelding,
Secretary-Treasurer

CASUALTY ACTUARIAL SOCIETY

Cash Receipts and Disbursements
from October 1, 1954 to September 30, 1955

Income

On deposit in Marine Midland on October 1, 1954		$ 5,660.46
Members Dues	$4,750.00	
Sale of Proceedings	2,242.77	
Examination Fees	931.00	
Luncheons & Dinners	4,090.00	
Interest on Bonds	125.00	
Sale of Reprints	1,990.75	
Michelbacher Fund	503.20	
Foreign Exchange	—.55	
Donations	100.00	14,732.17
Total		$20,392.63

Disbursements

Printing & Stationery	$ 9,296.96
Postage, Tel., Exp., etc.	103.32
Secretarial Work	600.00
Examination Expense	500.10
Luncheons & Dinners	4,076.26
Library Fund	178.32
Insurance	12.50
Storage	109.70
Miscellaneous	211.91
Total	$15,089.07
On deposit 9-30-55 in Chase Manhattan	5,303.56
Total	$20,392.63

Assets

Cash in Bank 9-30-55	$5,303.56	
U. S. Savings Bonds	5,000.00	
		$10,303.56

Liabilities

Michelbacher Fund 9-30-55	$ 7,133.72
Other Surplus	3,169.84
Total Liabilities & Surplus	$10,303.56

* * * * *

One 12 Yr. U. S. Savings Bond 2½% Series G No. M6,757,060G due for $1,000 on Nov. 1, 1960.

Four 12 Yr. U. S. Savings Bonds 2½% Series G Nos. M7,228,102G-103G-104G-105G due for $4,000 on October 1, 1961.

U. S. Fire Insurance Company Policy No. 109221 for $5,000 on Proceedings stored at Chelsea Fireproof Storage Warehouse; $2,000 on books kept in N. Y. Insurance Society Library. Expires September 14, 1957.

Surety Bond for $5,000 in the Royal Indemnity Company.

* * * * *

This is to certify that we have audited the accounts, examined all the vouchers and investments shown above and find same to be correct.

In this examination, it has been noted that there are no dues outstanding. It is also noted that the disbursement item for Printing & Stationery was exceptionally high due to increased printing costs and the printing of Recommendations for Study and of papers and reports of widespread interest.

(S) H. G. CRANE
Chairman, Auditing Committee

October 18, 1955

EXAMINATION FOR ENROLLMENT AS ASSOCIATE

PART I

MAY 12, 1955 TIME 9:30 TO 12:30 O'CLOCK

SECTION (a)

1. (a) Show that the Bravais-Pearson coefficient of correlation r_{xy} must lie in the interval -1 to $+1$.

   (b) Determine the mean of X for the probability function f(x), where f(x) is defined by the equations:

   $f(x) = k\,x^3\,(x-2)^2$, for $0 < x < 2$; and $f(x) = 0$, for $x < 0, x > 2$.

2. (a) A sample of $N = 625$ gave $E_m = 0.27$. What size sample would be required to give $E_m = 0.09$?

   (b) The theory of gunnery supposes that the longitudinal dispersion of shots upon a target approximately obeys the normal law. Assuming it does, find the standard deviation of the theoretical distribution (standard deviation of the means) if, out of a sample of 1000 test firings, the standard deviation was 1000 yards. In the theoretical distribution, how close to the target (longitudinally) is there an even chance that 50% of the shots would fall?

3. (a) If 10 coins are thrown, find the approximate value of the probability of obtaining exactly 7 heads by using the normal curve:

   Given: $\Phi\,(1.26) = .1804$
   $\Phi\,(1.27) = .1781$

   (b) Prove the theorem that, if the probability of success in a single trial, p, approaches zero while the number of trials, n, becomes infinite in such a manner that the mean $m = np$ remains fixed, then the binominal distribution approaches the Poisson distribution.

4. Determine the coefficient of correlation and the regression line of Y on X for the following data:

X	Y
1	10
2	8
3	6
4	4
5	−3

SECTION (b)

5. (a) At a round table n persons are to be seated, two of whom, A and B, must be placed together. If the places have been assigned at random in ignorance of this requirement, and the chance is two to one against its having been met, what is the value of n?

   (b) A and B are two inaccurate mathematicians whose chances of solving a given problem correctly are 1/8 and 1/12 respectively. If they obtain the same results and if it is 1000 to 1 against their making the same mistake, find the chance that the result is correct.

6. (a) A certain stake is to be won by the first person who throws an ace with a die of N faces. If there are P persons who throw in a fixed order until the stake is won, what is the chance that the rth person wins. (Reduce answer to its simplest form).

   (b) A rectangular grid of lines is prepared, one set being distance a apart, the other set distance b apart. A coin of radius r is thrown at random on the grid. What is the probability that it will rest on at least one of the grid lines? The diameter of the coin, 2r, is assumed to be less than a or b.

7 (a) If there are 99,999 registration numbers, what is the chance of a car having a registration number on which the same digit occurs more than once?

   (b) There are 3 balls in a bag, and each of them may with equal probability be white, black or red. A person puts in his hand and draws a ball. It is white. It is then replaced. Find the chance that all the balls in the bag are white.

8. Show that the probability of throwing an odd number of aces in 1000 throws of an ordinary die is equal to $\frac{3^{1000}-2^{1000}}{2\cdot 3^{1000}}$

PART II

MAY 12, 1955 TIME 1:30 TO 4:30 O'CLOCK

SECTION (a)

1. (a) Prove the following identities:

$$\text{(i)}\quad \ddot{a}_{x+1} = \frac{(1+i)\,a_x}{p_x}$$

$$\text{(ii)}\quad a^{(4)}_{x:\overline{n}|} = \tfrac{1}{8}\,(5\,a_{x:\overline{n}|} + 3\,\ddot{a}_{x:\overline{n}|})$$

(b) Express in terms of commutation symbols D, M, and N the equation you would use in determining the face amount of a 20 year endowment policy issued to a man aged 24 for which the net annual premium is $100.

2. (a) From the relation $M_x = vN_x - N_{x+1}$, find $\bar{a}_x$ when $A_x = .01x$ and $i = .02$.

(b) If $1 - A_{x+2n} = A_{x+2n} - A_{x+n}$, find the numerical value of ${}_nV_{x+n}$

3. (a) Express in commutation symbols the retrospective reserve for the tenth year for a $1000 policy issued at age 30 under each of the following plans. Simplify the final expression as much as possible.

(i) Ordinary Life

(ii) 15-Payment Life

(iii) 20-Year Term

(iv) 20-Pay Endowment at 85

(b) A whole life policy provides for an increasing death benefit under which the death benefit in the nth year is $(1.01)^n$. If the company calculates net premiums on a 2½% interest assumption, and the net annual premium for the policy is $A_x/\bar{a}_x$ where $\bar{a}_x$ is computed at 2½% and A_x is computed at rate i, find i.

4. The annual premium for a whole life policy is .04 for 5 years and .02 thereafter, *OR* .0475 for 5 years and .0175 thereafter. Find the uniform (level) annual whole life premium.

SECTION (b)

5. (a) In general, the types of investments best suited to the three broad classes of insurance companies [i.e., 1) Fire-and-marine, 2) Casualty, and 3) Life] depend upon the probable need of quick realization in cash which may arise from the type of business done. On this assumption, discuss the differences in the investment portfolio among such classes of companies as respects holdings in stocks, long term government and corporate bonds, short term government and corporate bonds, and mortgages.

   (b) What are the characteristics which a risk must possess in order that it may be regarded as insurable? Applying these tests, would you say that maternity coverage under an accident and health policy was an insurable risk?

6. "Because reserves are required to be only a fraction of deposits, the excess reserve of an individual bank may be expanded throughout the banking system . . . to several times its own size."

   (a) Illustrate this phenomenon, assuming a $10,000 deposit from outside the banking system and a 10% reserve ratio for each bank in the system.

   (b) How does the Federal Reserve System control the power of commercial banks to change the amount of money in the economy?

7. (a) List the factors which might govern your appraisal of an investment in a public utility.

   (b) Discuss briefly what is meant by the following:

(i) Short selling

(ii) Preferred stock

(iii) Fixed trust

(iv) Book value of a share of common stock

8. Discuss briefly the ways of meeting risks which are common to both men in isolation and men in society and also those which are available to men in society alone. In your discussion, develop a definition of insurance and comment upon its economic significance.

PART III

MAY 13, 1955 TIME 9:30 TO 12:30 O'CLOCK

SECTION (a)

1. (a) Define representations, warranties, and conditions and describe on what basis an insurer may avoid a policy under each.

   (b) Explain the term "Special Privilege Tax" and give an example.

2. (a) State the base upon which stock fire and casualty companies are taxed by the Federal Government.

   (b) Discuss the question of exactness of this base.

3. Public Law 15 provided a moratorium for the business of insurance from the application of certain federal statutes for a limited period of time.

   (a) Name and explain briefly the four statutes whose application was so deferred.

   (b) At the expiration of said moratorium, the aforesaid acts became applicable to what extent?

4. (a) Identify and discuss one of the following three cases:

(i) Prudential Insurance Company vs Benjamin

(ii) Robertson vs California

(iii) North Little Rock Transportation Company vs Casualty Reciprocal Exchange

(b) The typical state rating law enacted after Public Law 15 contains three major components. Name the three components and discuss one of the three in detail.

SECTION (b)

5. (a) Your state has just adopted a temporary disability benefits law with benefit provisions similar to the companion unemployment compensation law which has been in existence for some time. Given the following data, show how you would arrive at a final rate for a temporary disability benefits insurance plan directly comparable to the state plan, (assume no employee contribution):

(i) if the rate were expressed as a percentage of taxable payroll and there was no loading for female lives or extra-hazardous industry;

(ii) if the rate were per person per month, and was loaded 20% because of the number of female lives in the insured group.

pure premium (all male) — $ .50 per month for each $10 of weekly benefit

average taxable payroll per person — $2,400 per year

loading for expenses and contingencies — 25% of gross premium

average weekly benefit rate in companion unemployment compensation act — $24.00

statutory assessment loading — 1/10 of 1% of taxable payroll

(b) The objectives of Financial Responsibility Laws are broadly two:

(i) To segregate and penalize the bad driver and thus aid in accident prevention.

(ii) To require insurance of car owners, and drivers, only as owners or drivers prove their inability to pay damages or otherwise demonstrate their driving or financial unreliability, and thus gradually to increase the proportion of recoveries for automobile injuries.

Describe the provisions of these laws which are intended to accomplish these objectives and discuss to what extent accident prevention and increase in proportion of recoveries through insurance is accomplished by these laws.

6. (a) Discuss four differences between social and commercial insurance.

(b) In connection with the California Disability Insurance System, explain the meaning of the so-called "Shot-gun" clause.

7. (a) What are the conditions that must be observed in state unemployment compensation laws in order that employers may deduct from their Federal unemployment tax the amounts, subject to limitations, they actually pay under state unemployment compensation laws?

(b) (i) What is the value of actuarial reserves in Federal "old age insurance"?

(ii) Why is the use of an interest factor in the computation of such reserves different from the use of an interest factor in a private group insurance scheme?

8. In order to reduce the so-called "moral hazard" and also to develop insurance forms whose price might be attractive to the purchaser, private insurance has used in varying degrees:

deductibles,

pro-rata participation by the insured,

loss limitation.

Discuss briefly the manner in which these ideas have been applied to the following forms of social insurance:

(a) Temporary Disability Benefits Insurance

(b) Unemployment Insurance

(c) Compulsory Automobile Insurance

Give specific examples where possible.

PART IV

MAY 13, 1955 TIME 1:30 TO 4:30 O'CLOCK

SECTION (a)

NOTE: Answer any eight of the questions numbered 1 through 12.

1. In the standard mortgagee clause which may be endorsed on fire policies, the mortgagee assumes certain obligations in return for which he is granted certain advantages. What are these obligations and advantages?

2. (a) The Personal Property Floater distinguishes scheduled property from unscheduled property. Differentiate between these two types of property and briefly explain why the separation is necessary.

   (b) What are the limits of liability in an Annual Transportation Policy?

3. Explain the meaning and purpose of the 80% co-insurance clause in a fire policy. Illustrate its use by explaining the settlement of a loss in the following situation:

   Value of property = $20,000

   Total amount of insurance on property = $12,000

   Amount of loss = $8,000

4. Discuss the origin and interpretation of the phrase "lost or not lost" as used in ocean marine policies.

5. Describe the collision and fire and theft coverages in the automobile policy. What exclusion applies to the fire and theft coverage but not to the collision coverage?

6. Explain the use of the following terms as found in the Standard Fire Insurance Contract of New York:
   (a) Pro-rata liability
   (b) Uninsurable and excepted property
   (c) Other insurance

7. To what extent is an Excess Commercial Blanket Bond actually "blanket"? In what ways is the term "blanket" a misnomer?

8. Name the measures of exposure, and give the unit of exposure, which are used for premium determination in the following forms of public liability insurance:
   (a) Manufacturers' and Contractors' Liability — Name 1.
   (b) Owners', Landlords' and Tenants' Liability — Name 3.
   (c) Owners' or Contractors' Protective Liability — Name 1.
   (d) Product Liability — Name 3.
   (e) Contractual Liability — Name 1.

9. (a) (i) The president of a corporation receives a salary of $40,000 a year. How much would the annual audit show under the following policies:
   Workmen's Compensation
   Manufacturers' and Contractors' Liability
   (ii) What would these amounts be if the individual in question were a co-partner in a co-partnership?

   (b) Define the following terms as used in workmen's compensation insurance:
   1. Loss and Expense Constants
   2. Ex-medical coverage
   3. Monopolistic fund state

10. Describe the Extended Medical Payments Coverage available under an automobile liability policy and explain under what conditions it is afforded.

11. Describe the differences among the following forms used in residence burglary insurance and comment upon how each form might influence the adequacy of coverage purchased by an insured.
   (a) Form 1 — Divided Cover
   (b) Form 2 — 50% Blanket
   (c) Form 3 — 100% Blanket

12. As an underwriter, express your opinion of merit rating schemes for private passenger automobile liability insurance.

SECTION (b)

NOTE: Answer all of the questions numbered 13 through 16.

13. (a) Using the "loss ratio method", develop the formula for the percentage change in rate level, given the following:

x = loss ratio for experience period

y = expected loss ratio

z = percentage change in rates adopted since the experience period but prior to the effective date of the current revision

Assume no judgment factor.

(b) Given the following data, calculate the "formula" pure premiums:

	Underlying Pure Premium	*Indicated Pure Premium*	*Credibility*
Serious	$ .10	$ .15	20%
Non-Serious	.60	.40	75%
Medical	.30	.20	80%
TOTAL	$ 1.00	$ .75	—

14. (a) "Major Medical Expenses" is the newest and fastest growing line in the disability field. Outline the problems encountered in rate-making for this coverage up to the present time.

(b) Discuss the principal characteristics that should be found in any basis of exposure.

15. (a) Non-cancellable accident and health insurance has certain similarities to life insurance when it comes to arriving at gross premiums. Discuss briefly, referring particularly to the following:

(1) First-year costs.

(2) Renewal costs.

(b) What are the nine main divisions of hazard enumerated in the Schedule for Grading Cities and Towns of the National Board of Fire Underwriters? Describe briefly how a rating for a city is established under this Schedule.

16. (a) Compare the following lines of insurance with respect to the suitability of using written/paid loss ratio or earned/incurred loss ratio in rate-making.

(a) Automobile bodily injury
(b) Workmen's compensation
(c) Automobile property damage
(d) Fire

(b) The manufacturing classifications in the Workmen's Compensation manual for the most part are determined on a product basis. Compare the product theory of classification with the process theory and discuss the measurement of exposure under each.

EXAMINATION FOR ENROLLMENT AS FELLOW

PART I

MAY 12, 1955 TIME 9:30 TO 12:30 O'CLOCK

SECTION (a)

1. (a) The unearned premium reserve is one of the major liability items of the fire and casualty companies. What is this liability and why is it such a higher proportion of total liabilities in fire companies than in casualty companies?

   (b) What is meant by the phrase "equity in the unearned premium reserve"? Explain.

2. Name and describe briefly four common methods of determining total loss reserves on known cases, and suggest a line of business and the circumstances which might call for the use of each method.

3. (a) A male employee covered under the New York Workmen's Compensation Act has died of accidental injury received during the course of employment.

   (i) Name, and explain why, certain facts about the deceased's family status must be determined by the employer's insurance carrier before a reserve on the indemnity portion of the claim may be established.

   (ii) In addition to the above, the reserve will be based on estimates of two other important contingencies. Name these two contingencies and explain their potential effect on the adequacy of reserves on claims of this type.

   (b) (i) Explain what is meant by an "Indeterminate Compensable Disability" when used in connection with workmen's compensation claims.

   (ii) It has been suggested that reserves for such "Indeterminate" claims could be obtained from a table which would consist of a series of average values based on the development of a large number of indeterminate cases through to their ultimate conclusion. Would you recommend a single table based on country-wide data, or would you recommend that consideration be given to a breakdown of tables according to certain major factors? Explain the basis for your recommendation.

4. (a) One portion of the liability of a casualty company reported in the annual statement is the "Incurred But Not Reported" loss reserve. Discuss briefly the purpose and necessity of such a reserve for the various casualty lines.

   (b) Describe briefly how you would approach the problem of establishing a reasonable reserve for "Incurred But Not Reported" for automobile liability in your company annual statement. What special considerations would you give to the existence of a large segment of Massachusetts Compulsory Automobile Insurance in your company portfolio of business?

SECTION (b)

5. The following data (in thousands) have been taken from the records of Company X, a mutual casualty insurance company, and comprise the assets and liabilities as of December 31, 1954:

1.	Unearned premiums	$ 24,000
2.	Real Estate	2,000
3.	Federal Income Taxes	1,000
4.	Unpaid Losses	79,000
5.	Bonds	112,000
6.	Unpaid Loss Adjustment Expenses	6,000
7.	Cash and Bank Deposits	7,000
8.	Stocks	16,000
9.	Other Expenses (excluding taxes, licenses and fees)	1,000
10.	Special Surplus Funds	7,000
11.	Agents' Balances or Uncollected Premiums Less Ceded Reinsurance Balances Payable	6,000
12.	Taxes, Licenses and Fees (excluding Federal Income Taxes)	2,000
13.	Guaranty Funds	2,000
14.	Interest, Dividends and Real Estate Income Due and Accrued	1,000
15.	Unassigned Funds (surplus)	17,000
16.	Dividends Declared and Unpaid	5,000

Prepare page 2, "Assets", and page 3, "Liabilities, Surplus and Other Funds", of the annual statement.

6. In fire and casualty insurance accounting frequent reference is made to New York Insurance Department Regulation No. 30.

   a. What is the purpose of this Regulation and of what, in broad terms, does it consist?

   b. Many carriers do business in all other states as well as New York. What is the practical result of Regulation No. 30 as respects these companies and their country-wide operations?

7. (a) Discuss the fundamental theory underlying the various premium discount plans for casualty lines. Are these plans justified by the statistics compiled under the expense by size of risk study undertaken by the industry?

   (b) Give your opinion as to whether the claim expense provision in casualty insurance rates should be adjusted by size of risk and give your reasons. What other conclusions were drawn from the recent expense by size of risk study?

8. One of the main objectives of the Insurance Expense Exhibit is illustrated by Part II. Describe Part II and its purpose.

PART II

MAY 12, 1955 TIME 1:30 TO 4:30 O'CLOCK

SECTION (a)

NOTE: Answer any four of the questions numbered 1 through 7.

1. Suppose you found two relatively small workmen's compensation risks of identical size as respects exposures, and identical as respects classification, rating date, and state. Suppose further that the National Council has just promulgated an experience rating debit for one risk, and an experience rating credit for the other, yet you find that both had the same loss ratios for the three years of the rating period, with premiums adjusted back to manual level, and these loss ratios were below permissible. Assuming no errors in the rating calculations or data, what is the most probable reason for this apparent contradiction, and what basic principle of experience rating is illustrated?

2. Suppose you have a general liability manual rate of $1.00 based on a breakdown as follows:

Expected Loss	44%
Allocated Claim Expense	3
Tax, Profit, Commission	33
Other Expense	20
Total	100%

(a) What type of statistical data would you need to adjust this rate for writing the coverage on a deductible per claim basis?

(b) Show how you would adjust the rate if the data showed that 20% of the losses would be eliminated by a $100 deductible.

(c) On the other hand, how would the application of an experience rating plan to a risk with 100% credibility and an experience 20% below the expected affect the rate?

(d) What is the difference in principle that causes the difference between the rates obtained under (b) and (c)?

3. The Retrospective Rating Plans of the National Council include optional provisions for loss limitations, with appropriate Excess Loss Premium Factors. Outline the fundamental procedure underlying the computation of these factors, and explain the particular advantage of this procedure in keeping the factors up to date.

4. (a) What is the purpose of the basic limits maximum single loss amounts shown in the credibility tables of the New York Automobile Liability and General Liability Experience Rating Plans?

(b) Why do the maximum single loss amounts vary between certain sublines of Automobile and General Liability in the New York Experience Rating Plans?

(c) Develop a general formula for the limitation of the effect of the incurred losses resulting from a single accident to "X" points in the modification.

5. (a) What are the "Conditions of Eligibility" in the Collision Fleet Rating Plan of the National Automobile Underwriters Association?

(b) Assume that a risk has just become eligible under the rules in (a) above, and no collision insurance has been carried previously. Describe the procedure that would be followed in determining the modification of manual premiums applicable to this risk in:

1st year
2nd year
3rd year
4th year

6. Starting with a basic rate of $0.10, demonstrate the application of the Universal Mercantile System of Schedules by supplying your own arbitrary values for the following deficiencies or credits and showing how they would be applied to adjust the $0.10 rate.

(1) Faulty construction of walls.

(2) Watchman and clock.

(3) Additional occupant.

(4) Occupancy by box factory.

(5) Faults of management.

(6) Basement sprinkler.

7. With respect to the fire insurance plan for rating risks with multiple locations:

(a) Name four classes of property that may be covered.

(b) Name six classes of property that may not be covered.

(c) Name two types of coverage that may be written.

(d) Name five types of coverage that may not be written.

SECTION (b)

NOTE: Answer any four of the questions numbered 8 through 13.

8. During the past ten years many states have amended their insurance laws to provide "Multiple Line Underwriting Powers".

(a) What is meant by "Multiple Line Underwriting Powers"?

(b) What important step was taken in the field of accounting as a result, at least in part, of this legislative action?

(c) Describe briefly one leading "multiple line" policy put on the market recently for individual home owners.

9. (a) For qualifying risks, excess limits experience within certain limits is subject to experience rating for Automobile and General Liability in New York. Many underwriters consider this an unsound rating practice. Discuss.

(b) In these same experience rating plans, the non-experience rated excess limits premium is a function of the basic limits modified rate. The excess limits premium is less than manual when the basic limits modification is less than unity and more than manual when the basic limits modification is greater than unity. Many underwriters feel that the non-experience rated excess limits premium should be the straight manual premium regardless of the basic limits modification. Discuss.

10. Compare payroll with man-hours as a basis of exposure for determining workmen's compensation premium, with respect to:

(a) Equitableness

(b) Dependability

(c) Stability

(d) Practicability

11. What, briefly, is the "loss of hearing" problem that has arisen recently in workmen's compensation, and what practical program was adopted by the Workmen's Compensation Board of New York to prevent an immediate upsurge of payments arising out of this situation?

12. Some weather experts feel that the pattern of weather has changed to an extent that New England should expect a greater frequency of hurricanes in the future than we have ever known in the past. If this be true, what problems does this pose to the industry and what measures would you propose to provide extended coverage at a price that would not be prohibitive?

13. There is more judgment involved in establishing rates for fire insurance than for the major casualty lines. Would you say, therefore, that fire rates should be supervised by state insurance departments more or less strictly than casualty rates? Discuss your answer.

PART III

MAY 13, 1955 TIME 9:30 TO 12:30 O'CLOCK

SECTION (a)

1. Describe possible operations of the following machines when processing fire or casualty insurance data, giving examples:
   (a) Sorter
   (b) Collator
   (c) Gang Punch
   (d) Multiplying Punch
   (e) Tabulator

2. Discuss the advantages and disadvantages of preparing Workmen's Compensation Unit Reports by machine methods.

3. Describe a possible method of casualty or fire insurance premium collections on punch cards.

4. Outline what you feel a fire or casualty company should be doing now in preparation for ultimate electronic mechanization.

SECTION (b)

NOTE: Answer any four of the questions numbered 5 through 9.

5. Briefly outline the National Automobile Underwriters Association Statistical Plan as it relates to private passenger cars, and indicate the type of data it is designed to develop for rate-making purposes.

6. Describe the Statistical Plan of the Multiple Peril Insurance Rating Organization for reporting statistics on the Homeowners' Policies A and B.

7. Outline the main changes in the National Council's Workmen's Compensation Unit Statistical Plan which were recently made, and briefly outline the reasons for the changes.

8. (a) Outline a statistical procedure that could be followed by a company for automobile liability insurance to indicate more current trends in accident frequency and average claim cost than is generally developed on a statistical basis which produces policy year data only.

   (b) Name at least three sources of external statistics that can be used to support the use of trend factors in third party liability insurance and indicate how you believe such statistics should be used in the rate-making system.

9. Name three well-known annual insurance statistical publications and describe briefly the contents of each.

PART IV

MAY 13, 1955 TIME 1:30 TO 4:30 O'CLOCK

SECTION (a)

NOTE: Answer any four of the questions numbered 1 through 6.

1. In developing classification rates for many lines of insurance, the problem of "non-reviewed" classes continually presents itself. Describe this problem and outline a possible solution to it.

2. Describe the necessary statistical data to approximate premium rates for group major medical expense insurance and give possible sources or methods of obtaining this data.

3. What is the effect of changes in wages on workmen's compensation premiums and losses? Indicate how the rates can be adjusted to take these changes in wage level into consideration.

4. The National Automobile Underwriters Association has developed a new ratemaking procedure, and has used it in rate revisions which became effective in 1953 and 1954. Describe the details of this procedure.

5. Outline the arguments used by the fire insurance industry in taking the position that investment earnings should not be used in determining profit or loss under the so-called 1921 standard profit formula.

6. Fire insurance ratemaking procedures are not so detailed and precise as the ratemaking procedures used for the casualty lines. Discuss.

SECTION (b)

7. Write a short essay on any one of the following topics:

   (1) The right of a fire insurance company to subscribe to a Fire Insurance Rating Organization for all classes of insurance but one.

   (2) The problems of providing insurance coverage for privately financed Atomic Energy Projects.

   (3) Indivisible premium versus scheduled hazards under multiple-peril packaged policies.

   (4) The need for simplified handling of small workmen's compensation risks, and the difficulties of obtaining a solution to the problem.

   (5) Discuss the proposal for Federal health reinsurance as an answer to the problem of providing adequate health insurance to the nation.

INDEX TO VOLUME XLII

INDEX TO VOLUME XLII (Con.)

CASUALTY ACTUARIAL SOCIETY

ORGANIZED 1914

1956 YEAR BOOK

(Addendum to Volume XLII of the *Proceedings*)

Corrected to February 1, 1956

FOREWORD

The Casualty Actuarial Society was organized November 7, 1914 as the Casualty Actuarial and Statistical Society of America, with 97 charter members of the grade of Fellow. The present title was adopted on May 14, 1921. The object of the Society is the promotion of actuarial and statistical science as applied to the problems of casualty and social insurance by means of personal intercourse, the presentation and discussion of appropriate papers, the collection of a library and such other means as may be found desirable. The organization of the Society was brought about through the suggestion of Dr. I. M. Rubinow, who became the first president. The problems surrounding workmen's compensation were at that time the most urgent, and consequently many of the members played a leading part in the development of the scientific basis upon which workmen's compensation insurance now rests.

The members of the Society have also presented original papers to the *Proceedings* upon the scientific formulation of standards for the computation of both rates and reserves in accident and health insurance, liability, burglary, and the various automobile coverages. The presidential addresses constitute a valuable record of the current problems facing the casualty insurance business. Other papers in the *Proceedings* deal with acquisition costs, pension funds, legal decisions, investments, claims, reinsurance, accounting, statutory requirements, loss reserves, statistics, and the examination of casualty companies. "The Recommendations for Study" appear in *Proceedings* Vol. XLI and are in effect for the 1955 examinations and thereafter. The Report of the Committee on Mortality for Disabled Lives together with commutation tables and life annuities has been printed in *Proceedings* No. 62. The Committee on Compensation and Liability Loss and Loss Expense Reserves submitted a report which appears in Volume XXXV.

At the November 1950 meeting of the Society the Constitution and By-Laws were amended to enlarge the scope of the Society to include all lines of insurance other than life insurance. The effect of the amendment was to include fire insurance and allied lines in recognition of multiple line writing powers granted by many states to both casualty companies and fire companies.

The lower grade of membership in the Society is that of Associate. Examinations have been held every year since organization; they are held during the second or third week of the month of May, in various cities in the United States and Canada. The membership of the Society consists of actuaries, statisticians, and executives who are connected with the principal casualty companies and organizations in the United States and Canada. The Society has a total membership of 312 consisting of 170 Fellows and 142 Associates.

The Society issues a publication entitled the *Proceedings* which contains original papers presented at the meetings. The *Proceedings* also contain discussions of papers, and reviews of books. This Year Book is published annually. "Recommendations for Study" is a pamphlet which outlines the course of study to be followed in connection with the examinations for admission. These two booklets may be obtained free upon application to the Secretary-Treasurer Albert Z. Skelding, 200 Fourth Avenue, New York 3, N. Y.

CASUALTY ACTUARIAL SOCIETY

NOVEMBER 18, 1955

THE COUNCIL

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*Terms expire at the annual meeting in November 1956.
†Terms expire at the annual meeting in November of the year given.

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FRANK HARWAYNE — NELS M. VALERIUS

MEMBERSHIP OF THE SOCIETY, NOVEMBER 18, 1955

FELLOWS

Those marked (†) were Charter Members at date of organization, November 7, 1914

Admitted	
Nov. 21, 1930	AINLEY, JOHN W., Supervising Underwriter, The Travelers Insurance Company, 700 Main Street, Hartford 15, Conn.
Nov. 14, 1947	ALLEN, EDWARD S., Assistant General Manager and Actuary, New York Compensation Insurance Rating Board, 100 E. 42nd Street, New York 17, N. Y.
Nov. 13, 1931	AULT, GILBERT E., Actuary, Church Pension Fund and Church Life Insurance Corporation, 20 Exchange Place, New York 5, N. Y.
Nov. 18, 1955	BAILEY, ROBERT A., Actuarial Department, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 20, 1924	BARBER, HARMON T., Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15 Conn.
Nov. 19, 1954	BARKER, Gordon M., Actuarial Department, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Mass.
Nov 14, 1947	BARKER, LORING M., Actuary, Fireman's Fund Insurance Group, 401 California Street, San Francisco 20, Calif.
Nov. 20, 1942	BART, ROBERT D., Comptroller and Assistant Treasurer, West Bend Aluminum Co., 92 Island Avenue, West Bend, Wis.
Nov. 18, 1932	BARTER, JOHN L., Vice-President, Hartford Accident & Indemnity Co., 690 Asylum Avenue, Hartford 15, Conn.
Nov. 13, 1931	BATHO, ELGIN R., Research Actuary, Berkshire Life Insurance Co., 7 North Street, Pittsfield, Mass.
Nov. 22, 1934	BERKELEY, ERNEST T., Actuary, Employers' Liability Assurance Corporation, Ltd., American Employers' Insurance Company and Employers' Fire Insurance Company, 110 Milk Street, Boston 7, Mass.
Nov. 19, 1953	BEVAN, JOHN R., Assistant Actuary, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Mass.
†	BLACK, S. BRUCE, President, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Mass.
Apr. 20, 1917	BLANCHARD, RALPH H., Professor of Insurance, Graduate School of Business, Columbia University, New York 27, N. Y.
†	BREIBY, WILLIAM, Vice-President, Pacific Mutual Life Insurance Company, 523 West 6th St., Los Angeles 14, Cal.
Nov. 21, 1952	BRINDISE, RALPH S., Casualty Actuary, Standard Oil Company (Indiana) 910 So. Michigan Ave., Chicago 80, Ill.
Nov. 18, 1927	BROWN, F. STUART, Electronics Committee, American Insurance Group, 15 Washington Street, Newark 2, N. J.
Oct. 22, 1915	BROWN, HERBERT D., (Retired), Glenora-on-Lake Seneca, Dundee, New York.

FELLOWS

Admitted	
†	BUCK, GEORGE B., Consulting Actuary, 150 Nassau Street, New York 38, N. Y.
Apr. 20, 1917	BURHOP, WILLIAM H., President, Employers Mutual Liability Insurance Company, 407 Grant Street, Wausau, Wis.
Nov. 23, 1928	BURLING, WILLIAM H., Secretary, Group Department, The Travelers Insurance Company, 700 Main Street, Hartford 15, Conn.
Nov. 19, 1929	CAHILL, JAMES M., Secretary, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 18, 1932	CAMERON, FREELAND R., Vice-President and Comptroller, American Title and Insurance Company, 901 N.E. Second Avenue, Miami 32, Florida.
†	CAMMACK, EDMUND E., Vice-President and Actuary, Aetna Life Insurance Company, Hartford 15, Conn.
Nov. 17, 1938	CARLETON, JOHN W., Vice President and Actuary, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Mass.
Nov. 21, 1930	CARLSON, THOMAS O., Actuary, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 18, 1949	CLARKE, JOHN W., Vice President, Actuary and Comptroller, Pan-American Life Insurance Company, 2400 Canal Street, New Orleans, La.
Nov. 15, 1918	COATES, BARRETT N., 1007 Cragmont Avenue, Berkeley 8, Calif.
Nov. 17, 1922	COATES, CLARENCE S., Second Vice-President, Lumbermens Mutual Casualty Company, 4750 Sheridan Road, Chicago 40, Ill.
Oct. 27, 1916	COGSWELL, EDMUND S., Consulting Actuary, 18 Cedar St., Wenham, Mass.
Feb. 19, 1915	COLLINS, HENRY, (Retired), Box 250, Windermere, Florida.
Nov. 22, 1934	CONSTABLE, WILLIAM J., 45 Pondfield Road, West, Bronxville 8, N. Y.
Nov. 22, 1934	COOK, EDWIN A., General Manager and Secretary, Interboro Mutual Indemnity Insurance Company, 270 Madison Avenue, New York 16, N. Y.
Nov. 18, 1925	CORCORAN, WILLIAM M., Partner, Wolfe, Corcoran & Linder, 116 John Street, New York 38, N. Y.
Nov. 19, 1926	CRANE, HOWARD G., Vice-President and Treasurer, General Reinsurance Corporation, and North Star Reinsurance Corporation, 90 John Street, New York 38, N. Y.
Nov. 21, 1952	CRITCHLEY, DOUGLAS, Royal Insurance Company, Ltd., 1 North John Street, Liverpool, England.
Nov. 22, 1946	CROUSE, CHARLES W., Consulting Actuary, C. E. Preslan & Co., Inc., 20015 Detroit Road, Cleveland 16, Ohio.
Nov. 19, 1953	CURRY, HAROLD E., Vice President, State Farm Automobile Insurance Co., Bloomington, Ill.
Nov. 18, 1932	DAVIES, E. ALFRED, (Retired), Falls Village, Conn.
Nov. 18, 1927	DAVIS, EVELYN M., Woodward, Ryan, Sharp & Davis, Consulting Actuaries, 55 Broadway, New York 6, N. Y.

FELLOWS

Admitted	
Nov. 16, 1951	DOREMUS, FREDERICK W., Manager, Eastern Underwriters Association, 85 John St., New York 38, N. Y.
Nov. 17, 1920	DORWEILER, PAUL, Actuary, Aetna Casualty & Surety Company Hartford 15, Conn.
Nov. 24, 1933	EDWARDS, JOHN, Actuary, Ontario Department of Insurance, 1st floor, 145 Queen Street West, Toronto 1, Ontario, Canada.
Nov. 15, 1940	ELLIOTT, GEORGE B., General Manager, Pennsylvania Compensation Rating Bureau, 620 Packard Building, 15th at Chestnut Street, Philadelphia 2, Pa.
Nov. 17, 1922	ELSTON, JAMES S., (Retired) 1640 Palmer Avenue, Winter Park, Fla.
Nov. 15, 1935	EPPINK, WALTER T., Vice-President and Actuary, Merchants Mutual Casualty Co., Merchants Mutual Building, Buffalo 5, N. Y.
Nov. 18, 1955	FAIRBANKS, ALFRED V., Assistant Actuary, Monarch Life Insurance Co., 365 State Street, Springfield 1, Mass.
†	FALLOW, EVERETT S., (Retired), 28 Sunset Terrace, West Hartford, Conn.
Nov. 15, 1940	FARLEY, JARVIS, Secretary-Treasurer and Actuary, Massachusetts Indemnity Insurance Co., 654 Beacon Street, Boston 15, Mass.
†	FARRER, HENRY, (Retired), 1352 Overlea Street, Clearwater, Fla.
Nov. 15, 1935	FITZHUGH, GILBERT W., Second Vice-President, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Feb. 19, 1915	FONDILLER, RICHARD, Consulting Actuary, Woodward and Fondiller, 200 W. 57th Street, New York 19, N. Y.
Nov. 18, 1955	FOSTER, ROBERT B., Assistant Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 18, 1955	FOWLER, THOMAS W., Actuary, Northwestern National Insurance Co., 526 East Wisconsin Avenue, Milwaukee 1, Wis.
Nov. 18, 1927	FREDERICKSON, CARL H., Actuary, Canadian Underwriters Association, 12 Upjohn Road, Don Mills, Ontario, Canada.
Nov. 22, 1934	FULLER, GARDNER V., Second Vice-President, Lumbermen's Mutual Casualty Co., and American Motorists Insurance Co., 4750 Sheridan Road, Chicago 40, Ill.
Nov. 19, 1948	GARDINER, JAMES B., Assistant Actuary, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Nov. 20, 1924	GINSBURGH, HAROLD J., Senior Vice-President, American Mutual Liability Insurance Company, Vice-President, American Policyholders' Insurance Company and Allied American Mutual Fire Insurance Company, 142 Berkeley Street, Boston 17, Mass.
Nov. 21, 1930	GLENN, J. BRYAN, 5214 First Street, N.W., Washington 11, D.C.
Nov. 13, 1931	GODDARD, RUSSELL P., Assistant to the President, Pennsylvania Manufacturers Association Casualty Insurance Co., Finance Building, Philadelphia, Pa.

FELLOWS

Admitted	
†	GOODWIN, EDWARD S., (Investment Counselor, Retired) 96 Garvan Street, East Hartford 8, Conn.
Nov. 19, 1926	GRAHAM, CHARLES M., Chief Self-Insurance Examiner, New York State Workmen's Compensation Board, 55 Franklin Street, New York 13, N. Y.
†	GRAHAM, WILLIAM J., Consultant, 1070 Park Ave., New York 18, N Y.
Nov. 19, 1953	GRAVES, CLYDE H., Actuary, Mutual Insurance Rating Bureau and Mutual Insurance Advisory Association, 111 Fourth Ave. New York 3, N. Y.
†	GREENE, WINFIELD W., President, W. W. Greene Inc., Reinsurance Intermediaries and Actuarial Consultants, 110 Fulton Street, New York 38, N. Y.
Nov. 19, 1953	HALEY, JAMES B., JR., Actuary, Argonaut Insurance Group, 210 Sansome Street, San Francisco, Calif.
†	HAMMOND, H. PIERSON, (Retired), 22 Vanderbilt Road, West Hartford 7, Conn.
Nov. 17, 1950	HARWAYNE, FRANK, Chief Actuary, New York State Insurance Department, 61 Broadway, New York 6, N. Y.
Oct. 22, 1915	HATCH, LEONARD W., (Retired), 425 Pelham Manor Road, Pelham Manor, New York.
Nov. 17, 1950	HAZAM, WILLIAM J., Associate Actuary, American Mutual Liability Insurance Co., 142 Berkeley Street, Boston 16, Mass.
Nov. 19, 1926	HAUGH, CHARLES J., Second Vice-President, Compensation and Liability Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 16, 1951	HEWITT, CHARLES C., JR., Actuary, New Jersey Manufacturers Casualty Insurance Co., 363 W. State Street, Trenton, N. J.
Nov. 22, 1934	HOOKER, RUSSELL O., Actuary and Director of Examinations, State of Connecticut Insurance Department, Hartford 15, Conn.
Nov. 17, 1950	HOPE, FRANCIS J., Assistant Actuary, Hartford Accident and Indemnity Co., 690 Asylum Avenue, Hartford 15, Conn.
Nov. 18, 1932	HUEBNER, SOLOMON STEPHEN, Chairman of Board, The American Institute for Property and Liability Underwriters, 3924 Walnut St., Philadelphia 4, Pa., also President Emeritus of The American College of Life Underwriters, Emeritus Professor of Insurance, University of Pennsylvania.
Nov. 14, 1947	HUGHEY, M. STANLEY, Second Vice-President, Lumbermens Mutual Casualty Company, 4750 Sheridan Road, Chicago 40, Ill.
†	HUNTER, ARTHUR, (Retired), 124 Lloyd Road, Montclair, N. J.
Nov. 18, 1955	HURLEY, ROBERT L., Actuary, Liberty Mutual Fire Insurance Co., 175 Berkeley Street, Boston 17, Mass.
Feb. 25, 1916	JACKSON, CHARLES W., (Retired), 74 Quimby Avenue, White Plains, N. Y.
Nov. 19, 1954	JOHR, RICHARD L., Assistant Actuary, United States Fidelity and Guaranty Company, Baltimore, Md.

FELLOWS

Admitted	
Nov. 14, 1941	JOHNSON, ROGER A., Actuary, Utica Mutual Insurance Co., P. O. Box 530, Utica, N. Y.
Nov. 16, 1939	JONES, HAROLD M., Group Research Division, John Hancock Mutual Life Insurance Company, 200 Berkeley Street, Boston 17, Mass.
Nov. 19, 1926	KELTON, WILLIAM H., Associate Actuary, Life Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 21, 1919	KIRKPATRICK, A. LOOMIS, Manager Insurance Department, Chamber of Commerce of the U. S. A., 1615 H Street, N.W., Washington 6, D.C.
Nov. 14, 1941	KOLE, MORRIS B., Principal Actuary, State Insurance Fund, 199 Church Street, New York 7, N. Y.
Nov. 24, 1933	KORMES, MARK, Consulting Actuary, 285 Madison Avenue, New York 17, N. Y.
Nov. 19, 1953	KUENKLER, ARTHUR S., Vice President, United States Fidelity & Guaranty Co., Baltimore, Md.
Nov. 23, 1928	KULP, CLARENCE A., Professor of Insurance and Dean, Wharton School, University of Pennsylvania, Dietrich Hall, 37th and Locust Streets, Philadelphia 4, Pa.
Nov. 18, 1949	LA CROIX, HAROLD F., JR., Assistant Actuary, Accident and Group Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 13, 1931	LA MONT, STEWART M., (Retired), Hotel Claremont, Berkeley, Calif.
Nov. 24, 1933	LANGE, JOHN R., 1627 Madison Street, Madison 5, Wisc.
†	LEAL, JAMES R., (Retired).
†	LESLIE, WILLIAM, General Manager, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 17, 1950	LESLIE, WILLIAM, JR., General Manager, National Council on Compensation Insurance, 200 Fourth Ave., New York 3, N. Y.
Nov. 20, 1924	LINDER, JOSEPH, Consulting Actuary, Wolfe, Corcoran & Linder, 116 John Street, New York 38, N. Y.
Nov. 18, 1955	LISCORD, PAUL S., JR., Assistant Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 17, 1950	LIVINGSTON, GILBERT R., Assistant Actuary, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 16, 1951	LONGLEY-COOK, LAURENCE H., Actuary, Insurance Company of North America, 1600 Arch Street, Philadelphia 1, Pa.
Nov. 13, 1936	LYONS, DANIEL J., Administrative Vice President, The Guardian Life Insurance Co. of America, 50 Union Square, New York 3, N. Y.
Nov. 19, 1954	MACKEEN, HAROLD E., Assistant Actuary, Fire and Marine Actuarial Department, Travelers Insurance Company, Hartford 15, Conn.

FELLOWS

Admitted	
Nov. 23, 1928	MARSHALL, RALPH M., Assistant Actuary, National Council on Compensation Insurance, 200 Fourth Ave., New York 3, N. Y.
Nov. 18, 1927	MASTERSON, NORTON E., Vice-President and Actuary, Hardware Mutual Casualty Co. and Hardware Dealers Mutual Fire Insurance Co., 200 Strongs Avenue, Stevens Point, Wis.
Nov. 19, 1926	MATTHEWS, ARTHUR N., Associate Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
May 19, 1915	MAYCRINK, EMMA C., Secretary-Treasurer, Association of New York State Mutual Casualty Companies, 60 East 42nd Street, New York 17, N. Y.
Nov. 15, 1935	MCCONNELL, MATTHEW H., Superintendent, Compensation and Liability Department, General Accident Fire and Life Assurance Company, Fourth and Walnut Sts., Philadelphia 5, Pa.
Oct. 31, 1917	MCMANUS, ROBERT J., Assistant Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street Hartford 15, Conn.
Nov. 18, 1955	MENZEL, HENRY W., Actuary, Springfield Fire and Marine Insurance Co., 1250 State Street, Springfield, Mass.
†	MICHELBACHER, G. F., President, Great American Indemnity Co., 1 Liberty Street, New York 5, N. Y.
Nov. 17, 1938	MILLER, JOHN HAYNES, Vice-President and Actuary, Monarch Life Insurance Company, 365 State St., Springfield 1, Mass.
†	MILLIGAN, SAMUEL, Senior Vice-President, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Nov. 18, 1937	MILLS, JOHN A., Vice-President and Actuary, Lumbermens Mutual Casualty Co., American Manufacturers Mutual Insurance Company and American Motorists Insurance Co., Mutual Insurance Bldg., 4750 Sheridan Road, Chicago 40, Ill.
Nov. 18, 1921	MONTGOMERY, VICTOR, President, Pacific Employers Insurance Co., 1033 So. Hope Street, Los Angeles 15, Calif.
†	MOORE, GEORGE D., Actuary, 13 Emerson Street, E. Orange, N. J.
Nov. 17, 1920	MUELLER, LOUIS H., 2845 Lake Street, San Francisco 21, Calif.
Nov. 17, 1950	MUNTERICH, GEORGE C., Statistician, Hartford Accident and Indemnity Co., 690 Asylum Ave., Hartford 15, Conn.
May 28, 1920	MURPHY, RAY D., President, The Equitable Life Assurance Society of the U. S. A., 393 Seventh Avenue, New York 1, N. Y.
Nov. 19, 1954	MURRIN, THOMAS E., Assistant Actuary, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 15, 1935	OBERHAUS, THOMAS M., Consulting Actuary, Woodward and Fondiller, 200 West 57th Street, New York 19, N. Y.
†	OLIFIERS, EDWARD, Consulting Actuary, Caixa Postal 8, Petropolis, Rio, Brazil.
†	ORR, ROBERT K., (Retired), 316 E. Lenawee Street, Lansing, Mich.

FELLOWS

Admitted	
Nov. 21, 1919	OUTWATER, OLIVE E., (Retired), Harbert, Michigan.
Nov. 21, 1930	PERRYMAN, FRANCIS S., Assistant U. S. Manager and Actuary, Royal-Liverpool Insurance Group, 150 William Street, New York 38, N. Y.
Nov. 14, 1941	PETERS, STEFAN, Actuary, Connell, Price and Co., 161 Devonshire Street, Boston 9, Mass.
Nov. 21, 1952	PETZ, EARL F., JR., Procedures Department, Lumbermens Mutual Casualty Co., Chicago 40, Ill.
Nov. 24, 1933	PICKETT, SAMUEL C., (Retired), Macktown Road, Windsor, Conn.
Nov. 17, 1922	PINNEY, SYDNEY D., 290 Wolcott Hill Road, Wethersfield 9, Conn.
Nov. 13, 1931	PRUITT, DUDLEY M., Assistant General Manager and Actuary, General Accident Fire & Life Assurance Corp., Fourth & Walnut Sts., Philadelphia 5, Pa.
Nov. 18, 1955	RESONY, ALLIE V., Actuarial Department, Hartford Accident and Indemnity Co., 690 Asylum Avenue, Hartford 15, Conn.
Nov. 18, 1949	RESONY, JOHN A., Casualty Actuary, Connecticut Insurance Department, State Office Building, Hartford 2, Conn.
Nov. 16, 1951	RICE, HOMER D., (Retired), 31 Birch Road, Darien, Conn.
Nov. 19, 1926	RICHTER, OTTO C., Chief Actuary, American Telephone & Telegraph Co., 195 Broadway, New York 7, N. Y.
May 24, 1921	RIEGEL, ROBERT, Professor of Statistics and Insurance, University of Buffalo, Buffalo 14, N. Y.
Nov. 14, 1947	RODERMUND, MATTHEW, Assistant Secretary, Interboro Mutual Indemnity Insurance Company, 270 Madison Avenue, New York 16, N. Y.
Nov. 14, 1947	ROSENBERG, NORMAN, Executive Assistant, Farmers Insurance Group, 4680 Wilshire Blvd., Los Angeles 54, Calif.
Nov. 14, 1947	ROWELL, JOHN H., Vice-President and Chief Actuary, Freedom Insurance Company, 2180 Milvia Street, Berkeley 4, Calif.
Nov. 17, 1938	RUCHLIS, ELSIE, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 14, 1947	SALZMANN, RUTH E., Associate Actuary, Hardware Mutual Casualty Company, Hardware Dealers Mutual Fire Insuarnce Co., 200 Strongs Ave., Stevens Point, Wis.
Nov. 20, 1942	SATTERTHWAITE, FRANKLIN E., Consulting Statistician, Rath and Strong, Inc., 140 Federal Street, Boston, Mass.
Nov. 19, 1948	SCHLOSS, HAROLD W., Superintendent, Actuarial Department, Royal-Liverpool Insurance Group, 150 William Street, New York 38, N. Y.
Nov. 18, 1937	SHAPIRO, GEORGE I., 934 E. 9th Street, Brooklyn 30, N. Y.
Nov. 13, 1931	SILVERMAN, DAVID, Partner, Wolfe, Corcoran & Linder, 116 John Street, New York 38, N. Y.
Nov. 19, 1954	SIMON, LEROY J., Actuary, Mutual Service Casualty Company, 1923 University Avenue, St. Paul, Minn.

FELLOWS

Admitted	
Nov. 19, 1929	SKELDING, ALBERT Z., Assistant Manager, National Council on Compensation Insurance, 200 Fourth Ave., New York 3, N. Y.
Nov. 19, 1929	SKILLINGS, E. SHAW, Assistant Vice-President and Actuary, Allstate Insurance Co., 7447 Skokie Blvd., Skokie, Ill.
Nov. 18, 1932	SMICK, JACK J., Consulting Actuary, 38 Park Row, New York 7, N. Y.
Nov. 15, 1940	SMITH, SEYMOUR E., Vice-President and Actuary, The Travelers Insurance Co., Hartford 15, Conn.
Nov. 16, 1951	SNOW, A. J., Manager, Oregon Insurance Rating Bureau, 329 S.W. 5th Avenue, Portland, Ore.
Nov. 24, 1933	ST. JOHN, JOHN B., Consulting Actuary, Box 57, Penllyn, Pa.
Nov. 18, 1927	STONE, EDWARD C., Chairman of the Board, American Employers' Insurance Company, 40 Central Street, Boston 9, Mass.
Nov. 17, 1920	TARBELL, THOMAS F., (Retired), 42 Linwold Drive, West Hartford 7, Conn.
†	THOMPSON, JOHN S., 79 Douglas Road, Glen Ridge, N. J.
†	TRAIN, JOHN L., President, Utica Mutual Insurance Co., Box 530, Utica, N. Y.
Nov. 17, 1922	TRAVERSI, ANTONIO T., 59 Barry St., Neutral Bay, Sydney, Australia.
Nov. 19, 1953	TRIST, JOHN A. W., Statistical Department, Lumbermens Mutual Casualty Company, Mutual Insurance Bldg., 4750 Sheridan Road, Chicago 40, Ill.
Nov. 19, 1948	TURNER, PAUL A., 435 South La Cienega Boulevard, Los Angeles 48, Calif.
Nov. 14, 1947	UHTHOFF, D. R., Associate Actuary, Employers Mutual Liability Insurance Co. of Wisconsin, Wausau, Wis.
Nov. 23, 1928	VALERIUS, NELS M., Assistant Actuary, Aetna Casualty and Surety Co., Hartford 15, Conn.
Nov. 21, 1919	VAN TUYL, HIRAM O., (Retired), 17 Coolidge Ave., White Plains, N. Y.
Nov. 16, 1951	VERGANO, ELIA (Retired), 390 Central Park, W., New York 25, N. Y.
Nov. 16, 1951	VINCENT, LEWIS A., General Manager, National Board of Fire Underwriters, 85 John Street, New York 38, N. Y.
Nov. 17, 1920	WAITE, ALAN W., Secretary, The Aetna Casualty and Surety Co. 151 Farmington Ave., Hartford 15, Conn.
Nov. 16, 1951	WATSON, LEON A., Secretary-Treasurer, The Fire Insurance Rating Organization of New Jersey, 15 Washington St., Newark 1, N. J.
Nov. 14, 1947	WIEDER, JOHN W., JR., Assistant Actuary, Aetna Casualty and Surety Company, Hartford 15, Conn.
Nov. 15, 1935	WILLIAMS, HARRY V., Vice-President, Hartford Accident and Indemnity Co., 690 Asylum Ave., Hartford 15, Conn.
Nov. 14, 1941	WILLIAMSON, W., RULON, Research Actuary, 3400 Fairhill Drive, Washington 23, D.C.
Nov. 13, 1931	WITTICK, HERBERT E., Assistant General Manager and Secretary, Pilot Insurance Co., 199 Bay Street, Toronto 1, Canada.
Nov. 18, 1949	WOLFRUM, RICHARD J., Assistant Actuary, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Mass.
Nov 16, 1951	WOODALL, JOHN P., Secretary, Southeastern Underwriters Association, 327 Trust Company of Georgia Bldg., Atlanta, Ga.
Nov. 19, 1953	YOUNT, HUBERT W., Vice President, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Mass.

ASSOCIATES

Admitted	
May 23, 1924	ACKER, MILTON, Manager, General Liability Division, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 15, 1918	ACKERMAN, SAUL B., Professor Emeritus of Insurance School of Commerce, New York University, Washington Square, New York 6, N. Y.
Nov. 16, 1939	AIN, SAMUEL N., Consulting Actuary, 120 Broadway, New York 5, N. Y.
Apr. 5, 1928	ALLEN, AUSTIN F., President, Texas Employers' Insurance Association, P.O. Box 2759, Dallas 1, Texas.
Nov. 18, 1955	ANDREWS, EDWARD C., Assistant Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 15, 1918	ANKERS, R. E., Vice-President and Treasurer, The Southland Life Insurance Company, Dallas, Tex.
Nov. 21, 1930	ARCHIBALD, A. EDWARD, Director, Management Controls, Investors Diversified Services, Inc., Minneapolis 2, Minn.
Nov. 24, 1933	BARRON, JAMES C., Assistant Treasurer, General Reinsurance Corporation and North Star Reinsurance Corporation, 90 John Street, New York 38, N. Y.
Nov. 23, 1928	BATEMAN, ARTHUR E., c/o Arthur Q. Melendy, Southboro, Mass.
Nov. 15, 1940	BATHO, BRUCE, Vice-President and Actuary, Life Insurance Company of Georgia, 573 W. Peachtree St., N. E., Atlanta 1, Georgia.
Nov. 19, 1953	BENNETT, NORMAN J., Actuarial Assistant, American Mutual Liability Insurance Company, 142 Berkeley Street, Boston 16, Mass.
Nov. 18, 1955	BERQUIST, JAMES R., Actuarial Department, Employers Mutual Liability Insurance Co. of Wisconsin, Wausau, Wis.
Nov. 18, 1925	BITTEL, W. HAROLD, Chief Actuary, Department of Banking and Insurance, Trenton 7, N. J.
Nov. 17, 1920	BLACK, NELLAS C., Manager, Statistical Department, Maryland Casualty Co., Baltimore 3, Md.
Nov. 15, 1940	BLACKHALL, JOHN M., Assistant Actuary, California-Western States Life Insurance Company, 2020 L Street, Sacramento, Calif.
Nov. 22, 1934	BOMSE, EDWARD L., Assistant Manager, Foreign Department, Royal-Liverpool Insurance Group, 150 William Street, New York 38, N. Y.
Nov. 19, 1953	BONDY, MARTIN, Associate Actuary, New York State Insurance Department, 61 Broadway, New York 6, N. Y.
Nov. 23, 1928	BOWER, P. S., Assistant General Manager and Treasurer, The Great-West Life Assurance Company, Winnipeg, Manitoba, Canada.
Nov. 17, 1950	BOYAJIAN, JOHN H., Actuary, California Inspection Rating Bureau, 500 Sansome St., San Francisco 11, Cal.

ASSOCIATES

Admitted	
Nov. 15, 1918	BRUNNQUELL, HELMUTH G., (Retired), 1013 East Circle Drive, Milwaukee 17, Wis.
Oct. 22, 1915	BUFFLER, LOUIS, Underwriting Director, The State Insurance Fund, 199 Church Street, New York 7, N. Y.
Nov. 20, 1924	BUGBEE J. M., Manager, Automobile Department, Maryland Casualty Co., Box 1228, Baltimore 3, Md.
Mar. 31, 1920	BURT, MARGARET A., Office of George B. Buck, Consulting Actuary 150 Nassau Street, New York 38, N. Y.
Nov. 17, 1922	CAVANAUGH, L. D., Chairman, Federal Life Insurance Co., 168 N. Michigan Avenue, Chicago 1, Ill.
Nov. 18, 1927	CHEN, S. T., Consulting Actuary, Home Security Life Insurance Company, 106 Hong Kong Hotel Building, Pedder Street, Hong Kong, China.
Nov. 18, 1955	COATES, WILLIAM D., Assistant Actuary, Accident and Health Actuarial Department, Continental Casualty Co., Chicago, 4, Ill.
Nov. 19, 1953	CONTE, JOSEPH P., Associate Actuary, Woodward & Fondiller, 200 West 57th Street, New York 19, N. Y.
Nov. 24, 1933	CRAWFORD, W. H., Treasurer, Industrial Indemnity Co., 155 Sansome Street, San Francisco 4, Calif.
Nov. 18, 1932	CRIMMINS, JOSEPH B., Associate Actuary, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Nov. 19, 1953	CROFTS, GEOFFREY, Associate Professor of Actuarial Science, Occidental College, Los Angeles 41, Calif.
Nov. 21, 1952	DANIEL, C. M., Hardware Mutual Casualty Company, 200 Strongs Avenue, Stevens Point, Wis.
Nov. 18, 1925	DAVIS, MALVIN E., Vice-President and Chief Actuary, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Nov. 14, 1941	DOWLING, WILLIAM F., President, New York Mutual Casualty Insurance Co., 260 Fourth Avenue, New York 10, N. Y.
Nov. 19, 1954	EATON, KARL F., Supervisor, Actuarial Department, Businessmen's Assurance Company, 215 Pershing Road, Kansas City, Mo.
June 5, 1925	EGER, FRANK A., Secretary-Comptroller, Indemnity Insurance Co. of North America, 1600 Arch Street, Philadelphia 1, Pa.
Nov. 19, 1954	EIDE, K. ARNE, Actuarial Personal A and S Unit, Metropolitan Life Insurance Company, 1 Madison Ave., New York 10, N. Y.
Nov. 16, 1923	FITZ, L. LEROY, Group Department, John Hancock Mutual Life Insurance Company, Boston 17, Mass.
Nov. 16, 1923	FLEMING, FRANK A., General Manager, Mutual Insurance Rating Bureau, 111 Fourth Ave., New York 3, N. Y.
Nov. 21, 1952	FRANKLIN, N. M., Actuary, Surety Association of America, 60 John Street, New York 38, N. Y.
Nov. 13, 1936	FRUECHTEMEYER, FRED J., Assistant to Comptroller, The Andrew Jergens Company, 2535 Spring Grove Ave., Cincinnati 14 Ohio.

ASSOCIATES

Admitted	
Nov. 19, 1929	FURNIVALL, MAURICE L., Associate Actuary, Accident and Group Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 19, 1954	GAINES, NATHANIEL, Actuary, Pension Planning Company, 260 Madison Avenue, New York 16, N. Y.
Nov. 18, 1932	GETMAN, RICHARD A., Assistant Actuary, Life Department, The Travelers Insurance Co., 700 Main St., Hartford 15, Conn.
Nov. 17, 1922	GIBSON, JOSEPH P., JR., President, American Mutual Reinsurance Co., 919 North Michigan Ave., Chicago 11, Ill.
Nov. 16, 1923	GILDEA, JAMES F., Assistant Actuary, Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Nov. 19, 1953	GILLAM, WILLIAM S., Research Unit, Actuarial Department, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 14, 1947	GINGERY, STANLEY W., Associate Actuary, The Prudential Insurance Co., Newark, N. J.
Nov. 18, 1927	GREEN, WALTER C., Consulting Actuary, Continental Bank Building, Salt Lake City, Utah.
Nov. 15, 1940	GROSSMAN, ELI A., Vice-President-Actuary, Union Labor Life Insurance Co., 200 East 70th Street, New York 21, N. Y.
Nov. 15, 1935	GUERTIN, ALFRED N., Actuary, American Life Convention, 230 N. Michigan Avenue, Chicago 1, Ill.
Nov. 16, 1939	HAGEN, OLAF E., Metropolitan Life Insurance Company, 1 Madison Avenue, New York 10, N. Y.
Nov. 18, 1921	HAGGARD, ROBERT E., (Retired), 922 The Alameda, Berkeley 7, Calif.
Nov. 17, 1922	HALL, HARTWELL L., Chief Examiner, Connecticut Insurance Department, 165 Capitol Avenue, Hartford 2, Conn.
Nov. 13, 1936	HAM, HUGH P., General Manager, The British American Assurance Company, 40 Scott Street, Toronto 1, Ontario, Can.
Nov. 19, 1953	HARACK, JOHN, Manager, Technical Assistance Division, Blue Cross Commission, 425 North Michigan, Chicago 11, Ill.
Mar. 24, 1932	HARRIS, SCOTT, Executive Vice-President, Joseph Froggatt & Co., Inc., 74 Trinity Place, New York 6, N. Y.
Mar. 25, 1924	HART, WARD VAN B., Associate Actuary, Connecticut General Life Insurance Company, 55 Elm Street, Hartford 15, Conn.
Nov. 19, 1953	HART, W. VAN BUREN, JR., Rating Division, Compensation & Liability Department, Aetna Insurance Group, 670 Main Street, Hartford 15, Connecticut.
Nov. 21, 1919	HAYDON, GEORGE F., Manager Emeritus, Wisconsin Compensation Rating Bureau, 623 North 2nd Street, Milwaukee 3, Wis.
Nov. 19, 1953	HEAD, GLENN O., Actuary, The United States Life Insurance Company, 84 William Street, New York 38, N. Y.
Nov. 17, 1927	HIPP, GRADY H., Underwriting Vice-President, Liberty Life Insurance Co., Greenville, S. C.
Nov. 16, 1945	HOLZINGER, ERNEST, Actuary, Pension Planning Company, 260 Madison Avenue, New York 16, N. Y.

ASSOCIATES

Admitted	
Nov. 19, 1929	JACOBS, CARL N., President, Hardware Mutual Casualty Co. and Hardware Dealers Mutual Fire Insurance Co., 200 Strongs Avenue, Stevens Point, Wis.
Nov. 18, 1921	JENSEN, EDWARD S., Assistant Vice-President, Group Department, Occidental Life Insurance Co. of California, 1151 So. Broadway, Los Angeles 55, Calif.
Nov. 21, 1930	JONES, H. LLOYD, United States Manager and Attorney, Phoenix-London Group, 55 Fifth Avenue, New York 3, N. Y.
Nov. 21, 1919	JONES, LORING D., (Retired), 64 Raymond Avenue, Rockville Centre, Long Island, N. Y.
Nov. 21, 1952	JONES, NATHAN F., Assistant Actuary, Prudential Insurance Company, Newark 1, N. J.
Nov. 19, 1953	KALLOP, ROY H., Actuarial Department, National Council on Compensation Insurance, 200 Fourth Ave, New York 3, N. Y.
Nov. 19, 1953	KATES, PHILLIP B., Actuary, Southern Fire and Casualty Company, 4277 Lyons View Pike, Knoxville, Tenn.
Nov. 17, 1922	KIRK, CARL L., Deputy U.S. Manager, Zurich Insurance Co., 135 South LaSalle Street, Chicago 3, Ill.
Nov. 15, 1935	KITZROW, E. W., General Manager, Mid-Century Insurance Company, member of Farmers Insurance Group, 4680 Wilshire Boulevard, Los Angeles 54, Calif.
Nov. 21, 1952	LINO, RICHARD, Assistant Actuary, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 14, 1947	LUFKIN, ROBERT W., Office Manager, Craftsman Insurance Co., 137 Newbury St., Boston, Mass.
Mar. 24, 1932	MAGRATH, JOSEPH J., Secretary, Federal Insurance Company, 90 John Street, New York 38, N. Y.
Nov. 18, 1925	MALMUTH, JACOB, Principal Examiner, New York State Insurance Department, 61 Broadway, New York 6, N. Y.
Mar. 24, 1927	MARSH, CHARLES V. R., (Retired), 1430 Glencoe Road, P. O. Box 1115, Winter Park, Florida.
Nov. 13, 1936	MAYER, WILLIAM H., JR., Associate Manager, Group Contract Bureau, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Nov. 17, 1950	MAYERSON, ALLEN L., Principal Actuary, New York State Insurance Department, 61 Broadway, New York 6, N. Y.
Nov. 18, 1955	MCDONALD, MILTON G., Casualty Actuary, Department of Banking and Insurance, 100 Nashua Street, Boston 14, Mass.
Nov. 17, 1922	MCIVER, R. A., Actuary, Washington National Insurance Co., 1630 Chicago Avenue, Evanston, Ill.
Nov. 13, 1931	MILLER, HENRY C., Comptroller, California State Compensation Insurance Fund, 450 McAllister Street, San Francisco 1, Calif.
Nov. 19, 1953	MILLS, RICHARD J., Statistical Department, Lumbermens Mutual Casualty Company, 4750 Sheridan Road, Chicago 40, Ill.

ASSOCIATES

Admitted	
Nov. 18, 1937	MINOR, EDUARD H., Assistant Actuary, Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10, N. Y.
Nov. 17, 1922	MONTGOMERY, JOHN C., Secretary and Treasurer, Bankers Indemnity Insurance Co., Treasurer, The American Insurance Co., 15 Washington Street, Newark 1, N. J.
May 25, 1923	MOORE, JOSEPH P., Mutual Life and Citizens Assurance Co., Ltd., P.O. Box 1770, Place D'arms, Montreal, Canada.
Nov. 18, 1955	MUETTERTIES, JOHN H., Casualty Actuary, Industrial Indemnity Co., 155 Sansome Street, San Francisco 4, Calif.
Nov. 18, 1937	MYERS, ROBERT J., Chief Actuary, Social Security Administration, Washington 25, D.C.
Nov. 15, 1935	NELSON, S. TYLER, Assistant General Manager, American Agricultural Mutual Insurance Co., Room 2300, Merchandise Mart, Chicago 54, Ill.
Oct. 27, 1916	NEWELL, WILLIAM, (Retired), 1225 Park Avenue, New York 28, N. Y.
Nov. 18, 1925	NICHOLSON, EARL, Actuary, Joseph Froggatt & Co., Inc., 74 Trinity Place, New York 6, N. Y.
Nov. 19, 1954	OTTESON, PAUL M., Vice-President, Federated Mutual Implement and Hardware Insurance Company, 129 East Broadway, Owatonna, Minn.
May 23, 1919	OTTO, WALTER E., President, Michigan Mutual Liability Co., Associated General Fire Co., Mutual Building, 28 West Adams Avenue, Detroit 26, Mich.
Nov. 19, 1926	OVERHOLSER, DONALD M., Office of George B. Buck, Consulting Actuary, 150 Nassau Street, New York 7, N. Y.
Nov. 20, 1924	PENNOCK, RICHARD M., (Retired), 12 E. Lodges Lane, Cynwyd, Pa.
Nov. 21, 1952	PENNYCOOK, RODERICK B., Assistant to the Executive Director, Manitoba Hospital Service Association, 116 Edmonton Street, Winnipeg, Man., Canada.
Nov. 19, 1953	PERKINS, WILLIAM J., Actuarial Assistant, Group Department, The London Life Insurance Company, London, Ont. Canada.
Nov. 14, 1947	PERRY, ROBERT C., First Vice-President, State Farm Life Insurance Company, Bloomington, Ill.
Nov. 19, 1929	PHILLIPS, JOHN H., Vice-President and Actuary, Employers' Mutual Liability Insurance Co., and Employers' Mutual Fire Insurance Company, 407 Grant Street, Wausau, Wis.
Nov. 17, 1920	PIKE, MORRIS, Second Vice-President, John Hancock Mutual Life Insurance Co., Boston 17, Mass.
Nov. 23, 1928	PIPER, K. B., Vice-President, Provident Life and Accident Insurance Co., 721 Broad Street, Chattanooga 2, Tenn.
Nov. 17, 1922	POORMAN, WILLIAM F., President, Central Life Assurance Company, 611 Fifth Avenue, Des Moines 6, Iowa.
Nov. 13, 1936	POTOFSKY, SYLVIA, Senior Actuary, The State Insurance Fund, 199 Church Street, New York, N. Y.

ASSOCIATES

Admitted	
Nov. 15, 1918	RAYWID, JOSEPH, Consultant, Woodward and Fondiller, Consulting Actuaries, 200 West 57th Street, New York 19, N. Y.
Nov. 19, 1932	RICHARDSON, HARRY F., (Retired), 61 North Monroe Street, Ridgewood, N. J.
Nov. 19, 1953	RICHMOND, OWEN D., Supervisor, Actuarial Department, Business Men's Assurance Company, 215 Pershing Road, Kansas City, Mo.
Nov. 18, 1932	ROBERTS, JAMES A., Accident and Group Actuarial Department, The Travelers Insurance Co., 700 Main St., Hartford 15, Conn.
Nov. 18, 1927	SARASON, HARRY M., Consulting Actuary, 1060 South Broadway, Los Angeles 15, Cal.
Nov. 16, 1923	SAWYER, ARTHUR, (Retired), 217 W. San Antonio, San Clemente, Cal.
Nov. 14, 1947	SCAMMON, LAWRENCE W., Actuary, Massachusetts Automobile Rating and Accident Prevention Bureau, Massachusetts Workmen's Compensation Rating and Inspection Bureau, 89 Broad Street, Boston 10, Mass.
Nov. 19, 1954	SCHULMAN, JUSTIN, Assistant Actuary, NewYork Compensation Insurance Rating Board, 100 East 42nd St., New York 17, N. Y.
Nov. 14, 1947	SCHWARTZ, MAX J., Associate Actuary (Casualty), New York State Insurance Department, Albany 1, N. Y.
Nov. 20, 1930	SEVILLA, EXEQUIEL S., President, Manager and Actuary, National Life Insurance Co. of the Philippines, Regina Building, P.O. Box 2056, Manila, Philippines.
Nov. 20, 1924	SHEPPARD, NORRIS E., Professor of Mathematics, University of Toronto, Toronto 5, Canada.
Nov. 15, 1918	SIBLEY, JOHN L., (Retired), 225 Amesbury Road, Haverhill, Mass.
Nov. 18, 1921	SMITH, ARTHUR G., (Retired), 404 Westfield Avenue, Elizabeth, N. J.
Nov. 19, 1926	SOMERVILLE, WILLIAM F., (Retired), 648 Sibley Highway, St. Paul 7, Minn.
Nov. 18, 1925	SOMMER, ARMAND, Vice President, Continental Casualty Co., Transportation Insurance Co., and United States Life Insurance Co., 310 So. Michigan Avenue, Chicago 4, Ill.
Nov. 15, 1918	SPENCER, HAROLD S., (Retired), 8 Chelsea Lane, West Hartford, Conn.
Nov. 20, 1924	STELLWAGEN, H. P., Executive Vice-President, Indemnity Insurance Company of North America, 1600 Arch Street, Philadelphia 1, Pa.
Nov. 16, 1923	STOKE, KENDRICK, Actuary, Michigan Mutual Liability Company, 28 W. Adams, Detroit 26, Mich.
Nov. 21, 1930	SULLIVAN, WALTER F., Actuary, State Compensation Insurance Fund, 450 McAllister Street, San Francisco 1, Cal.
Nov. 19, 1953	THOMAS, JAMES W., Fire and Marine Actuarial Dept., The Travelers Insurance Company, 700 Main Street, Hartford 15, Conn.
Nov. 21, 1919	TRENCH, FREDERICK H., Budget Director, Utica Mutual Insurance Co., Utica 1, N. Y.

ASSOCIATES

Admitted	
Nov. 20, 1924	UHL, M. ELIZABETH, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
Nov. 18, 1932	WEINSTEIN, MAX S., Actuary, New York State Employees' Retirement System, 256 Washington Avenue, Albany 1, N. Y.
Nov. 18, 1925	WELLMAN, ALEXANDER C., Senior Vice-President, Protective Life Insurance Co., Birmingham, Ala.
Nov. 21, 1930	WELLS, WALTER I., Director, Sickness and Accident Branch, State Mutual Life Assurance Co., 340 Main Street, Worcester 8, Mass.
Nov. 16, 1951	WERMEL, MICHAEL T., Consulting Actuary, Woodward and Fondiller, 417 South Hill St., Los Angeles 13, Cal.
Mar. 21, 1929	WHEELER, CHARLES A., (Retired), Black Oak Ridge Drive, Wayne Township, R. D. 4., Paterson, N. J.
Nov. 18, 1927	WHITBREAD, F. G., Assistant Vice-President, Lincoln National Life Insurance Company, 1301-27 S. Harrison Street, Fort Wayne, Ind.
Nov. 19, 1948	WHITE, AUBREY, Vice President and Actuary, Ostheimer & Co., 1510 Chestnut St., Philadelphia 2, Pa.
Nov. 19, 1954	WILLIAMS, D. G., Staff Actuary, Texas Employers' Insurance Association, Dallas 1, Tex.
Nov. 18, 1955	WILSON, JAMES C., Assistant Secretary-Treasurer, Wolverine Insurance Co., Battle Creek, Mich.
Nov. 16, 1939	WITTLAKE, J. CLARKE, Assistant to President, Business Men's Assurance Company, B.M.A. Building, Kansas City 10, Mo.
Nov. 19, 1954	WRIGHT, BYRON, Casualty Actuary, New Jersey Insurance Department, Trenton, N. J.
Oct. 22, 1915	WOOD, DONALD M., Partner, Childs & Wood, 175 W. Jackson Blvd., Chicago 4, Ill.
Nov. 18, 1937	WOOD, DONALD M., JR., Childs & Wood, 175 West Jackson Blvd., Chicago 4, Ill.
Nov. 18, 1927	WOOD, MILTON J., Vice-President and Actuary, Life, Accident and Group Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
Oct. 22, 1915	WOODMAN, CHARLES E., (Retired), 161 Sanger Avenue, Waterville, N. Y.
Nov. 22, 1934	WOODWARD, BARBARA H., The Reuben H. Donnelley Corporation, 205 East 42nd Street, New York 17, N. Y.
Nov. 17, 1950	WOODDY, JOHN C., Assistant Actuary, North American Reassurance Company, 161 East 42nd Street, New York 17, N. Y.
Nov. 18, 1925	WOOLERY, JAMES MYRON, Vice-President and Actuary, Occidental Life Insurance Company, Raleigh, N. C.

OFFICERS OF THE SOCIETY

Since Date of Organization

Elected	*President*	*Vice-Presidents*	
1914-1915	*Isaac M. Rubinow	*Albert H. Mowbray	*Benedict D. Flynn
1916-1917	*James D. Craig	*Joseph H. Woodward	*Harwood E. Ryan
1918	*Joseph H. Woodward	*Benedict D. Flynn	George D. Moore
1919	*Benedict D. Flynn	George D. Moore	William Leslie
1920	*Albert H. Mowbray	William Leslie	*Leon S. Senior
1921	*Albert H. Mowbray	*Leon S. Senior	*Harwood E. Ryan
1922	*Harwood E. Ryan	Gustav F. Michelbacher	Edmund E. Cammack
1923	William Leslie	Gustav F. Michelbacher	Edmund E. Cammack
1924-1925	Gustav F. Michelbacher	*Sanford B. Perkins	Ralph H. Blanchard
1926-1927	*Sanford B. Perkins	George D. Moore	Thomas F. Tarbell
1928-1929	George D. Moore	Sydney D. Pinney	Paul Dorweiler
1930-1931	Thomas F. Tarbell	*Roy A. Wheeler	Winfield W. Greene
1932-1933	Paul Dorweiler	William F. Roeber	*Leon S. Senior
1934-1935	Winfield W. Greene	Ralph H. Blanchard	Charles J. Haugh
1936-1937	*Leon S. Senior	Sydney D. Pinney	Francis S. Perryman
1938-1939	Francis S. Perryman	Harmon T. Barber	William J. Constable
1940	Sydney D. Pinney	Harold J. Ginsburgh	James M. Cahill
1941	Ralph H. Blanchard	Harold J. Ginsburgh	James M. Cahill
1942	Ralph H. Blanchard	Albert Z. Skelding	Charles J. Haugh
1943-1944	Harold J. Ginsburgh	Albert Z. Skelding	Charles J. Haugh
1945-1946	Charles J. Haugh	James M. Cahill	Harry V. Williams
1947-1948	James M. Cahill	Harmon T. Barber	Russell P. Goddard
1949-1950	Harmon T. Barber	Thomas O. Carlson	Norton E. Masterson
1951-1952	Thomas O. Carlson	Joseph Linder	Seymour E. Smith
1953-1954	Seymour E. Smith	Dudley M. Pruitt	John A. Mills
1955	Norton E. Masterson	Clarence A. Kulp	Arthur N. Matthews

Secretary-Treasurer

1914-1917....*C. E. Scattergood
1918-1953.....R. Fondiller
1954-1955.....A. Z. Skelding

Editor†

1914.....W. W. Greene
1915-1917.....R. Fondiller
1918.....W. W. Greene
1919-1921....G. F. Michelbacher
1922-1923.....O. E. Outwater
1924-1932.....R. J. McManus
1933-1943.....*C. W. Hobbs
1944-1954.....E. C. Maycrink
1955.....E. S. Allen

Librarian†

1914.....W. W. Greene
1915.....R. Fondiller
1916-1921.....L. I. Dublin
1922-1924.....*E. R. Hardy
1925-1937.....W. Breiby
1937-1947.....T. O. Carlson
1948-1950.....*S. M. Ross
1951-1955.....G. R. Livingston

Chairman—Examination Comm.

1949-1952.....R. A. Johnson
1952-1955.....J. W. Wieder, Jr.

*Deceased.
†The offices of Editor and Librarian were not separated until 1916.

FELLOWS WHO HAVE DIED

The (†) denotes charter members at date of organization, November 7, 1914.

Admitted		Died
Nov. 19, 1948	Arthur L. Bailey	Aug. 12, 1954
May 23, 1924	William B. Bailey	Jan. 10, 1952
†	Roland Benjamin	July 2, 1949
May 24, 1921	Edward J. Bond	Nov. 12, 1941
May 19, 1915	Thomas Bradshaw	Nov. 10, 1939
June 5, 1925	William Brosmith	Aug. 22, 1937
†	William A. Budlong	June 4, 1934
Nov. 18, 1932	Charles H. Burhans	June 15, 1942
Feb. 19, 1915	F. Highlands Burns	Mar. 30, 1935
†	Raymond V. Carpenter	Mar. 11, 1947
Feb. 19, 1915	Gorden Case	Feb. 4, 1920
Nov. 23, 1928	Walter P. Comstock	May 11, 1951
†	Charles T. Conway	July 23, 1921
†	John A. Copeland	June 12, 1953
†	Walter G. Cowles	May 30, 1942
†	James D. Craig	May 27, 1940
†	James McIntosh Craig	Jan. 20, 1922
May 26, 1916	Frederick S. Crum	Sept. 2, 1921
†	Alfred Burnett Dawson	June 21, 1931
†	Miles Menander Dawson	Mar. 27, 1942
†	Elmer H. Dearth	Mar. 26, 1947
†	Eckford C. DeKay	July 31, 1951
May 19, 1915	Samuel Deutschberger	Jan. 18, 1929
†	Ezekiel Hinton Downey	July 9, 1922
May 19, 1915	Earl O. Dunlap	July 5, 1944
†	Edward B. Fackler	Jan. 8, 1952
†	David Parks Fackler	Oct. 30, 1924
Feb. 19, 1915	Claude W. Fellows	July 15, 1938
†	Benedict D. Flynn	Aug. 22, 1944
†	Charles S. Forbes	Oct. 2, 1943
May 26, 1916	Lee K. Frankel	July 25, 1931
†	Charles H. Franklin	May 1951
Feb. 25, 1916	Joseph Froggatt	Sept. 28, 1940
†	Harry Furze	Dec. 26, 1945
Feb. 19, 1915	Fred S. Garrison	Nov. 14, 1949
†	Theodore E. Gaty	Aug. 22, 1925
May 19, 1915	James W. Glover	July 15, 1941
Oct. 22, 1915	George Graham	Apr. 15, 1937
Oct. 22, 1915	Thompson B. Graham	July 24, 1946
May 25, 1923	William A. Granville	Feb. 4, 1943
†	William H. Gould	Oct. 28, 1936
†	Robert Cowen Lees Hamilton	Nov. 15, 1941
Oct. 27, 1916	Edward R. Hardy	June 29, 1951
Nov. 21, 1919	Robert Henderson	Feb. 16, 1942
†	Robert J. Hillas	May 17, 1940
Nov. 15, 1918	Frank Webster Hinsdale	Mar. 18, 1932
May 23, 1924	Clarence W. Hobbs	July 21, 1944
Nov. 19, 1926	Charles E. Hodges	Jan. 22, 1937
Oct. 22, 1915	Lemuel G. Hodgkins	Dec. 26, 1951
†	Frederick L. Hoffman	Feb. 23, 1946
Oct. 22, 1915	Charles H. Holland	Dec. 28, 1951

FELLOWS WHO HAVE DIED—*Continued*

Admitted		Died
Nov. 21, 1919	Carl Hookstadt	Mar. 10, 1924
†	Charles Hughes	Aug. 27, 1948
Nov. 19, 1929	Robert S. Hull	Nov. 30, 1947
†	Burritt A. Hunt	Sept. 3, 1943
Nov. 28, 1921	William Anderson Hutcheson	Nov. 19, 1942
Nov. 19, 1929	Henry Hollister Jackson	May 27, 1955
May 19, 1915	William C. Johnson	Oct. 7, 1943
Nov. 23, 1928	F. Robertson Jones	Dec. 26, 1941
Nov. 18, 1921	Thomas P. Kearney	Feb. 11, 1928
Nov. 19, 1926	Gregory Cook Kelly	Sept. 11, 1948
Oct. 22, 1915	Virgil Morrison Kime	Oct. 15, 1918
†	Edwin W. Kopf	Aug. 3, 1933
Feb. 17, 1915	John M. Laird	June 20, 1942
Feb. 19, 1915	Abb Landis	Dec. 9, 1937
Nov. 17, 1922	Arnette Roy Lawrence	Dec. 1, 1942
Nov. 18, 1921	James Fulton Little	Aug. 11, 1938
Nov. 23, 1928	Edward C. Lunt	Jan. 13, 1941
Feb. 19, 1915	Harry Lubin	Dec. 20, 1920
Nov. 16, 1923	D. Ralph McClurg	Apr. 27, 1947
May 23, 1919	Alfred McDougald	July 28, 1944
†	William N. Magoun	Dec. 11, 1954
Feb. 15, 1915	Franklin B. Mead	Nov. 29, 1933
Apr. 20, 1917	Marcus Meltzer	Mar. 27, 1931
†	David W. Miller	Jan. 18, 1936
†	James F. Mitchell	Feb. 9, 1941
†	Henry Moir	June 8, 1937
Nov. 19, 1926	William L. Mooney	Oct. 21, 1948
Feb. 19, 1915	William J. Montgomery	Aug. 20, 1915
May 19, 1915	Edward Bontecou Morris	Dec. 19, 1929
†	Albert H. Mowbray	Jan. 7, 1949
†	Frank Mullaney	Jan. 22, 1953
†	Lewis A. Nicholas	Apr. 21, 1940
†	Stanley L. Otis	Oct. 12, 1937
Nov. 13, 1926	Bertrand A. Page	July 30, 1941
Nov. 18, 1921	Sanford B. Perkins	Sept. 16, 1945
Nov. 15, 1918	William Thomas Perry	Oct. 25, 1940
Nov. 19, 1926	Jesse S. Phillips	Nov. 6, 1954
†	Edward B. Phelps	July 24, 1915
†	Charles Grant Reiter	July 30, 1937
†	Charles H. Remington	Mar. 21, 1938
May 23, 1919	Frederick Richardson	July 22, 1955
Nov. 17, 1943	Samuel M. Ross	July 24, 1951
†	Isaac M. Rubinow	Sept. 1, 1936
†	Harwood Eldridge Ryan	Nov. 2, 1930
†	Arthur F. Saxton	Feb. 26, 1927
†	Emil Scheitlin	May 2, 1946
†	Leon S. Senior	Feb. 3, 1940
Nov. 24, 1933	Robert V. Sinnott	Dec. 15, 1952
April 20, 1917	Charles Gordon Smith	June 22, 1938
Feb. 19, 1915	John T. Stone	May 9, 1920
Feb. 25, 1916	Wendell Melville Strong	Mar. 30, 1942
Oct. 22, 1915	William R. Strong	Jan. 10, 1946
†	Robert J. Sullivan	July 19, 1934

FELLOWS WHO HAVE DIED—*Continued*

Admitted		Died
Nov. 22, 1934	Walter H. Thompson	May 25, 1935
Nov. 18, 1921	Guido Toja	Feb. 28, 1933
Nov. 15, 1935	Harry V. Waite	Aug. 14, 1951
Nov. 18, 1925	Lloyd A. H. Warren	Sept. 30, 1949
May 23, 1919	Archibald A. Welch	May 8, 1945
Nov. 19, 1926	Roy A. Wheeler	Aug. 26, 1932
†	Albert W. Whitney	July 27, 1943
†	Lee J. Wolfe	Apr. 28, 1949
†	S. Herbert Wolfe	Dec. 31, 1927
†	Joseph H. Woodward	May 15, 1928
†	William Young	Oct. 23, 1927
May 24, 1921	Arthur B. Wood	June 14, 1952

ASSOCIATES WHO HAVE DIED

Admitted		Died
Oct. 22, 1915	Don A. Baxter	Feb. 10, 1920
May 25, 1923	Harilaus E. Economidy	Apr. 13, 1948
Nov. 20, 1924	John Froberg	Oct. 11, 1949
Nov. 22, 1934	John J. Gately	Nov. 3, 1943
Nov. 14, 1947	Harold J. George	Apr. 1, 1952
Nov. 19, 1929	Harold R. Gordon	July 8, 1948
Nov. 20, 1924	Leslie LeVant Hall	Mar. 8, 1931
Oct. 31, 1917	Edward T. Jackson	May 8, 1939
Nov. 21, 1919	Rolland V. Mothersill	July 25, 1949
Nov. 19, 1929	Fritz Muller	Apr. 27, 1945
Nov. 23, 1928	Karl Newhall	Oct. 24, 1944
Nov. 18, 1927	Alexander A. Speers	June 25, 1941
Mar. 23, 1921	Arthur E. Thompson	Jan. 17, 1944
Nov. 21, 1919	Walter G. Voogt	May 8, 1945
May 23, 1919	Charles S. Warren	May 1, 1952
Nov. 18, 1925	James H. Washburn	Aug. 19, 1946
Nov. 17, 1920	James J. Watson	Feb. 23, 1937
Nov. 18, 1921	Eugene R. Welch	Jan. 17, 1945
Nov. 15, 1918	Albert Edward Wilkinson	June 11, 1930

SCHEDULE OF MEMBERSHIP, NOVEMBER 18, 1955

	Fellows	Associates	Total
Membership, November 19, 1954	164	144	308
Additions:			
By Election	...	2	2
By Reinstatement	...	...	...
By Examination	8	4	12
	172	150	322
Deductions:			
By Death	2	...	2
By Withdrawal	...	...	...
By Transfer from Associate to Fellow	...	8	8
Membership, November 18, 1955	170	142	312

CONSTITUTION

(As Amended November 17, 1950)

Article I.—*Name.*

This organization shall be called the Casualty Actuarial Society.

Article II.—*Object.*

The object of the Society shall be the promotion of actuarial and statistical science as applied to the problems of insurance, other than life insurance, by means of personal intercourse, the presentation and discussion of appropriate papers, the collection of a library and such other means as may be found desirable.

The Society shall take no partisan attitude, by resolution or otherwise, upon any question relating to insurance.

Article III.—*Membership.*

The membership of the Society shall be composed of two classes, Fellows and Associates. Fellows only shall be eligible to office or have the right to vote.

The Fellows of the Society shall be the present Fellows and those who may be duly admitted to Fellowship as hereinafter provided. The Associates shall be the present Associates and those who may be duly admitted to Associateship as hereinafter provided.

Any person may, upon nomination to the Council by two Fellows of the Society and approval by the Council of such nomination with not more than one negative vote, become enrolled as an Associate of the Society, provided that he shall pass such examination as the Council may prescribe. Such examination may be waived in the case of a candidate who for a period of not less than two years has been in responsible charge of the Statistical or Actuarial Department of an insurance organization (other than life insurance) or has had such other practical experience in insurance (other than life insurance) as, in the opinion of the Council, renders him qualified for Associateship.

Any person who shall have qualified for Associateship may become a Fellow on passing such final examination as the Council may prescribe. Otherwise, no one shall be admitted as a Fellow unless recommended by a duly called meeting of the Council with not more than three negative votes, followed by a three-fourths ballot of the Fellows present and voting at a meeting of the Society.

Article IV.—*Officers and Council.*

The officers of the Society shall be a President, two Vice-Presidents, a Secretary-Treasurer, an Editor, a Librarian, and a General Chairman of the Examination Committee. The Council shall be composed of the active officers, nine other Fellows and, during the four years following the expiration of their terms of office, the ex-Presidents and ex-Vice-Presidents. The Council shall fill vacancies occasioned by death or resignation of any officer or other member of the Council, such appointees to serve until the next annual meeting of the Society.

Article V.—*Election of Officers and Council.*

The President, Vice-Presidents, and the Secretary-Treasurer shall be elected by a majority ballot at the annual meeting for the term of one year and three

members of the Council shall, in a similar manner, be annually elected to serve for three years. The President and Vice-Presidents shall not be eligible for the same office for more than two consecutive years nor shall any retiring member of the Council be eligible for re-election at the same meeting.

The Editor, the Librarian and the General Chairman of the Examination Committee shall be elected annually by the Council at the Council meeting preceding the annual meeting of the Society. They shall be subject to confirmation by majority ballot of the Society at the annual meeting.

The terms of the officers shall begin at the close of the meeting at which they are elected except that the retiring Editor shall retain the powers and duties of office so long as may be necessary to complete the then current issue of *Proceedings*.

ARTICLE VI.—*Duties of Officers and Council.*

The duties of the officers shall be such as usually appertain to their respective offices or may be specified in the by-laws. The duties of the Council shall be to pass upon candidates for membership, to decide upon papers offered for reading at the meetings, to supervise the examination of candidates and prescribe fees therefor, to call meetings, and in general, through the appointment of committees and otherwise, to manage the affairs of the Society.

ARTICLE VII.—*Meetings.*

There shall be an annual meeting of the Society on such date in the month of November as may be fixed by the Council in each year, but other meetings may be called by the Council from time to time and shall be called by the President at any time upon the written request of ten Fellows. At least two weeks notice of all meetings shall be given by the Secretary.

ARTICLE VIII.—*Quorum.*

Seven members of the Council shall constitute a quorum. Twenty Fellows of the Society shall constitute a quorum.

ARTICLE IX.—*Expulsion or Suspension of Members.*

Except for non-payment of dues, no member of the Society shall be expelled or suspended save upon action by the Council with not more than three negative votes followed by a three-fourths ballot of the Fellows present and voting at a meeting of the Society.

ARTICLE X.—*Amendments.*

This constitution may be amended by an affirmative vote of two-thirds of the Fellows present at any meeting held at least one month after notice of such proposed amendment shall have been sent to each Fellow by the Secretary.

BY-LAWS

(As Amended November 19, 1954)

Article I.—*Order of Business.*

At a meeting of the Society the following order of business shall be observed unless the Society votes otherwise for the time being:

1. Calling of the roll.
2. Address or remarks by the President.
3. Minutes of the last meeting.
4. Report by the Council on business transacted by it since the last meeting of the Society.
5. New Membership.
6. Reports of officers and committees.
7. Election of officers and Council (at annual meetings only).
8. Unfinished business.
9. New business.
10. Reading of papers.
11. Discussion of papers.

Article II.—*Council Meetings.*

Meetings of the Council shall be called whenever the President or three members of the Council so request, but not without sending notice to each member of the Council seven or more days before the time appointed. Such notice shall state the objects intended to be brought before the meeting, and should other matter be passed upon, any member of the Council shall have the right to re-open the question at the next meeting.

Article III.—*Duties of Officers.*

The President, or, in his absence, one of the Vice-Presidents, shall preside at meetings of the Society and of the Council. At the Society meetings the presiding officer shall vote only in case of a tie, but at the Council meetings he may vote in all cases.

The Secretary-Treasurer shall keep a full and accurate record of the proceedings at the meetings of the Society and of the Council, send out calls for the said meetings, and, with the approval of the President and Council, carry on the correspondence of the Society. Subject to the direction of the Council, he shall have immediate charge of the office and archives of the Society.

The Secretary-Treasurer shall also send out calls for annual dues and acknowledge receipt of same; pay all bills approved by the President for expenditures authorized by the Council of the Society; keep a detailed account of all receipts and expenditures, and present an abstract of the same at the annual meetings, after it has been audited by a committee appointed by the President.

The Editor shall, under the general supervision of the Council, have charge of all matters connected with editing and printing the Society's publications. The *Proceedings* shall contain only the proceedings of the meetings, original papers or reviews written by members, discussions on said papers and other matter expressly authorized by the Council.

The Librarian shall, under the general supervision of the Council, have charge of the books, pamphlets, manuscripts and other literary or scientific material collected by the Society.

The General Chairman of the Examination Committee, shall, under the general supervision of the Council, have charge of the examination system and of the examinations held by the Society for the admission to the grades of Associate and of Fellow.

ARTICLE IV.—*Dues.*

The Council shall fix the annual dues for Fellows and Associates. Effective November 19, 1954, the payment of dues will be waived in the case of any Fellow or Associate who attains the age of 70 years or who, having been a member for at least 20 years, attains the age of 65 years and notifies the Secretary-Treasurer in writing that he has retired from active work. Fellows and Associates who have become totally disabled while members may upon approval of the Council be exempted from the payment of dues during the period of disability.

It shall be the duty of the Secretary-Treasurer to notify by mail any Fellow or Associate whose dues may be six months in arrears, and to accompany such notice by a copy of this article. If such Fellow or Associate shall fail to pay his dues within three months from the date of mailing such notice, his name shall be stricken from the rolls, and he shall thereupon cease to be a Fellow or Associate of the Society. He may, however, be reinstated by vote of the Council upon payment of arrears in dues, which shall in no event exceed two years.

ARTICLE V.—*Designation by Initials.*

Fellows of the Society are authorized to append to their names the initials F.C.A.S.; and Associates are authorized to append to their names the initials A.C.A.S.

ARTICLE VI.—*Amendments.*

These by-laws may be amended by an affirmative vote of two-thirds of the Fellows present at any meeting held at least one month after notice of the proposed amendment shall have been sent to each Fellow by the Secretary.

RULES REGARDING EXAMINATIONS FOR ADMISSION TO THE CASUALTY ACTUARIAL SOCIETY

1. Dates of Examination.

Examinations will be held on two successive days during the second or third week of the month of May each year in such cities as will be convenient for three or more candidates. The exact dates will be set by the Secretary-Treasurer.

2. Filing of Application.

Application for admission to examinations should be made on the Society's blank form, which may be obtained from the Secretary-Treasurer. No applications will be considered unless received before the fifteenth day of February preceding the dates of examination. Applications should definitely state for what parts the candidate will appear.

3. Fees.

The examination fee is $3.00 for each part, subject to a minimum of $5.00 for each year in which the candidate presents himself; thus, for one part, $5.00, for two parts, $6.00, etc. Examination fees are payable to the order of the Society and must be received by the Secretary-Treasurer before the fifteenth day of February preceding the dates of examination.

4. Associateship and Fellowship Examinations.

The examination for Associateship consists of four parts and that for Fellowship consists of four parts. A candidate may take any one or more of the four parts of the Associateship examination. A candidate may present himself for part or all of the Fellowship examination either if he has previously passed the Associateship examination or if he concurrently presents himself for and submits papers for all unpassed parts of the Associateship examination. Subject to the foregoing requirements, the candidate will be given credit for any part or parts of either examination which he may pass.

5. Credit for Examination Parts under Former Syllabus.

The new Syllabus of examinations effective in 1955 represents a considerable rearrangement of study materials. In order to simplify the process of transition and assure maximum equity among candidates, the following procedure has been established:

A candidate who has passed, or been credited with, one or more parts of the Associateship or Fellowship examinations under the Syllabus effective in 1948 and/or the Syllabus effective in 1953 will receive credit for the corresponding parts of the new Syllabus in accordance with the following table:

Parts Passed or Credited Under Old Syllabus (Effective in 1948 and/or 1953)	*Parts Credited Under New Syllabus (Effective in 1955)*
ssociateship, Part I	Associateship, Part I (a) and II (b)
" " II	" " III
" " III	" " I (b) and II (a)
" " IV	" " IV
Fellowship, Part I	Fellowship, Part IV
" " II	" " II (a) and III (a)
" " III	" " I (a) and III (b)
" " IV	" " I (b) and II (b)

Partial examinations will be given to those candidates requiring them in accordance with the foregoing credits.

6. Waiver of Examinations for Fellowship:

The examinations for Fellowship will be waived under Article III of the Constitution in part or in whole for those candidates who meet the qualifications and requirements set forth below.

1. WAIVER OF FELLOWSHIP PARTS III AND IV

(a) The candidate shall present himself in the same year for Fellowship Parts I and II, or shall have previously passed Parts I and II.

(b) The candidate shall present an original thesis on an approved subject relating to insurance (other than life insurance). Such thesis must show evidence of ability for original research and the solution of advanced insurance problems comparable with that required to pass Fellowship Parts III and IV. The thesis shall be of a character which would qualify it for printing in the Proceedings.

(c) Candidates electing this alternative should communicate with the Secretary-Treasurer and obtain through him approval of the Committee on Papers of the subject of the thesis and also of the thesis. In communicating with the Secretary-Treasurer, the candidate should state, in addition to the subject of the thesis, the main divisions of the subject and the general method of treatment, the approximate number of words and the approximate proportion to be devoted to data of an historical nature. All theses shall be in the hands of the Secretary-Treasurer before the examinations are held in May of the year in which they are to be considered. No examination fee will be required in connection with the presentation of a thesis.

2. FULL WAIVER

(a) The candidate shall have completed twenty years as an Associate member of this Society.

(b) The candidate shall present an original thesis on an approved subject relating to insurance (other than life insurance). The thesis shall be of a character which would qualify it for printing in the *Proceedings*.

(c) Candidates electing this alternative should communicate with the Secretary-Treasurer and obtain through him approval by the Com-

mittee on Papers of the subject of the thesis and also of the thesis. No examination fee will be required in connection with the presentation of a thesis.

7. Waiver of Examinations for Associateship.

The examinations for Associateship will be waived under Article III of the Constitution in part or in whole for those candidates who meet the qualifications and requirements set forth below.

1. PARTIAL WAIVER

Associateship Part I will be waived for a candidate who has passed Parts 1, 2 and 3 of the examinations of the Society of Actuaries.

2. FULL WAIVER

(a) The candidate shall be at least thirty-five years of age.

(b) The candidate shall have at least ten years' experience in actuarial or statistical work in insurance (other than life insurance) or in a phase of such insurance which requires a working knowledge of actuarial or statistical procedure or in the teaching of the principles of insurance (other than life insurance) in colleges or universities.

(c) For the two years preceding date of application, the candidate shall have been in responsible charge of the actuarial or statistical department of an insurance organization (other than a life insurance organization) or shall have occupied an executive position in connection with the phase of insurance (other than life insurance) in which he is engaged, or, if engaged in teaching, shall have attained the status of a professor.

(d) The candidate shall have submitted a thesis approved by the Committee on Papers. Such thesis must show evidence of analytical ability and knowledge of insurance (other than life insurance) sufficient to justify waiver of examinations.

(e) Refer to Paragraph 1 (c) of Rule 6 for details of submission.

LIBRARY

All students registered for the examinations of the Casualty Actuarial Society and all members of the Casualty Actuarial Society have access to all the library facilities of the Insurance Society of New York and of the Casualty Actuarial Society. These two libraries, with combined operations, are located at 107 William St., New York 38, New York and are under the supervision of Miss Ruby Church.

Registered students may have access to the library by receiving from the Society's Secretary-Treasurer the necessary credentials. Books may be withdrawn from the library for a period of one month without charge. The Insurance Society is responsible for postage and insurance charges for sending books to out of town borrowers, and borrowers are responsible for the safe return of the books.

Address requests for books to:

Librarian
Insurance Society of New York
107 William St.
New York 38, New York

SYLLABUS OF EXAMINATIONS

(Effective with 1955 Examinations)

ASSOCIATESHIP

Part	*Section*	*Subject*
I	(a)	Statistics.
	(b)	Probability.
II	(a)	Elementary Life Insurance Mathematics.
	(b)	General Principles of Insurance; Insurance Economics and Investments.
III	(a)	Insurance Law; Supervision, Regulation and Taxation of Insurance.
	(b)	Social Insurance.
IV	(a)	Policy Forms and Underwriting Practice.
	(b)	General Principles of Rate-making; Credibility.

FELLOWSHIP

I	(a)	Determination of Premium, Loss and Expense Reserves.
	(b)	Insurance Expense Analysis and Accounting.
II	(a)	Individual Risk Rating.
	(b)	Advanced Problems in Underwriting and Administration.
III	(a)	Machine Methods.
	(b)	Advanced Problems in Insurance Statistics.
IV	(a)	Advanced Problems in Rate-making.
	(b)	Current Insurance Problems.