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PROCEEDINGS

OF THE

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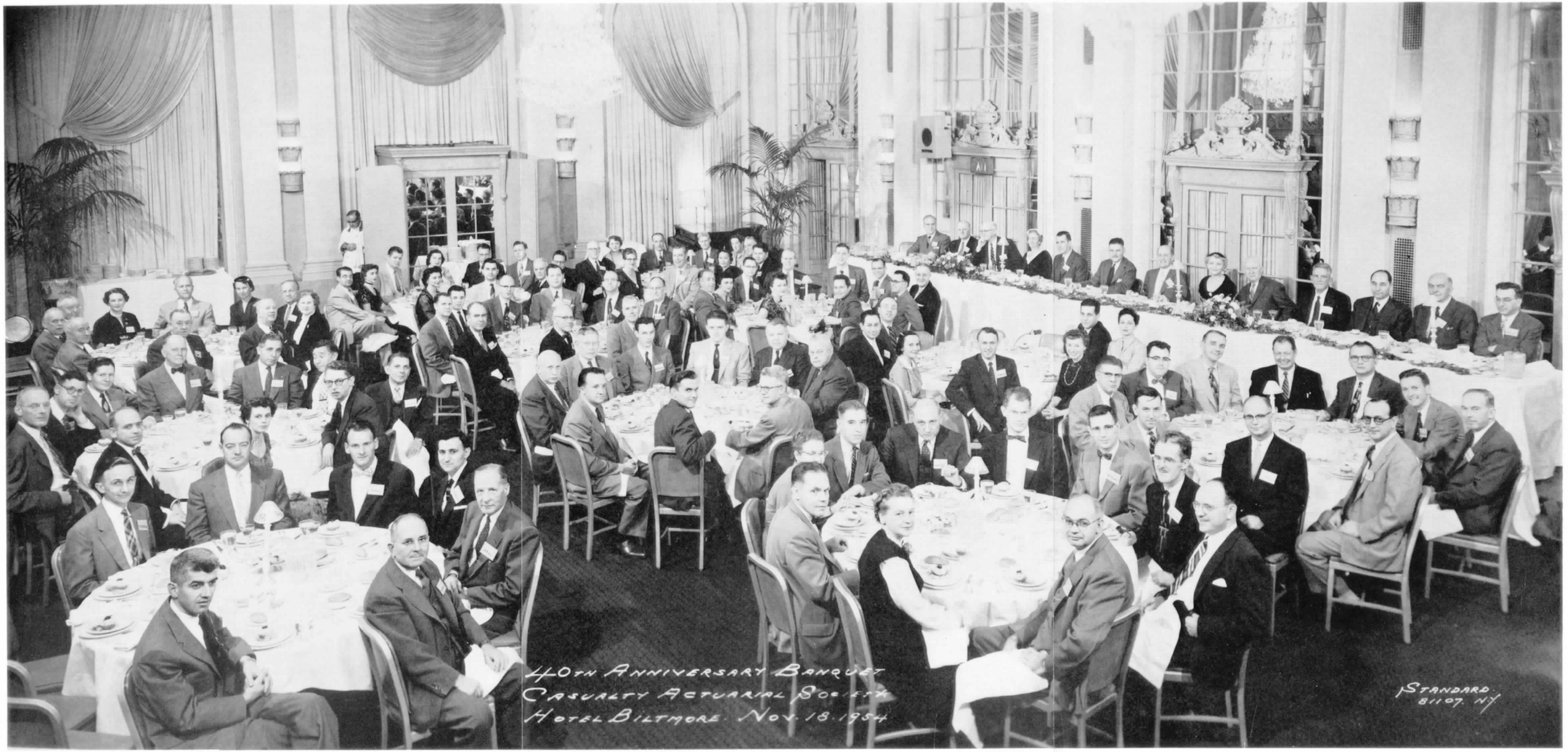
CONTENTS OF VOLUME XLI

"Progress then, if discernible within 'historical times' must have been progress in the improvement of our social heritage and not progress in the improvement of our breed, and the evidence for social progress is, of course, impressive in the field of scientific knowledge and its application to technology: in everything, that is to say, which has to do with man's command over non-human nature. This, however, is a side issue; for the impressiveness of the evidence for progress in this particular field is matched by the obviousness of the fact that man is relatively good at dealing with non-human nature. What he is bad at is his dealing with human nature in himself and in his fellow human beings."

—*Arnold J. Toynbee*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Vol. XLI, Part I No. 75

PROCEEDINGS

May 23-25, 1954

EXPANDING REQUIREMENTS FOR ACTUARIAL EDUCATION

PRESIDENTIAL ADDRESS BY SEYMOUR E. SMITH

As a result of the many changes, trends and problems that have developed in our business over the past several years, the membership of this Society has devoted a considerable amount of thought and concern to the role of the actuary in the casualty and fire insurance field. This has been evidenced in many ways — in presidential remarks, formal papers, panel discussion, informal discussions and individual conversation at our various meetings. Although the subject is not new, I hope that you will forgive my dealing with it again today, but I believe it to be of sufficient importance to warrant further attention on our part.

I will not burden you with a long recitation of all of our many problems of recent years, because you are all only too well aware of them. Rate regulatory laws, inflation, multiple line legislation and a host of other changes have all had, and are continuing to have, their various effects on the business, but they all seem to have one thing in common. That is to call for an increasingly expanded role on the part of the actuary. Not only is there a need for more capable actuaries, but these individuals must also be familiar with many more aspects of our business than has been their traditional part in past years. This applies not only to internal company operations, but also to many functions outside of company offices.

In casualty insurance, until recent years, actuarial functions have, with certain exceptions, been primarily concerned with statistical problems and the establishment and maintenance of proper reserves, with occasional consultation on rating problems. The field of rate making, with the exception of workmen's compensation insurance, was not one in which actuarial techniques were extensively employed. Although he performed a valuable function, and did it well, the role of the actuary was a limited one. A review of the *Proceedings* of our Society for its first three decades will substantiate this to a large degree.

The changes of the last few years have profoundly affected this picture, and at the present it appears reasonable to assume that even more changes will be forthcoming. Laws and regulations in regard to rates have in varying degrees affected the whole pricing structure of a substantial portion of the insurance business. Because most of these laws and regulations are comparatively new, and because there

are many widely divergent views as to their proper application, it will undoubtedly be some time before it can clearly be determined exactly what they do and do not mean. However, there appears to be reasonably general agreement that the price paid by a policyholder must meet certain standards and that there will be a far greater requirement for the explanation and justification of rates than has existed in the past.

This has produced a tremendously increased demand, not only for actuarial talent per se, but also for such talent with a broader understanding of insurance functions than was previously required by the limited field traditionally assigned to the actuaries. This demand comes from individual companies, from rating organizations, and from regulatory bodies.

Because rate making is not an exact science, and because rate regulation is resulting in a much greater requirement for actuarial techniques in our pricing practices, it would follow that the actuary must be more than a pure technician. Certainly he must have a sound grasp of actuarial procedure, but more is required. He should be familiar with major underwriting considerations and problems, since informed judgment is essential in the application and interpretation of statistical data to rates and rating plans.

He should understand and be familiar with the problems and aims of his sales establishment. Rates may be calculated with a wondrous degree of mathematical preciseness, but they are no good at all if they appear ridiculous in a competitive market. With this problem in mind he must also make a profit for his company.

He must be thoroughly familiar with the applicable rating laws and regulations in developing rates that will meet the applicable standards. Subsequent to this, there is a wide variety of procedures that must be followed to secure the approval of these rates. This may involve the drafting of filing memoranda and the preparation of supporting exhibits, participation in conferences with regulatory officials, or the presentation of testimony at full dress public hearings. In the latter connection he may be subjected to intensive cross-examination on all aspects of the filing. Frequently this may cover everything from the technical niceties of credibility factors to an economic justification of profit provisions in the rates.

In addition to the above, there is one more aspect that is worthy of consideration. That is the very substantial increase in recent years in the interest displayed by the general public in the price it pays for insurance coverage. Whether this is a temporary situation resulting from a combination of new rate regulatory laws and post war inflation, or whether it is a growing and permanent development in our business, I do not know. It would seem reasonable to assume, however, that the manner in which this problem is handled in the present and in the immediate future will have a large bearing upon the extent of our difficulties in the years ahead. This public concern over the price of insurance varies considerably from place to place and also

between individual forms of coverage. It also arises in many forms. It may be an investigating committee or commission appointed as a result of a resolution by the state legislature. It may be complaints raised by local public officials concerning rates in their city or county. Trade associations or other groups having a certain homogeneity of insurance classifications may be dissatisfied, or it may be the individual policyholder requesting an explanation as to why his rate is what it is.

In any event, the question invariably is concerned with price, and the solution to the problem is likewise almost invariably the same. Although individual cases may call for varying degrees of analytical thoroughness, in almost all instances the problem is satisfactorily resolved by a clear and complete explanation of the various items affecting the final cost. This may sound simple enough at first, but it calls for a considerable amount of talent. It calls for actuarial knowledge plus the ability to express that knowledge articulately in clear and simple terms. It calls for familiarity with the many services and operations performed by the insurance companies, so that they may be thoroughly explained and so that their effect on the final price may be justified. Basically, it calls for a combination of actuarial ability, insurance knowledge and an appreciation of public relations.

The foregoing examples, plus others that might be given, illustrate the expansion in the role for actuarial ability that has been taking place within the last few years. At the present time there is a shortage of the actuarial talent required by our business. This talent is rarely found in its native state, but is the product of extensive education. Admittedly nothing speeds up the educational process of an individual quite as fast as having someone gleefully beat his brains out on the witness stand at a public hearing, but I am sure there is a better way.

As you all know, the object of the Casualty Actuarial Society is the promotion of actuarial and statistical science as applied to the problems of insurance, other than life insurance. This is basically an educational function, and I believe that our Society has made, and is continuing to make, substantial progress in meeting the needs of our business in this connection. In recent years our examination syllabus has been revised to bring the requirements up to date under changing conditions in our business. This subject has had the continuing study of our Educational Committee, and a further revision and improvement is to become effective in the near future. The Educational Committee is also reviewing our *Proceedings* and developing a list from which a program can be instituted to secure the presentation of formal papers which are needed on current subjects of importance.

In the past few years our informal discussions have been augmented by panel discussions. In many cases outstanding men in the business who are not members of our Society have served on these panels and have made substantial contributions to our understanding of many current problems. I would like to urge the continuation and possible

expansion of this idea for the immediate future, since it appears to offer great opportunities for extending our knowledge into many desirable fields.

The Special Committee on Membership is developing a program which should result in an increase in the membership of our Society and in certain other improvements which should contribute greatly to the needed increase in actuarial knowledge and in the contribution which such can make to the business as a whole. The report of this Special Committee should be available in the near future and will be well worth the earnest consideration of each member of the Society.

In addition to what we may do as a group, many of our individual members can contribute substantially to the development of actuarial ability within their own offices. The encouragement of able young men in studying for the examinations for admission is most worth while, particularly if this is accompanied by a definite training program. If it can possibly be arranged, this training should be as broad in scope as is practicable. A certain amount of time should be spent working on each of the various functions performed by the actuarial department so that the student will become familiar with statistical, reserve, rating and tax problems and procedures. In many instances companies will find it extremely advantageous to arrange for officials of the other company departments to discuss their departmental functions and problems with these students. It involves an exceedingly modest investment of time, but the results will be most worth while in the development of needed and able men. Those students who have demonstrated their ability to pass the examinations should be encouraged to attend not only the meetings of our Society, but also a reasonable number of company meetings and public hearings on rating matters. This will enhance their understanding of the insurance facts of life and accordingly their value to their companies.

In the foregoing I have merely highlighted a few of the trends of our business which are calling for more capable actuaries to perform an expanding function, and a few of the things that are being done or may be done to develop the necessary talent. Obviously it is not a problem which is capable of either an easy or a speedy solution. It is one, however, which appears to be worthy of the continuing thought and consideration of the entire Casualty Actuarial Society. The extent to which our educational activities keep pace with the expanding needs of current conditions will, to a large extent, measure the contribution which our Society makes to the insurance business as a whole.

PROCEEDINGS

November 18, 1954

ON OUR FORTIETH ANNIVERSARY

PRESIDENTIAL ADDRESS BY SEYMOUR E. SMITH

This particular meeting marks the Fortieth Anniversary of the founding of the Casualty Actuarial Society. On such a noteworthy occasion, it would seem to be appropriate to review our development and accomplishments over the past years and to devote some thought to the problems of the future. However, a complete historical review of the past four decades of our business would be a monumental compilation. I doubt if it could be accomplished by any one person. Even if it could be, it would be far too extensive to be recited here. Likewise, the problems of the future range over such a tremendous area of nebulous potentiality that it would be foolhardy indeed to attempt to cover them all, to say nothing of trying to solve them with summary dispatch. Accordingly, these brief and somewhat rambling remarks will be limited to a few of those things which seem to be particularly worthy of comment at this time. Items of omission are not due to any minor or secondary degree of their importance, but merely to the practical limitations of my allotted time.

On this anniversary occasion there is one question that obviously comes to mind. Over the past forty years what progress has our Society made in the furtherance of its object — namely, the promotion of actuarial and statistical science as applied to the problems of insurance, other than life insurance? I believe that this can be answered only in relationship to our business as a whole. There are two reasons for this. First, because ours is not an exact science, and secondly, because our endeavors become meaningful only when they contribute to improved protection and service to the insuring public. Unlike the physicist or the chemist, we do not deal with immutable laws of nature that must only be discovered to become a contribution to knowledge that is fixed for all time. Also, actuarial and statistical science cannot operate by itself, but must contribute to the close teamwork that is so essential to successful insurance operation. The actuary, underwriter, producer, claim adjuster, payroll auditor, safety engineer or accountant cannot function alone. Although each one has his special duties and problems, the criterion of successful performance does not lie within his own field alone, but in the results of the combined teamwork of all.

As for the business as a whole, I believe that the record is most

impressive. I will not burden you with an elaborate recitation of growth statistics, since the story can be simply told. At the inception of our Society, Workmen's Compensation Insurance was a new and untried infant in this country. Today every state in the Union has a Workmen's Compensation law and the annual premium income of the private carriers is well over a billion dollars. From a very small number of cars, and a still smaller number of them insured, we have seen the number of automobiles increase to over 45 million with the great majority of them covered by insurance protection. The resulting premium volume exceeds four billion dollars a year. Over the years the changing concepts of liability have resulted in a veritable jungle of potential pitfalls for the individual or the business establishment. Insurance has kept pace with this developing need for protection, and from a very modest line of coverage has grown to an annual volume in the neighborhood of over 500 million dollars, exclusive of automobile business. Although fire insurance was well established a great many years before our Actuarial Society was born, its gains have continued to be most substantial, keeping pace with our country's growth and now exceeding substantially the billion and a half dollar annual mark. A comparative new-comer in property protection that has shown remarkable growth within the last score of years is extended coverage. Insofar as fire and extended coverage are concerned, who can question the strength and soundness of a coverage which can take in its stride, without a falter, the tornadoes of 1953, a Livonia disaster, and the terrible depredations of those Jezebels known as Carol, Edna and Hazel. There is one other major coverage in our business which is amazing. Forty years ago it was small indeed, covering but a very small percentage of our people. Today accident and health insurance is a mushrooming giant, affording protection to many tens of millions and amounting all told to over three billion dollars in annual premiums for all of its various forms. The foregoing does not, of course, cover all of our major forms of insurance, but this brief outline of the larger lines speaks for the business as a whole.

Before attempting to evaluate the contribution which our Society and its members may have made to the growth and ever widening protection which our business affords, it would be well to refer once again to the fact that ours is not an exact science. In reading our *Proceedings* of many years ago one finds that our membership was then struggling with many of the same problems that we have today. Their form or the degree of their acuteness may have changed somewhat, but to a remarkable extent they are the same. This is neither cause for discouragement nor for the feeling that we have not progressed. An analysis of what we are dealing with will indicate that this could not be expected to be otherwise. Instead of dealing with fixed natural laws, we are dealing, particularly in the casualty insurance field, with the most complex, intricate and unpredictable thing that has ever been created — namely, human society. The world's greatest minds have been trying to fathom its workings since the

dawn of history with little if any success in trying to determine and predict why it does what it does when it does it. Since our major function in dealing with rating and reserve questions involves predictions of future happenings within human society, it is clear that most of our problems can never be reduced to a precise answer. What we can do, however, is to learn how to handle and cope with these questions — to use scientific methods to narrow the impact of future possibilities — to increase our knowledge of the relationship between events that affect our business — to improve our techniques for measuring variations in hazards with increasing reasonableness of accuracy.

I believe that we have done well in this regard. Our business could not have grown so tremendously unless it were soundly constituted, and improving actuarial and statistical techniques have contributed to that soundness. This contribution has been not only within our own field, but also in regard to the over-all teamwork that is so important. We have been increasingly successful in furthering the adoption of more scientific approaches to the problems which are faced by all sections of the business. Likewise, we ourselves have become increasingly aware of non-actuarial problems. Rather than to attempt to recite examples of the various ways in which our actuarial techniques have progressed, I believe that a broader indication will come from a very brief glance at the background against which our business has grown. It has certainly not been a peaceful scene, with quiet and orderly development at a sedate pace. The past forty years have seen two world wars of unprecedented destruction, the full cycles of boom and bust, inflation and deflation, periods of intense competition and times when most companies had more business offered to them than they could handle. We have seen drastic and dramatic change in the social, political and economic forces that affect our business, and, to top it all off, a brand new set of rate regulatory laws in most states that still have unsettled questions as to exactly what they do or do not mean. Against this tempestuous background we have handled our day-to-day problems of making proper rates, developing adequate reserves and compiling and analyzing statistical data, sometimes with and sometimes without much past experience to guide us. I believe it is reasonable to conclude that the great growth and expansion of our business on a sound basis over these hectic years is in itself some reflection of the progress which our Actuarial Society has made.

In regard to the various problems with which we must learn to cope, there are many items in the current scene that are of major importance. I cannot, of course, cover them all, but there are a few things on which I would like to comment briefly.

Over the years one of the difficulties that has constantly been with us is the time lag between the period covered by our available statistical data and the period for which the resulting rates will be in effect. The degree of acuteness of this siutation has varied substantially from time to time depending upon whether or not conditions were relatively

stable or whether they were changing rapidly. In recent years, particularly for certain lines of insurance, the effects of postwar inflation have changed the picture with breath-taking speed. We all know what happened to the automobile line, and similar situations have existed in other fields. We have had no perfect solution to this, of course, but within a comparatively short period of time workable methods were devised which materially improved the picture. They were not perfect by any means but they do reflect a substantial improvement over what would otherwise exist and, undoubtedly in years to come, additional refinements and better ideas will be forthcoming. For the automobile and general liability lines, trend and projection factors have been developed to adjust our experience to what it might reasonably be expected to be during the period to be covered by the rates. For plate glass insurance, a record of glass replacement costs indicated appropriate rate adjustments to be made. For workmen's compensation insurance, a rate level adjustment factor was devised to reflect the aggregate indications of the latest available calendar period. This particular problem of time lag between statistics and the period to be covered by the rates is, I believe, of sufficient importance to warrant intensive and continuing study by all of us. In considering the unpredictable nature of many of the changes in our social and economic structure, it may be found desirable to use, to a far greater extent than we do, available statistical data outside of the insurance field. For many of our coverages, particularly in the third party lines, a keen awareness of social trends is essential if our rates and reserves are to keep abreast with the changing scene. A suggestion for the use of outside statistical data is, of course, nothing new and may ultimately be found to be impractical. This has been studied over the years by many people and as yet no particular index or series of indices has been found which has a sufficient correlation to the changes in insurance experience. In spite of this, I believe that this is worthy of continued study and it may very well be that the coming out of high-speed electronic computing machines will enable us to expand our research in this field to a degree that has not been practical heretofore. As you are well aware, most of our rating laws require that due consideration shall be given to both past and prospective loss experience. I do not intend to imply any criticism of past or current procedures, but I would suggest that in the future it would be well worth our while to devote an appreciable amount of thought and research in attempting to develop additional sources of statistical information to supplement our regular statistical data for the development of prospective rates.

Within recent years, in our business, we have made very substantial progress in developing procedures for the handling and rating of large risks. Developments have been many and continuing. Although there are very substantial differences in the large risk problems between individual lines of coverage, we seem to have done rather well in developing various devices to meet the unique problems of both varia-

tions in coverage and in the differences reflecting the unique characteristics of individual large risks. In various forms we have experience rating, retrospective rating, composite rating, rating plans for multiple location risks, rating schedules reflecting individual hazards, procedures for the handling of highly protected fire risks, and, of course, the ubiquitous Plan D, to mention but a few.

The point in mentioning these various rating devices is not concerned with the plans themselves, but rather to indicate the existence of a workable and generally accepted philosophy in the rating of large risks. There are differences of opinion, of course, but in most cases they appear to be more of detail than of fundamental concept. In general, we have a workable and satisfactory market which has been developed without any great upsetting of apple carts.

However, in the rating of small risks, the so-called mass market if you wish, there are much more fundamental differences of opinion. Recent developments in certain areas of the small risk field seem to indicate that a substantial amount of thoughtful consideration would be well worthwhile. In the day-to-day business of insuring these small risks, we are faced with a number of things, each of which has many desirable features, yet many of these same things are in direct conflict one with the other. The recitation of but a few of these things will serve to illustrate.

The insurance of small risks is an averaging process in which the many pay a small price to cover the losses which will be suffered by the few. The broader the averaging base, the sounder the rates. Individual groups or classifications of policyholders whose experience is better or worse than the average should in equity be rewarded or penalized accordingly. The more groups or classes that can demonstrably be rated on their own, the greater the equity.

Individual companies whose underwriting results are better than average should be rewarded accordingly or be permitted to pass their savings on to their policyholders. Individual companies should not be penalized for performing the socially desirable service of providing a broad and ready market to those who need insurance protection.

Individual policyholders should be offered tangible incentives for preventing or avoiding losses. Individual policyholders should not be penalized for fortuitous losses, but should pay a reasonable average cost which is the essence of insurance.

Competition in both price and coverage are highly desirable, being in conformity with our basic philosophy of competition, thus preventing stagnation and promoting progress. The more competition the better. The orderly development of sound insurance protection is hindered by a wide variety of rapidly changing, confusing and little-understood forms of coverage for the same basic hazards and by unbridled price competition that is disruptive to an orderly market.

I expect that most of us would agree in some measure with each of the above statements, although there will be wide divergences of opinion as to the amount of emphasis to be placed on each. These dif-

ferences of opinion are honest differences, to be respected as such, and I would be the last to suggest that one is better than the other. The point that I would like to make, however, is this — that in the legitimate furthering of our own positions in regard to these matters we do not let a situation develop in which confusion, misunderstanding or dissatisfaction exist within any appreciable segment of the insurance buying public. If this should happen, our differences may very well be summarily settled by legislative fiat, and the chances are extremely high that the result would be one in which we would all have common misery.

Another current item of more than common interest is in the field of workmen's compensation insurance and is commonly referred to as "loss of hearing." I will not burden you with a review of the problem or its tremendous potentialities, since many able individuals have written or spoken at length on it and I am sure that it is familiar to all of you. At the present time a great deal of research and study is being devoted to the medical aspects of this subject, and also to the complicated administrative problems that it could present. This is, of course, as it should be, since a great deal must be learned in this little-known field before it can properly be evaluated. In addition to the medical and administrative aspects, there is the all important question of cost. All three of these items are inter-related, but at this juncture cost appears to be of paramount importance. A great deal has been said of this particular phase, but the facts are very thin. Terms of tens and hundreds and multiple hundreds of millions of dollars have been freely bruited about, but of necessity they have not been based upon a concrete factual valuation of various potentialities. It is difficult indeed to over emphasize the importance of properly evaluating the cost element of this problem. In many ways it far overshadows in degree of seriousness the occupational disease situation with which the workmen's compensation business was suddenly faced a little over twenty years ago. Basically it is a matter to be determined one way or another in the various state legislatures, but sound decisions must be based upon facts. It would appear to be essential that we keep abreast of the medical studies and the various proposals that are advanced in this field, and that we apply thereto the knowledge and techniques that we have developed over the years in evaluating workmen's compensation law amendments. In this way we will make available a factual base upon which legislative decisions may be made. I have every confidence that if sufficient reliable information is developed, the dire possibilities that have been predicted will not materialize.

In closing, there is one more current item that is most worthy of comment. This is the recent action taken by our government which should result in greatly expanding research and the use of atomic energy in peaceful industrial pursuits. Of necessity, we know very little indeed about this subject except what we have been told of its terrible destructive power as a military weapon. It appears reason-

able to assume, however, that in the years to come it will be used in varying degrees throughout an ever-widening area of our industrial establishment. This poses many new insurance problems for practically all forms of coverage. Like the hazard of war, some of the potentialities involved are uninsurable. The losses that could conceivably result from widespread contamination in highly-congested industrial areas would far exceed the resources of any insurance company or group of companies, and, although I have no solution to offer, it would appear that some other method than our normal insurance procedures will have to be developed to take care of this sort of possibility. However, the awesomeness of a super catastrophe should not cause us to lose sight of the fact that industrial use of atomic energy will involve many normal insurance hazards which we can very well handle. If we are to retain the position of insurance as a function of private enterprise, I believe that it is essential that we devote every effort to develop procedures for affording coverage and protection against all insurable hazards in connection with the growing use of this new industrial component.

WORKMEN'S COMPENSATION INSURANCE RATEMAKING

BY

RALPH M. MARSHALL

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

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

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

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

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

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

(4) Addition of catastrophe and disease loadings.

I — DETERMINATE OF RATE LEVEL

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

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

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

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

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

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

Exhibit I—Determination of Change in Manual Rate Level

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

Exhibit II-A—Pure Premium Exhibits

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

Exhibit IV—Occupational Disease Rates

Exhibit V—Computation of final Manual Rate

Exhibit VI—Proposed Rates and Rating Values

Exhibit VII—Glossary of Ratemaking Terms

For convenience Exhibit VII is included preceding Exhibit I.

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

A. Policy Year Experience
B. Correction For Off-Balance Due to the Experience Rating Plan
C. Policy Year Indicated Change in Manual Rate Level
D. Rate Level Adjustment Factor
E. Change in Manual Rate Level

EXHIBIT VII (From Connecticut Filing)
GLOSSARY OF RATEMAKING TERMS

CALENDAR YEAR EXPERIENCE (EXHIBIT I, SECTION D)

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

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

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

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

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

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

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

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

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

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

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

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

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

EXHIBIT I

Determination of Change in Manual Rate Level

A. *Policy Year Experience*

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

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

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

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

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

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

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

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

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

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

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

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

D. *Rate Level Adjustment Factor*

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

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

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

E. *Change In Manual Rate Level*

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

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

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

FOOTNOTES TO SECTION A — POLICY YEAR EXPERIENCE

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

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

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

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

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

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

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

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

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

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

Adjustment Of Standard Expense Loading For $10 Expense Constant

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

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

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

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

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

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

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

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

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

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

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

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

EXHIBIT I-A

Calculation of Development Factors

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

where
- A = Adjusted Rate
- I = Rate Indicated by Risk Experience
  - = (Risk Losses ÷ Risk Payroll) ÷ Permissible Loss Ratio
- Z = Risk Experience Rating Credibility
- C = Classification Collectible Rate
- F = Correction for Off-Balance Factor
- (1-Z) = Class Credibility

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

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

Subtracting (2) minus (1)

We have

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

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

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

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

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

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

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

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

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

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

FOOTNOTES TO SECTION D — RATE LEVEL ADJUSTMENT FACTOR

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

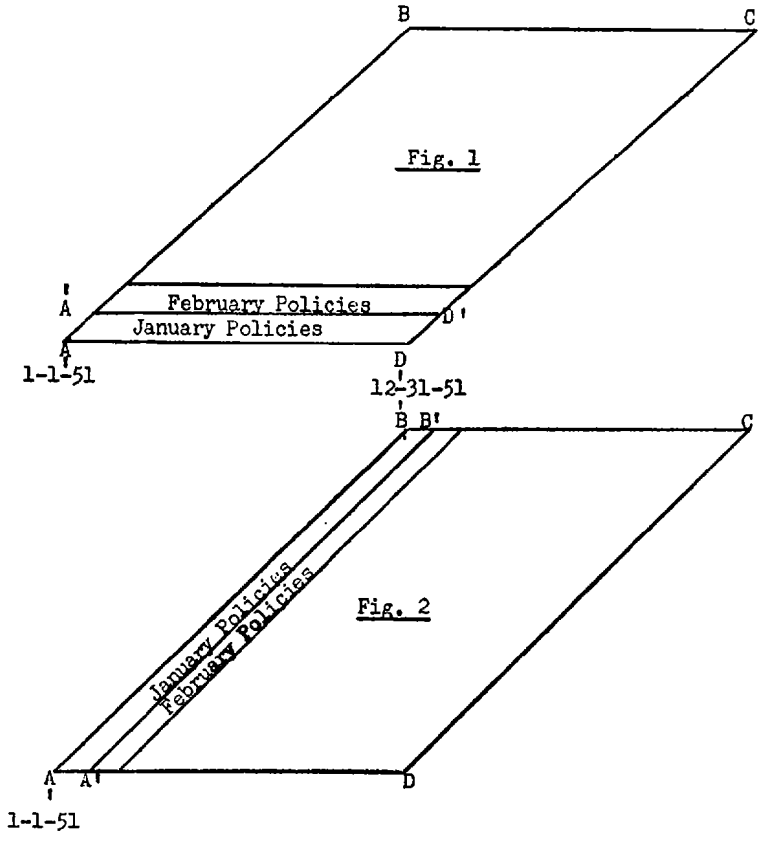


Figure 1 illustrates the "horizontal concept." Policies becoming effective January 1st for a 12 month period are represented by the line AD; policies becoming effective January 2nd by a line immediately above AD etc., until we come to the line BC representing policies becoming effective December 31st.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

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

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

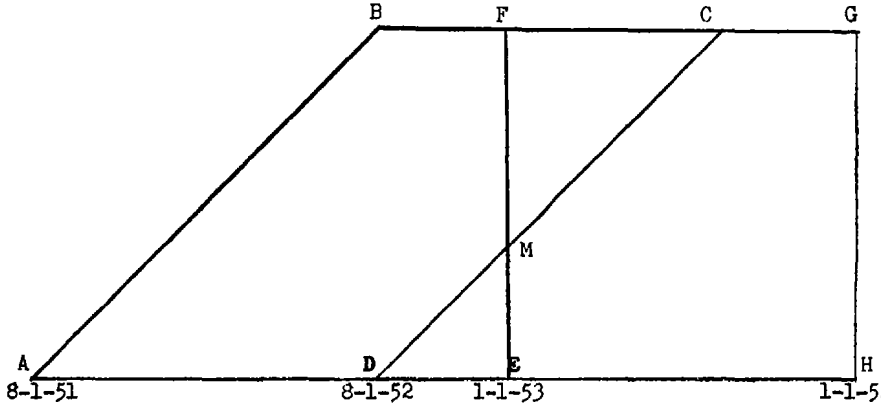
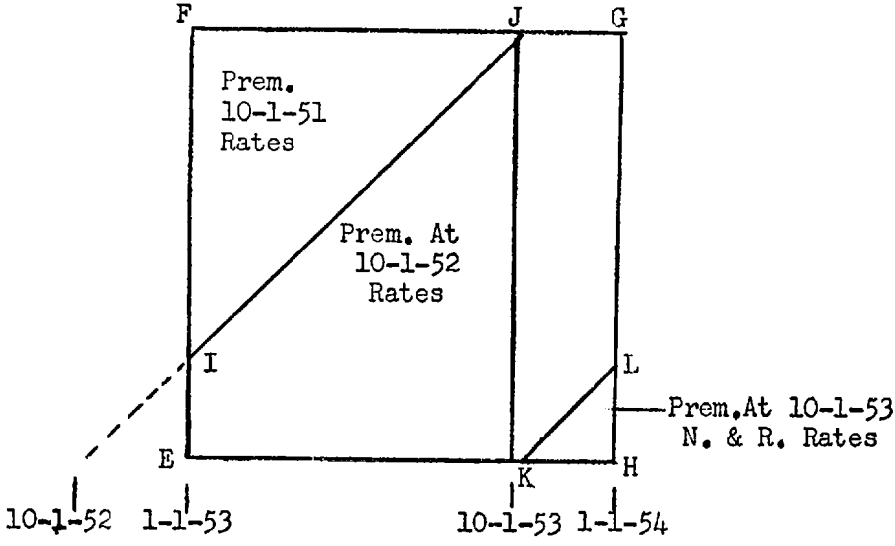


Figure 3

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

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

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



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

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

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

*1.092 × 1.159 = 1.266

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

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

†Determined from relative areas.

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

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

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

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

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

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

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

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

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

*DEVELOPMENT FACTORS

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

8-1-50 to 7-31-51*
8-1-51 to 7-31-52†

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

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

Industry Group: MANUFACTURING

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

*DEVELOPMENT FACTORS

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

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

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

Industry Group: CONTRACTING

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

*DEVELOPMENT FACTORS

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

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

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

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

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

*DEVELOPMENT FACTORS

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

II DETERMINATION OF CLASSIFICATION RELATIVITY

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

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

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

EXHIBIT II

Distribution Of Change In Manual Rate Level To Industry Classifications

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

A. *Reviewed Classifications*

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

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

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

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

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

(c) *Derived by Formula:*[5] The formula pure premium is derived by the scientific weighting between the indicated and the present on rate level pure premiums. The weight given to the policy year indicated pure premium varies from zero percent to 100%, depending on the volume of the expected losses. The complement of the weight given the indicated pure premium is applied to the present on rate level pure premium. Thus, if 80% credibility is assigned to the Indicated, 20% is applied to the Present Rate level. The amount of credibility assigned[6] each portion of the indicated pure premium is shown by the figure following the column captioned "Serious", "Non-Serious", and "Medical". The figure "3" indicates 30% credibility to the indicated pure premium, the figure "4" indicates 40% credibility, etc.; where no figure is shown, a credibility of zero is assigned to the indicated pure premium. For example, for the first reviewed classification Code 1924, shown on the first page of the photostat exhibits, the serious indicated pure premium receives zero credibility, non-serious indicated pure premium receives zero credibility and the medical receives 20%. The table of credibilities shown below was used to assign weights to the indications for each of the three industry groups.

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

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

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

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

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

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

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

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

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

No classifications were affected by such limitations.

B. *Non-Reviewed Classifications*

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

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

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

The results of such test are as follows:

Test of Proposed Pure Premiums—Reviewed Classifications

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

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

EXHIBIT II-A (Sample)

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

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

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

*18-1 to 7-31

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

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

Sch. & Group 1 Code 2003 Class Bakeries

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

M.C.203-54

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

Sch. & Group 1 Code 2070 Class Creameries

POLICY PERIOD	PAYROLL (IN HUNDREDS)	SERIOUS 2 No.	SERIOUS 2 AMOUNT	SERIOUS 2 P.P.	NON-SERIOUS 6 No.	NON-SERIOUS 6 AMOUNT	NON-SERIOUS 6 P.P.	MEDICAL 6 AMOUNT	MEDICAL 6 P.P.	TOTAL AMOUNT	TOTAL P.P.
*1950-51	9,624,4	2	63805		79	23148		27032		113985	1.18
†1951-52	10,857,8	5	27759		121	71370		54103		153232	1.41
TOTAL	20,482,2	7	91564	.45	200	94518	.45	81135	.40	267217	1.30
P. P.: Present on Rate Level				.30			.42		.36		1.08
P. P.: Derived by Formula				.33			.44		.38		1.15
P. P.: Underlying Present Rate				.29			.40		.34		1.03
P. P.: Proposed				.33			.44		.38		1.15

*18-1 to 7-31

Sch. & Group 1 Code 2089 Class Packing Houses

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

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

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

M.C.203-54

EXHIBIT II-A (Sample)

57
NATIONAL COUNCIL ON COMPENSATION INSURANCE
STATE CONNECTICUT LOCAL REV'N # 28 DATE AUGUST 25, 1954

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

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

*18-1 to 7-31

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

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

STATE

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

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

N.C.-201-54

58
NATIONAL COUNCIL ON COMPENSATION INSURANCE
STATE CONNECTICUT LOCAL REV'N # 28 DATE AUGUST 25, 1954
FEDERAL

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

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

*18-1 to 7-31

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

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

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

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

N.C.-201-54

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

*(Rate level change—1.000)

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

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

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

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

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

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

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

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

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

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

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

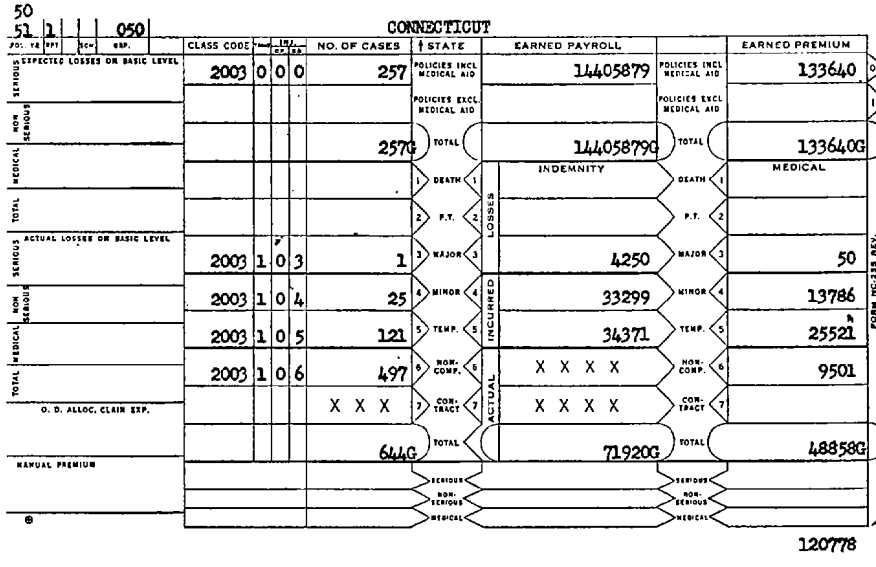
(10) Test of Proposed Pure Premiums. The process of determining formula pure premiums and departures from such pure premiums by the middle pure premium selection procedure, produces departures from the required rate level. Of course it is also possible that the reviewed classifications may produce a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

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

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

* Modified as indicated above.

UNIT PLAN EXPERIENCE CODE 2003 — BAKERIES FROM TABULATING DEPARTMENT



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CONNECTICUT

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

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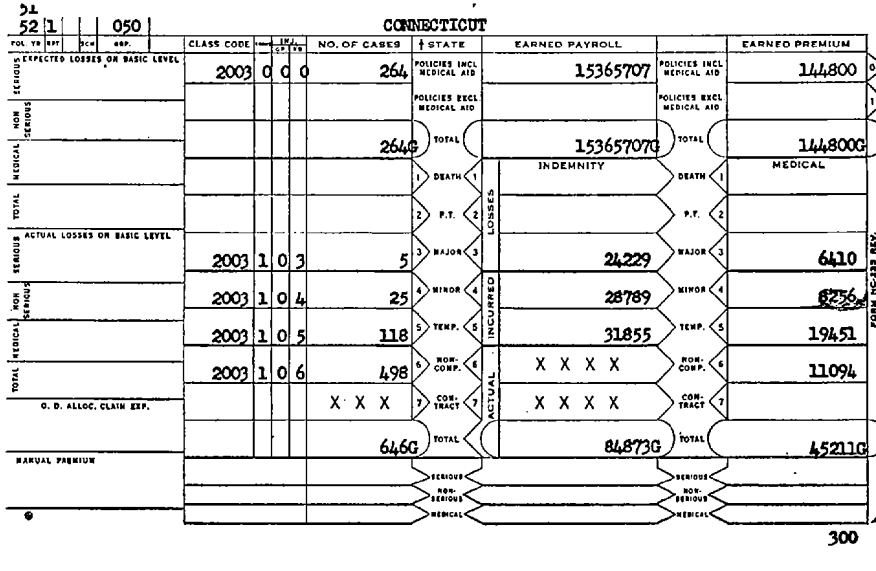

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CONNECTICUT

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

300

Adjustment Of Incurred Losses — Code 2003 — Bakeries

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

NATIONAL COUNCIL ON COMPENSATION INSURANCE STATE CONNECTICUT

FORM "H" DATE JULY 29, 1954

MANUFACTURING EXPECTED LOSSES LOCAL REV'N. NO. 28

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

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

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

CREDIBILITY CRITERIA * † — DATE JULY 29, 1954

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

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

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

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

8-5a

III DETERMINATION OF MANUAL RATES

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

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

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

Exhibit V—Computation of Final Manual Rate

Exhibit IV—Occupational Disease Rates

Exhibit VI—Schedule of Rates and Rating Values

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

CONNECTICUT FILING
EXHIBIT III

Allowances For Expenses, Taxes and Profit and Contingencies

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

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

It should be borne in mind that the allowances shown above apply only to the first $1000 of premium. For risks with premium over $1000 which in Connecticut represent about 8% of the total number of risks and about 74% of the total premium, manual rules provide for a reduction of rates through application of premium discounts (or their equivalents included in the Retrospective Rating Plan values). Premium discounts result from the reduction of expense requirements for Acquisition and General Administration with increasing premium size. The approved Connecticut premum discount percentages, which we propose be continued, are as follows:

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

A tabulation of Connecticut experience by risk size from policies written to expire between August 1, 1952 and July 31, 1953 (the latest available policy period) shows that for nonparticipating stock carriers the above discounts produced a net discount of 5.8%. This figure undoubtedly is on the conservative side because in actual practice the discounts, which increase by risk size, are based on the total risk premium, including premium developed by operations in states other than Connecticut.

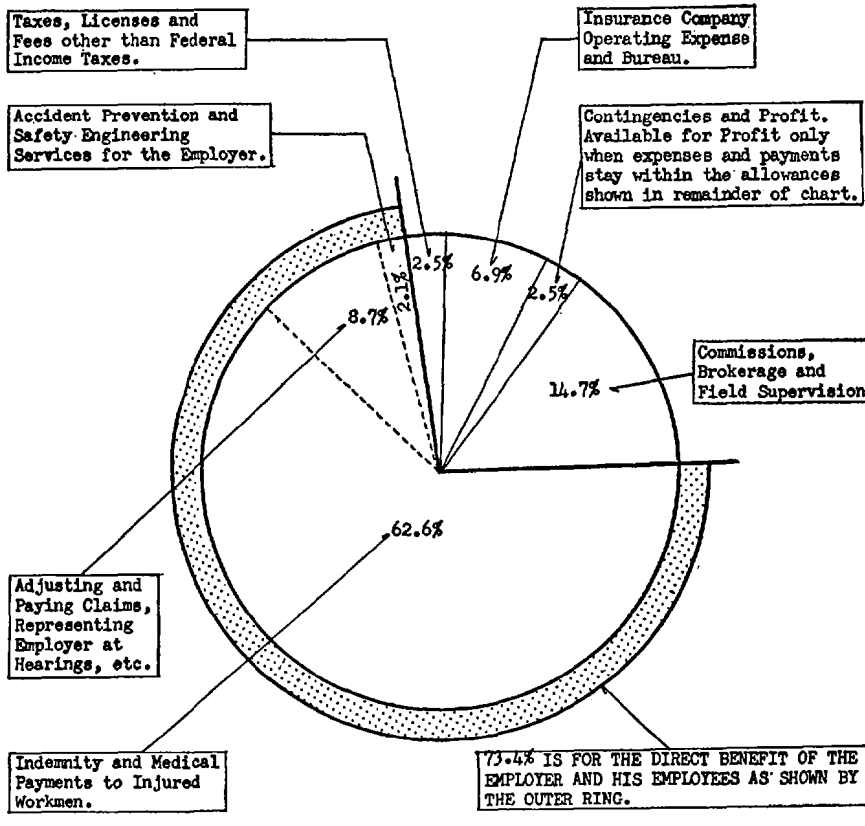
The tables below indicate for the non-participating stock carriers, the expense, taxes and profit and contingencies allowances on two bases. Column (1) lists the net allowances for the various items after reduction for premium discounts. Column (2) relates the various items to the premium actually collected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

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

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

NON-PARTICIPATING STOCK COMPANIES

BREAKDOWN OF NET PREMIUM RATE



NOTES:

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

CONNECTICUT FILING

EXHIBIT V

Computation of Final Manual Rate

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

A. *Rate Level Adjustment Factor*

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

B. *Loss Constants and Offsetting Reductions*

The present manual rates include an offsetting reduction for the loss constants so that the premium from such loss constants will not produce premium in excess of requirements. This proposal contemplates the continuance of existing loss constants. Calculations based upon a distribution by size of risk of Connecticut experience for the policy year rate level period (policies written to expire between August 1, 1951 and July 31, 1953) indicate that the present offsetting reductions will be appropriate for use with the proposed rates. By industry groups, loss constants and offsetting reductions follow:

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

C. *Proposed Rates*

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

The factors used in this proposal are the following:

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

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

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

CONNECTICUT FILING

EXHIBIT IV

Occupational Disease Rates

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

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

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

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

CONNECTICUT FILING

EXHIBIT VI

RATES AND RATING VALUES

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

COMMENTS REGARDING EXHIBIT III —

ALLOWANCE FOR EXPENSES, TAXES AND PROFIT AND CONTINGENCIES

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

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

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

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

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

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

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

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

Notes: (1) Acquisition is a budgetary item

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

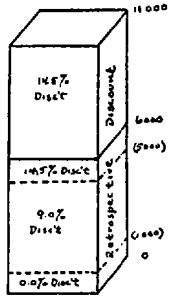
I might also include briefly the theory underlying the procedure when premium discounts and retrospective rating are involved on the same risk. As previously stated the retrospective rating values have the equivalent of the premium discounts built into the Basic Premium Ratios. The Premium Discount Rules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

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

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

(3) Net discount equals (1)–(2)

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



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

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

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

Step (3) Net Discount (1)-(2) $\quad 725$

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

COMMENTS REGARDING EXHIBIT V
—COMPUTATION OF FINAL MANUAL RATE LEVEL

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

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

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

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

C. Proposed Rates

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

Illustration Of Calculation Of Manual Rate — Code 2003 — Bakeries

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

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

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

COMMENTS ON EXHIBIT IV

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NATIONAL COVERAGE B RATES FOR DUST DISEASES

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

*Minimum less than .05

MISCELLANEOUS RATING VALUES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CONCLUSION

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

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

ADDENDUM

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART D — RATE LEVEL ADJUSTMENT FACTOR

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

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

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

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

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

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

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

The corresponding rate level adjustment factor is therefore

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

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

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

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

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

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

II. DETERMINATION OF CLASSIFICATION RELATIVITY

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

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

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

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

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

MISCELLANEOUS VALUES

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

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

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

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

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

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

STANDARD PROVISIONS FOR WORKMEN'S COMPENSATION AND EMPLOYERS' LIABILITY POLICIES*

BY

RANDALL C. KEAN

INTRODUCTION

It is the intent of this paper to present a concise explanation of the more important features of the new Workmen's Compensation and Employers' Liability Policy and to describe the Standard Provisions Program which was adopted by the National Council on Compensation Insurance and which became effective on October 1, 1954. This paper will not go into minute detail with respect to the individual policy provisions since it is prepared to serve as a general reference to help in the transition from the old to the new policy for those not directly engaged in using the policy.

We will first concern ourselves with some of the historical reasons why a new policy was needed and how work on it got underway. Next we will consider a description of the Standard Provisions Program. The special features of the new policy are explained herein and its scope of coverage is discussed. Certain comparisons are drawn with the policy previously used and comments are made with respect to new provisions. The endorsement program is outlined and references are made to contemplated legislative changes desirable to further simplify the contract.

WHY — A NEW POLICY?

The old Workmen's Compensation and Employers' Liability Policy was drafted about forty years ago when workmen's compensation insurance was in its infancy and when underwriting concepts were considerably different from what they are today. The policy had not been revised since it was originally drafted.

All of these years, until October 1, 1954, this standard policy was used by the carriers for the writing of workmen's compensation and employers' liability insurance in all states (with the exception of Arizona) in which private carriers are permitted to write compensation insurance. The broad national use of the policy was of great benefit and importance to the companies and the insured alike.

The policy served extremely well and relatively few questions of coverage arose under it. However, during its existence, changes occurred in the workmen's compensation laws of the various states and there were changes in underwriting methods.

Perhaps the most important changes in compensation laws have been those establishing requirements as to what the policies should cover. For example, some states require that all operations of an

*This paper presented by invitation.

employer at a specific location shall be covered, others require that all operations in the state shall be covered and still others require that all operations in a specific business shall be covered.

The underwriting changes have been many although it is necessary to refer to only a few such as:

1. Establishment of a per accident limit for employers' liability,
2. Interpretation of paragraph One (b), Employers' Liability, as not providing disease coverage,
3. Establishment of a different One (b) limit of liability for occupational disease,
4. Interpretation of paragraph One (b) with respect to illegal employment,
5. Inclusion of loss and expense constants and
6. Inclusion of executive officers remuneration charges.

Most of these changes are not applicable on a countrywide basis but are applied differently in the various jurisdictions.

All of these changes had been incorporated in the contract by endorsements which were designed to meet the specific situations involved.

From the beginning it was also necessary to attach to each policy state endorsements citing the compensation acts which were applicable. The policy was designed on the basis that, to perfect coverage, such endorsements would be attached. In addition to these citations, the state endorsements generally contained paragraphs dealing with special state requirements and in many cases specific language was required. As time went on it became necessary to attach more and more underwriting endorsements to the policy.

All in all, the old policy with its many necessary endorsements naturally became complicated, unwieldy, costly to issue and difficult for most people to understand.

HOW — A NEW POLICY?

For some time it had been felt that the ideal would be a new policy which could be used nationally, which would provide an employer with as nearly complete protection as possible for employee work injuries, and in which substantial simplification would be achieved. Such a policy, which eliminated the need for many of the endorsements required with the old policy and which incorporated current underwriting concepts and practices, would have three great advantages. First, it would satisfy the varying coverage needs of the insured, second, it would reduce expenses in connection with the issuance of policies, and third, it would make for better understanding on the part of carriers and insureds.

The achievement of a new simplified policy was necessarily contingent upon many underwriting conclusions. Decisions of the underwriters were sought with respect to innumerable questions. It might be helpful to highlight just a few of these questions:

Question #1 — What operations should be covered? The old policy applied, by its terms, to designated operations at designated locations and to operations necessary, incident, or appurtenant thereto. As pointed out, during the time that policy was in effect many states enacted statutes which required that compensation policies should cover operations more broadly than the old policy did. The old policy had to be endorsed accordingly.

After a number of coverage possibilities were considered, it was finally concluded that the new policy should cover all operations of a risk, at all of its locations within the state or states designated and all operations necessary or incidental thereto.

Question #2 — With respect to paragraph One (b) (Employers' Liability), should provision be made in the policy for voluntary compensation? At first the new policy was drafted as affording such coverage and later it was decided, for several reasons, that the coverage should be added by endorsement.

Question #3 — What should be the extent of coverage afforded under employers' liability? Should it include coverage for traumatic injuries only, or for occupational diseases, or should broad disease coverage be provided? It was ultimately agreed that all of these should be covered.

Question #4 — What limit of liability should apply under paragraph One (b)? The old policy, without endorsement, had no limit under paragraph One (b). Limits of liability were introduced at the time of the enactment of some compensation laws to protect the carriers in the event the laws were found unconstitutional. The basic policy limit for paragraph One (b) had been endorsed on at $25,000. A different limitation was used in some states, while no limitation applied in New York, Massachusetts and certain other states. It was finally decided that a basic policy limit of $25,000 should be established.

Many other questions arose, as for example: What should be done about covering illegal employment and what about liability cover? The old policy was commonly endorsed to limit the policy, under paragraph One (b) to liability imposed by law upon the employer for negligence. Should the new policy be limited to cover liability for negligence? What about contractual liability, should it continue to be excluded? The old policy covered "personal injury", was this too broad? Should the coverage be limited to "bodily injury"? These and many more questions were asked and ultimately answered before the actual drafting of the new policy was undertaken.

On the basis of considered answers involving underwriting conclusions, the Policy Forms Committee of the National Council was assigned the task of developing a policy program which would in-

corporate these conclusions and achieve simplification, clarification and operating economies.

For many months the Policy Forms Committee, assisted by other appropriate committees of the National Council on Compensation Insurance and in cooperation with other workmen's compensation insurance bureaus throughout the country, worked to develop the new policy and the Standard Provisions Program.

THE STANDARD PROVISIONS PROGRAM

This Standard Provision Program consists of the standard policy provisions including the policy declarations page, together with a set of general instructions (See Exhibit). Also, as a part of the program, are a number of endorsements which are designed to conform the basic policy to certain special individual state requirements which, in general, are of a statutory nature. For want of a better term these will be referred to as "enabling" endorsements. Certain other endorsements have been developed, as for example; those which provide coverage for maritime and other employments subject to federal law, those which provide voluntary compensation for non-subject employees and those which satisfy other special underwriting rules and requirements which are not applicable to all policies.

A memorandum of advice and direction has been prepared to guide the carriers in connection with the development, printing and issuing of their new policies.

A legislative program is now in the process of development as it is hoped that the several state legislatures can be prevailed upon to make amendments to the laws which will eliminate the need for several of the enabling endorsements. Finally, recommendations have been submitted for certain manual rule changes to achieve uniformity and thus eliminate the need for some of the special endorsements now required.

THE NEW POLICY

The redrafting of the policy was a tremendous task because of the multiplicity and wide variety of compensation laws, the many court decisions which have interpreted the old policy and the underwriting and coverage concept changes which had developed over the years.

The requirements of state laws and regulations applicable to workmen's compensation and employers' liability policies were carefully reviewed. Court decisions were fully examined. Policy drafts were prepared and studied from legal and underwriting viewpoints. Auditors, engineers and sales people considered the suggested language. The new policy, together with its enabling and other special endorsements, represents, as near as possible, the satisfying of all requirements.

In the preparation of the policy it was recognized that a great amount of effort had been expended in the development of standardized provisions for use nationally in other types of liability policies.

The Policy Forms Committee took advantage of the results obtained by the Joint Forms Committee of the Mutual and National Bureaus and adopted comparable provisions and language with whatever changes were necessary. The new policy, with its declarations, insuring agreements, exclusions and conditions, follows generally the national standard provisions for liability policies. It is intended that this new policy will be reviewed periodically in order to keep it up to date.

STANDARDIZATION

The entire form is expressed in standard language which may not be amended except in accordance with the specific instructions which are provided. There are options, however, for making such arrangement of the parts of the form as may be desired by individual carriers. Except for the major parts of the form and the coverage statements, the various identifying and indexing designations may be omitted or amended. This standardization is for the purpose of attaining reasonable uniformity among carriers and for the benefit of policyholders.

SCOPE OF COVERAGE

The old policy, unless otherwise endorsed, covered only those operations described in the declarations and only those employees whose individual remuneration was included in the total remuneration on which the premium for the policy was computed.

The basic concept of the new policy is the undertaking to provide statewide workmen's compensation and employers' liability coverage for all of the insured's locations and operations and to all of the insured's employees subject to the law of that state. Instead of statutory citations, as used in the old state endorsements to make the policy effective with respect to the individual workmen's compensation laws, there has been substituted a declaration that the new policy applies to the workmen's compensation laws of the states designated in Item 3 of its declarations. Having thus designated the states in which workmen's compensation coverage is to be afforded, the employers' liability coverage is automatically afforded with respect to all operations of the insured in the named states and operations necessary or incidental thereto.

The employers' liability coverage which was given by the old policy, unless extended by endorsement, was limited to injury by accident. The new policy, unless restricted by endorsement, gives coverage for bodily injury by accident and also for injury by disease. Thus, under the employers' liability agreement of the new policy, broad common law disease coverage is provided. "Disease" coverage has been included instead of the "occupational disease" coverage afforded by endorsement to the old policy.

The employers' liability coverage of the new policy, in conjunction with the workmen's compensation coverage, approaches the ideal of

giving an employer virtually complete protection with respect to claims by employees for work injuries. This is further highlighted by the fact that in using standard endorsements an employer now has available protection when, and if, he unexpectedly finds himself subject to a workmen's compensation law, under which coverage was not purchased or provided by the policy at the outset, or when he finds that some of his employees engaged in his wide spread operations are not subject to any workmen's compensation law. The standardization of these coverages, under the new program, is a big step forward in eliminating the many and varied "universal" or "all states" coverage and voluntary compensation coverage endorsements devised under the old program by the carriers themselves.

Generally speaking, under the new program more coverage is provided the average insured and more protection is provided for injured workmen.

It is also to be pointed out that during the transition period between the old and the new program certain of the old policies will remain in effect until their expiration date when new policies will be issued. So far as possible those carriers using the new policy will, as respects work injuries occurring on and after October 1, 1954 and arising out of operations covered by the old policy, interpret the old policy as affording, subject to certain conditions, the same coverage as if the contracts had been written on the new form. It is not necessary for an insured to have his old policy cancelled and his coverage written on the new policy in order to get the coverage advantages of the new policy.

At this point some comments with respect to the major provisions of the new policy, with remarks explaining changes from the old policy, seem to be desirable.

DECLARATIONS

The makeup of the declaration page permits the carriers in general to follow existing policy writing and policy issuing practices and facilitates the use of established accounting and statistical procedures.

Item 1 of the declarations is for the name, address and type of organization of the insured. It is drawn so as to require a minimum of typed entries for the very large number of policies covering single location risks. This item also calls for a listing of the usual or fixed locations of the risk if other than the address shown.

Item 2, "Policy Period," establishes a policy period relating to standard time at the address of the insured and is unlike the old policy wherein the policy period is not necessarily the same for all operations or for all injuries because of time differentials. It will be temporarily necessary to use an endorsement to eliminate overlapping of coverage, or gaps in coverage, which might occur where a new policy replaces or renews an old one and where coverage extends to more than one time zone.

In Item 3 of the declarations is listed the name of each state in

which the insured conducts operations which are to be covered under the policy and entries in this Item control policy coverage.

In Item 4, "Classification of Operations", provision is made for indicating the manual classifications applicable to the operations of the insured, the premium bases and rates, loss and expense constants, etc. and the method, if any, of interim premium adjustment. This is in accordance with existing practices. Introductory language to be noted at the head of this item reading as follows: "Entries in this item, except as specifically provided elsewhere in this policy, do not modify any of the other provisions of the policy", is intended to prevent an interpretation that typewritten entries therein override other provisions of the policy.

Item 5 is the "Limit of Liability for Coverage B" and provides for the entry in the declarations of the actual amount of the limit of liability for that coverage. In certain states employers' liability cannot be limited at present. It is hoped that someday it may be possible to specify a limit for employers' liability coverage which will be effective in all states. In the meantime, endorsements which remove this limit are necessary with respect to certain states. It is not possible under the new policy (see Manual Rules) to provide different limits of liability for accident and for disease.

Item 6, which may be included at the option of the company, calls for a statement of those operations of the insured which are not intended to be covered under the policy and is for the purpose of including in the declarations underwriting information with respect to operations which are otherwise insured. It should be understood that this declaration does not exclude coverage and may not be relied upon to affect such an exclusion.

Provision is also made in the declarations for other underwriting information which may be incorporated at the option of the company.

INSURING AGREEMENTS

Insuring Agreement I, Coverage A, "Workmen's Compensation", states the company's undertaking to insure the entire obligation of the insured under the workmen's compensation law of any state specified in the appropriate item of the declarations, including the insured's obligations under the law with respect to employees of uninsured subcontractors. If a state, having separate workmen's compensation and occupational disease laws and coverage, is to be afforded for only one of these laws, coverage for the other law must be excluded by endorsement.

Insuring Agreement I, Coverage B, "Employers' Liability", states the company's undertaking, subject to the applicable limit of liability stated in the declarations, to cover the liability imposed by law upon the insured because of bodily injury by accident or disease sustained by his employees arising out of and in the course of their employment. Such coverage applies only with respect to operations of the insured in any state specified in Item 3 of the declarations and with respect

to operations necessary or incidental to such operations. Basically, the employers' liability coverage has been revised to bring it into line with similar provisions of other liability policies. In certain instances, such as in the "employee exclusion" in the general liability and automobile liability policies, these other liability policies have been revised to complement this coverage.

Insuring Agreement II is the "Defense, Settlement, Supplementary Payments" agreement which, with appropriate editorial changes, follows the corresponding standard provisions in use in other forms of liability policies.

Insuring Agreement III, "Definitions", the definition of "Workmen's Compensation Law" is so devised as to bring within Coverage A the workmen's compensation and occupational disease law of each state listed in the declarations. This does not, however, include those provisions of such laws which provide non-occupational disability benefits, as for example, the New York Disability Benefits Law. This definition also does not include the provisions of the U. S. Longshoremen's and Harbor Worker's Compensation Act, coverage for which will continue to be afforded by endorsement. Definition (c) defines "Bodily Injury by Accident and Bodily Injury by Disease" and is necessary to make clear that for the purpose of applying the limits of liability, the same injury cannot be both a "bodily injury by accident" and a "bodily injury by disease." Furthermore, it makes effective an exclusion from the policy of coverage for bodily injury by accident or for bodily injury by disease where such an exclusion is desired.

Insuring Agreement IV, "Application of Policy", provides that in a disease case the insurance company covering the employer at the time of the last injurious exposure of the employee in the employment of the employer is the carrier liable. A special endorsement is necessary in California and Connecticut as respects contribution in disease cases between successive insurance carriers of the same employer.

EXCLUSIONS

The new policy contains exclusions "a" through "f". The old policy contained no exclusions.

Because coverage is provided for all operations within a state designated in Item 3 of the declarations, exclusion (a) which reads, "This policy does not apply to operations conducted at or from any workplace not described in Item 1 or 4 of the declaration if the insured has, under the workmen's compensation law, other insurance for such operations or is a qualified self-insurer therefor;", is necessary to exclude coverage for any operations in such state which are otherwise insured or are self-insured. If further restriction of coverage is desired by a carrier in any state the attachment of a special endorsement is necessary.

Exclusion (b) which reads, "This policy does not apply unless required by law or described in the declaration, to domestic employment or to farm or agricultural employment;" prevents automatic applica-

tion of the policy to such employments. This gives recognition to the fact that insureds having commercial operations often have domestic servants or farm labor, but do not wish to secure compensation for such employees unless required to do so by the statute. With the exclusion such coverage is eliminated, but it can be afforded, except in California where the workmen's compensation law includes farm laborers, by describing such employments in the "Classification of Operations" section of the declarations.

Exclusion (c), the contractual exclusion which reads, "This policy does not apply under Coverage B, to liability assumed by the insured under any contract or agreement;", speaks for itself and is as expressed in other forms of liability policies.

Exclusion (d) reads, "This policy does not apply under Coverage B, (1) to punitive or exemplary damages on account of bodily injury to or death of any employee employed in violation of law, or (2), with respect to any employee employed in violation of law with the knowledge or acquiescence of the insured or any executive officer thereof;" and is also typical of other liability policies.

Under the endorsements used with the old policy no coverage for common law liability for disease was afforded unless incapacity resulted within twelve months after the end of the policy period. Exclusion (e), of the new policy, which reads, "This policy does not apply under Coverage B, to bodily injury by disease unless prior to thirty-six months after the end of the policy period written claim is made or suit is brought against the insured for damages because of such injury or death resulting therefrom", rules out coverage for any common law disease claims unless brought within thirty-six months after the end of the policy period and eliminates the requirement in the old policy that incapacity must result within twelve months after the policy terminates. This change has the effect of broadening somewhat the common law disease coverage.

Exclusion (f) reads as follows: "This policy does not apply under Coverage B, to any obligation for which the insured or any carrier as his insurer may be held liable under the workmen's compensation or occupational disease law of a state designated in Item 3 of the declarations, any other workmen's compensation or occupational disease law, any unemployment compensation or disability benefits law, or under any similar law". This eliminates from employers' liability all cases coming within the scope of any workmen's compensation law and cases coming under any unemployment compensation law or disability benefits law. Although the old policy contained no such exclusion this serves to carry out the presently accepted practices and makes for no change in coverage.

CONDITIONS

Throughout the new policy and particularly in Condition 1, the "Premium" condition, complete reliance is placed on the words "manuals in use by the company". This expresses the policy provisions

with respect to the application of premium bases, the determination of premiums and the effect of changes in classifications, rates and rating plans, including rate changes required to compensate for law amendments affecting benefits. This device makes unnecessary numerous provisions formerly appearing in the several state and other endorsements by including by reference the basic manual rules for premium computation, etc. in the policy itself.

With some minor exceptions premium discount and retrospective rating endorsements are the only endorsements for premium computation to be used and this because of the special nature of these programs.

Condition 2, incorporates special provisions applicable to policies written for a term in excess of one year and its use is optional with each company.

Condition 3, entitled "Partnership or Joint Venture as Insured", is designed to remove from the coverage afforded under a policy written for a partnership or joint venture any other operations of a partner or member of the joint venture which are not operations of the partnership or joint venture itself.

With respect to Condition 4-7 which include "Inspection and Audit", "Notice of Injury", "Notice of Claim or Suit", "Assistance and Cooperation of the Insured", they all follow, with such editorial changes as were necessary, the corresponding standard provisions adopted for use in other forms of liability policies.

Condition 8, "Statutory Provisions", sets forth the statutory obligations of the company under each of the workmen's compensation laws with respect to which coverage is afforded under the policy.

In the first sentence of Condition 9, which is the "Limits of Liability" condition, it is made clear that damages for "care and loss of services" and recoveries from the insured in "third party indemnity cover" actions growing out of bodily injuries to employees of the insured are within the coverage of employer's liability. The limit of liability for bodily injury by accident is expressed on an "any one accident" basis. The limit of liability for bodily injury by disease is expressed as a policy year limit by state. For the present the policy must be endorsed to eliminate the application of the limit of liability stated in the declarations with respect to injuries growing out of operations subject to the workmen's compensation laws of certain states where no limit of liability applies.

The "Other Insurance" provision embodied in Condition 11, makes the insurance afforded by the policy contributing insurance with other valid and collectible insurance. The language of this condition gives recognition to the fact that with respect to certain types of cases in some states the limit of liability applicable to Coverage B is not recognized and, further, provides for a more equitable distribution of losses among carriers.

Condition 16, which reads, "Terms of this policy which are in con-

flict with the provisions of the workmen's compensation law are hereby amended to conform to such law", guarantees conformity of the policy with each workmen's compensation law and eliminates the need for endorsements to correct conflicts created by the lack of uniformity in the workmen's compensation laws.

The remaining conditions all follow, with such editorial changes as were necessary, the corresponding standard provisions adopted for use nationally in other forms of liability policies. Condition 15, "Cancelation", however, contains an additional provision requiring compliance with any statutory provisions respecting cancelation of policies which provide coverage under the workmen's compensation law.

ENDORSEMENTS

It is to be remembered that one major purpose of the new policy was to eliminate a large number of endorsements which were formerly required to adapt the old policy to the different coverage needs of individual employers, the administrative regulations of the various supervising authorities, the various state laws and the requirements of the underwriting and rating manuals. This was accomplished by incorporating in the policy, wherever possible, the provisions of "State" and other standard endorsements. The new policy, therefore, can be used in many states for the majority of risks without attaching a single endorsement.

At the outset the endorsement problem fell into the following general sub-divisions:

1. Previously used endorsements made unnecessary by language of the new policy.
2. Previously used endorsements which could be used with the new policy without change.
3. Previously used endorsements which had to be amended in order to be used with the revised policy.
4. New endorsements which had to be drafted to be used with the new policy.

A review was made of all statutory endorsements to determine what portions of them could be eliminated as not necessary because of the provisions being included in the new policy itself. The result was that state endorsements as such were eliminated. In more than half of the jurisdictions which approved the new program, the policy itself provides the complete contract. In the other jurisdictions only one short endorsement is necessary to form the basic contract and make it conform with special state requirements. A review of all other endorsements was made in line with the general sub-divisions mentioned above. Some endorsements were eliminated, some were revised and in some cases new ones were drafted.

As previously pointed out, certain endorsements became necessary to tailor the policy to meet the statutory requirements which could not be incorporated in the policy itself and because of the elimination of the regular state endorsements previously used. Examples of such endorsements are those which include or exclude from the policy executive officers, working partners and relatives of the insured. Other endorsements designed to take care of underwriting rules in the manuals and other special situations were drafted. Most of these endorsements are "Standard" under the National Council filing program.

Although it was necessary to draft a rather large number of endorsements, most of them are necessary only on a relatively few policies to satisfy specific requirements of one sort or another.

LEGISLATIVE PROGRAM

Many people have expressed interest in the program which is being undertaken to attain further simplification and to make for the most effective and efficient use of the policy. Actually, the primary objective of this program is to make it possible to write a basic workmen's compensation contract in every state without endorsement. To accomplish this, some legislation will need to be enacted in several states. Through a cooperative effort the Policy Forms Committee of the National Council is working with the various bureaus throughout the country in an effort to develop a program designed to achieve these goals.

It can be said that attempts are being made to encourage the states to consider whatever may be necessary in the way of law changes to make possible the elimination of some of the enabling endorsements.

The present requirement in several states is that in order to come within the compensation law employers or carriers must make certain filings with state authorities. It is planned to encourage legislation in these states, to provide that the purchase of insurance by an employer is an election to be bound by the compensation law. If successful, much greater simplification with consequent reduction in costs will be achieved.

It is also hoped that amendments can be made to certain compensation laws which will make it unnecessary to quote in the policy (or endorsements), word for word, portions of such laws.

These examples merely illustrate the type of action contemplated under the legislative program. 1955 should be an appropriate year in which to introduce these actions since the legislatures of most of the states will meet during the year and will have an opportunity to consider the various questions.

STATUS OF PROGRAM

The Standard Provisions Policy, including the enabling endorsements, after approval by all of the workmen's compensation bureaus, was filed by the National Council with the supervising authorities in all states where the National Council is a rating organization and has

authority to file. It was recommended to other rating organizations for filing in the so-called Independent Bureau states. In addition, in Alaska, Idaho, Illinois, Rhode Island, Montana and California, test filings of the proposed policy were made.

In several states questions were raised requesting clarification of certain elements of the policy. After due consideration, each of these questions has been answered through the Policy Forms Committee.

With the exception of Arizona, the policy and endorsements have been approved in all states in which private carriers are permitted to write workmen's compensation insurance and have been approved also by the Bureau of Employees' Compensation, Department of Labor.

The new policy became effective October 1, 1954.

STANDARD PROVISIONS FOR WORKMEN'S COMPENSATION AND EMPLOYERS' LIABILITY POLICIES

GENERAL INSTRUCTIONS

1. Standard Language

This form is expressed in standard language which may not be amended and no part of which may be omitted except (a) as indicated by these instructions, or (b) as indicated in reference notes shown below referring to specific portions of the form, or (c) by an endorsement which states an amendment or exclusion of some provision of the form in accordance with the provisions of a manual rule, the form of which endorsement has been approved, if required, by the supervising authority of each state in which such endorsement is applicable.

2. Optional Sequence and Arrangement

The several parts of the form, viz., "Insuring Agreements," "Exclusions," "Conditions" and "Declarations" may appear in the policy in such sequence as the company may elect and the sequence and arrangement of the several provisions of those parts are also optional with the company.

3. Descriptive Headings—Identifying or Indexing Designations

The descriptive headings of the parts of the form (as quoted above) and of the major insuring agreements ("Workmen's Compensation" and "Employers' Liability") are standard expressions which may not be amended or omitted, but all identifying or indexing designations (such as "Coverage A," "Defense, Settlement, Supplementary Payments," "Cancelation," etc.), including literal or numerical designations of paragraphs or phrases may be amended or omitted at the company's option. When such identifying or indexing designations, used for the purpose of reference in the text of the form or any endorsement form applicable thereto, are amended or omitted, descriptive designations shall be substituted therefor.

4. Definition of "Standard Language"

"Standard language" when used in these instructions means the form and endorsements either prescribed or approved by the insurance supervising authority of the state in which policy forms and endorsements are approved or prescribed. In those states where supervising authorities do not have the authority to approve or prescribe policies, forms and endorsements, the term means the forms and endorsements adopted by the companies for use in such states.

5. Special Conditions for Mutuals, Reciprocals and Participating Stock Companies

When the policy is issued by a mutual company, a reciprocal association or a participating stock company having special provisions applicable to its membership or policyholders, such provisions, when approved by the supervising authority of the state in which the policy is issued if such approval is required, may be inserted in the policy.

REFERENCE NOTES

1—Matter in brackets may be included, omitted or amended at the option of the company.
2—The effective hour and date of the policy may be typed or printed in this space.
3—Matter in brackets may be omitted.
4—The applicable classifications, including the standard exceptions, may be typed or printed in this space.
5—The capacity of the person countersigning may be stated.
6—Declarations of this type calling for underwriting data and general information may be used at the option of the company.
7—The name and location of the company are to be stated. The type of the company and the word used throughout the policy suitably to designate the company are to be stated.
8—The exclusions may be combined into one or any other number of paragraphs.
9—The language of this paragraph is optional with the company.

BLANK INSURANCE COMPANY

[Workmen's Compensation and
Employers' Liability][1] Policy No._____

DECLARATIONS

Item 1. Name of insured_____

Address_____
[No. Street Town or City County State][1]

☐ Individual ☐ Partnership ☐ Corporation ☐ _____ (Other)

Locations—All usual workplaces of the insured at or from which operations covered by this policy are conducted are located at the above address unless otherwise stated herein:_____

Item 2. Policy Period: From_____ (See Reference Note 2.) to_____
12:01 A.M., standard time at the address of the insured as stated herein.

Item 3. Coverage A of this policy applies to the workmen's compensation law and any occupational disease law of each of the following states:

_____

Item 4. Classification of Operations Entries in this item, except as specifically provided elsewhere in this policy, do not modify any of the other provisions of this policy.	Code No.	Premium Basis: Estimated Total Annual Remuneration	Rates: Per $100 of Remuneration	Estimated Annual Premiums [3]
Loss Constant Expense Constant Loss and Expense Constant Policy Fee [3]				
(See Reference Note 4.)				

Minimum Premium $ **Total Estimated Annual Premium $**

If indicated below, interim adjustments of premium shall be made: Deposit Premium $
Semi-Annually ☐ Quarterly ☐ Monthly ☐ [3]

Item 5. Limit of Liability for Coverage B—Employers' Liability: $, subject to all the terms of this policy having reference thereto.

Item 6. The insured is not conducting other operations at or from the locations described herein or any operations at or from any other location in a state designated in Item 3; exception, if any_____ [1]

[Date and Place of Issue_____][1]

Countersigned [_____ 19____, at_____][1] by_____
(See Reference Note 5.)

A. Renewal of policy number.
B. Endorsement serial numbers.
C. Rating plan or premium discount.
D. Record of past experience.
E. Cancelation of similar insurance. [6]

[**BLANK INSURANCE COMPANY**
[A_____insurance company, herein called the company)]7

Agrees with the insured, named in the declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the declarations and subject to the limits of liability, exclusions, conditions and other terms of this policy:

INSURING AGREEMENTS

I Coverage A—Workmen's Compensation

To pay promptly when due all compensation and other benefits required of the insured by the workmen's compensation law.

Coverage B—Employers' Liability

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of bodily injury by accident or disease, including death at any time resulting therefrom, sustained in the United States of America, its territories or possessions, or Canada by any employee of the insured arising out of and in the course of his employment by the insured either in operations in a state designated in Item 3 of the declarations or in operations necessary or incidental thereto.

II Defense, Settlement, Supplementary Payments

As respects the insurance afforded by the other terms of this policy the company shall:

(a) defend any proceeding against the insured seeking such benefits and any suit against the insured alleging such injury and seeking damages on account thereof, even if such proceeding or suit is groundless, false or fraudulent; but the company may make such investigation, negotiation and settlement of any claim or suit as it deems expedient;

(b) pay all premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, all premiums on appeal bonds required in any such defended proceeding or suit, but without any obligation to apply for or furnish any such bonds;

(c) pay all expenses incurred by the company, all costs taxed against the insured in any such proceeding or suit and all interest accruing after entry of judgment until the company has paid or tendered or deposited in court such part of such judgment as does not exceed the limit of the company's liability thereon;

(d) reimburse the insured for all reasonable expenses, other than loss of earnings, incurred at the company's request.

The amounts incurred under this insuring agreement, except settlements of claims and suits, are payable by the company in addition to the amounts payable under coverage A or the applicable limit of liability under coverage B.

III Definitions

(a) **Workmen's Compensation Law.** The unqualified term "workmen's compensation law" means the workmen's compensation law and any occupational disease law of a state designated in Item 3 of the declarations, but does not include those provisions of any such law which provide non-occupational disability benefits.

(b) **State.** The word "state" means any State or Territory of the United States of America and the District of Columbia.

(c) **Bodily Injury by Accident; Bodily Injury by Disease.** The contraction of disease is not an accident within the meaning of the word "accident" in the term "bodily injury by accident" and only such disease as results directly from a bodily injury by accident is included within the term "bodily injury by accident." The term "bodily injury by disease" includes only such disease as is not included within the term "bodily injury by accident."

(d) **Assault and Battery.** Under coverage B, assault and battery shall be deemed an accident unless committed by or at the direction of the insured.

IV Application of Policy

This policy applies only to injury (1) by accident occurring during the policy period, or (2) by disease caused or aggravated by exposure of which the last day of the last exposure, in the employment of the insured, to conditions causing the disease occurs during the policy period.

[EXCLUSIONS][8]

This policy does not apply:

(a) to operations conducted at or from any workplace not described in Item 1 or 4 of the declarations if the insured has, under the workmen's compensation law, other insurance for such operations or is a qualified self-insurer therefor;

(b) unless required by law or described in the declarations, to domestic employment or to farm or agricultural employment;

(c) under coverage B, to liability assumed by the insured under any contract or agreement;

(d) under coverage B, (1) to punitive or exemplary damages on account of bodily injury to or death of any employee employed in violation of law, or (2) with respect to any employee employed in violation of law with the knowledge or acquiescence of the insured or any executive officer thereof;

(e) under coverage B, to bodily injury by disease unless prior to thirty-six months after the end of the policy period written claim is made or suit is brought against the insured for damages because of such injury or death resulting therefrom;

(f) under coverage B, to any obligation for which the insured or any carrier as his insurer may be held liable under the workmen's compensation or occupational disease law of a state designated in Item 3 of the declarations, any other workmen's compensation or occupational disease law, any unemployment compensation or disability benefits law, or under any similar law.

CONDITIONS

[The conditions, except conditions 8, 9, 10 and 16, apply to all coverages.][1]
[Conditions 8, 9, 10 and 16, apply only to the coverage noted thereunder.][1]

1. Premium The premium bases and rates for the classifications of operations described in the declarations are as stated therein and for classifications not so described are those applicable in accordance with the manuals in use by the company. This policy is issued by the company and accepted by the insured with the agreement that if any change in classifications, rates or rating plans is or becomes applicable to this policy under any law regulating this insurance or because of any amendments affecting the benefits provided by the workmen's compensation law, such change with the effective date thereof shall be stated in an endorsement issued to form a part of this policy.

When used as a premium basis, "remuneration" means the entire remuneration, computed in accordance with the manuals in use by the company, earned during the policy period by (a) all executive officers and other employees of the insured engaged in operations covered by this policy, and (b) any other person performing work which may render the company liable under this policy for injury to or death of such person in accordance with the workmen's compensation law. "Remuneration" shall not include the remuneration of any person within division (b) foregoing if the insured maintains evidence satisfactory to the company that the payment of compensation and other benefits under such law to such person is secured by other valid and collectible insurance or by any other undertaking approved by the governmental agency having jurisdiction thereof.

If the declarations provide for adjustment of premium on other than an annual basis, the insured shall pay the deposit premium to the company upon the inception of this policy and thereafter interim premiums shall be computed in accordance with the manuals in use by the company and paid by the insured promptly after the end of each interval specified in the declarations. The deposit premium shall be retained by the company until termination of this policy and credited to the final premium adjustment.

The insured shall maintain records of the information necessary for premium computation on the bases stated in the declarations, and shall send copies of such records to the company at the end of the policy period and at such times during the policy period as the company may direct. If the insured does not furnish records of the remuneration of persons within division (b) of the definition of remuneration foregoing, the remuneration of such persons shall be computed in accordance with the manuals in use by the company.

The premium stated in the declarations is an estimated premium only. Upon termination of this policy, the earned premium shall be computed in accordance with the rules, rates, rating plans, premiums and minimum premiums applicable to this insurance in accordance with the manuals in use by the company. If the earned premium thus computed exceeds the premium previously paid, the insured shall pay the excess to the company; if less, the company shall return to the insured the unearned portion paid by the insured. All premiums shall be fully earned whether any workmen's compensation law, or any part thereof, is or shall be declared invalid or unconstitutional.

[2. Long Term Policy If this policy is written for a period longer than one year, all the provisions of this policy shall apply separately to each consecutive twelve months period, or, if the first or last consecutive period is less than twelve months, to such period of less than twelve months, in the same manner as if a separate policy had been written for each consecutive period. The earned premium for each such period shall be computed as provided by Condition 1 of this policy, subject, except as otherwise provided in the manuals in use by the company with respect to classifications of operations for which this policy provides a per capita premium basis, to the following provisions:

(a) The premium rates for the first consecutive period shall be those stated in the declarations and those applicable for such period in accordance with the manuals in use by the company;

(b) The premium bases, classifications of operations, rates, rating plans, premiums and minimum premiums for each such subsequent period shall be those applicable for such period in accordance with the manuals in use by the company.]*

3. Partnership or Joint Venture as Insured If the insured is a partnership or joint venture, such insurance as is afforded by this policy applies to each partner or member thereof as an insured only while he is acting within the scope of his duties as such partner or member.

4. Inspection and Audit The company and any rating authority having jurisdiction by law shall each be permitted to inspect the workplaces, machinery and equipment covered by this policy and to examine and audit the insured's books, vouchers, contracts, documents and records of any and every kind at any reasonable time during the policy period and any extension thereof and within three years after termination of this policy, as far as they relate to the premium bases or the subject matter of this insurance.

5. Notice of Injury When an injury occurs written notice shall be given by or on behalf of the insured to the company or any of its authorized agents as soon as practicable. Such notice shall contain particulars sufficient to identify the insured and also reasonably obtainable information respecting the time, place and circumstances of the injury, the names and addresses of the injured and of available witnesses.

6. Notice of Claim or Suit If claim is made or suit or other proceeding is brought against the insured, the insured shall immediately forward to the company every demand, notice, summons or other process received by him or his representative.

7. Assistance and Cooperation of the Insured The insured shall cooperate with the company and, upon the company's request, shall attend hearings and trials and shall assist in effecting settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of suits or proceedings. The insured shall not, except at his own cost, voluntarily make any payment, assume any obligation or incur any expense other than for such immediate medical and other services at the time of injury as are required by the workmen's compensation law.

8. Statutory Provisions Coverage A The company shall be directly and primarily liable to any person entitled to the benefits of the workmen's compensation law under this policy. The obligations of the company may be enforced by such person, or for his benefit by any agency authorized by law, whether against the company alone or jointly with the insured. Bankruptcy or insolvency of the insured or of the insured's estate, or any default of the insured, shall not relieve the company of any of its obligations under coverage A.

As between the employee and the company, notice or knowledge of the injury on the part of the insured shall be notice or knowledge, as the case may be, on the part of the company; the jurisdiction of the insured, for the purposes of the workmen's compensation law, shall be jurisdiction of the company and the company shall in all things be bound by and subject to the findings, judgments, awards, decrees, orders or decisions rendered against the insured in the form and manner provided by such law and within the terms, limitations and provisions of this policy not inconsistent with such law.

All of the provisions of the workmen's compensation law shall be and remain a part of this policy as fully and completely as if written herein, so far as they apply to compensation and other benefits provided by this policy and to special taxes, payments into security or other special funds, and assessments required of or levied against compensation insurance carriers under such law.

The insured shall reimburse the company for any payments required of the company under the workmen's compensation law, in excess of the benefits regularly provided by such law, solely because of injury to (a) any employee by reason of the serious and wilful misconduct of the insured, or (b) any employee employed by the insured in violation of law with the knowledge or acquiescence of the insured or any executive officer thereof.

Nothing herein shall relieve the insured of the obligations imposed upon the insured by the other terms of this policy.

9. Limits of Liability Coverage B The words "damages because of bodily injury by accident or disease, including death at any time resulting therefrom," in coverage B include damages for care and loss of services and damages for which the insured is liable by reason of suits or claims brought against the insured by others to recover the damages obtained from such others because of such bodily injury sustained by employees of the insured arising out of and in the course of their employment. The limit of liability stated in the declarations for coverage B is the total limit of the company's liability for all damages because of bodily injury by accident, including death at any time resulting therefrom, sustained by one or more employees in any one accident. The limit of liability stated in the declarations for coverage B is the total limit of the company's liability for all damages because of bodily injury by disease, including death at any time resulting therefrom, sustained by one or more employees of the insured in operations in any one state designated in Item 3 of the declarations or in operations necessary or incidental thereto.

The inclusion herein of more than one insured shall not operate to increase the limits of the company's liability.

10. Action Against Company Coverage B No action shall lie against the company unless, as a condition precedent thereto, the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured's obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant and the company.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this policy. Nothing contained in this policy shall give

any person or organization any right to join the company as a co-defendant in any action against the insured to determine the insured's liability.

Bankruptcy or insolvency of the insured or of the insured's estate shall not relieve the company of any of its obligations under coverage B.

11. Other Insurance If the insured has other insurance against a loss covered by this policy, the company shall not be liable to the insured hereunder for a greater proportion of such loss than the amount which would have been payable under this policy, had no such other insurance existed, bears to the sum of said amount and the amounts which would have been payable under each other policy applicable to such loss, had each such policy been the only policy so applicable.

12. Subrogation In the event of any payment under this policy, the company shall be subrogated to all rights of recovery therefor of the insured and any person entitled to the benefits of this policy against any person or organization, and the insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. The insured shall do nothing after loss to prejudice such rights.

13. Changes Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this policy or estop the company from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part of this policy [, signed by_____ (here insert titles of authorized company officials or representatives); provided, however, changes may be made in the written portion of the declarations by_____ (here insert titles of authorized company representatives) when initialed by such_____ (here insert titles of authorized company representatives) or by endorsement issued to form a part of this policy signed by such_____ (here insert titles of authorized company representatives)][1].

14. Assignment Assignment of interest under this policy shall not bind the company until its consent is endorsed hereon. If, however, during the policy period the insured shall die, and written notice is given to the company within thirty days after the date of such death, this policy shall cover the insured's legal representative as insured; provided that notice of cancelation addressed to the insured named in the declarations and mailed or delivered, after such death, to the address shown in this policy shall be sufficient notice to effect cancelation of this policy.

15. Cancelation This policy may be canceled by the insured [by surrender thereof to the company or any of its authorized agents or][3] by mailing to the company written notice stating when thereafter the cancelation shall be effective. This policy may be canceled by the company by mailing to the insured at the address shown in this policy written notice stating when not less than ten days thereafter such cancelation shall be effective. The mailing of notice as aforesaid shall be sufficient proof of notice. The [time of the surrender or the][3] effective date [and hour][3] of cancelation stated in the notice shall become the end of the policy period. Delivery of such written notice either by the insured or by the company shall be equivalent to mailing.

If the insured cancels, unless the manuals in use by the company otherwise provide, earned premium shall be (1) computed in accordance with the customary short rate table and procedure and (2) not less than the minimum premium stated in the declarations. If the company cancels, earned premium shall be computed pro rata. Premium adjustment may be made at the time cancelation is effected and, if not then made, shall be made as soon as practicable after cancelation becomes effective. The company's check or the check of its representative mailed or delivered as aforesaid shall be a sufficient tender of any refund of premium due to the insured.

When the insurance under the workmen's compensation law may not be canceled except in accordance with such law, this condition so far as it applies to the insurance under this policy with respect to such law, is amended to conform to such law.

16. Terms of Policy Conformed to Statute Terms of this policy which are in conflict with the provisions of the workmen's compensation law are hereby amended to conform to such law.

Coverage A

17. Declarations By acceptance of this policy the insured agrees that the statements in the declarations are his agreements and representations, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements existing between himself and the company or any of its agents relating to this insurance.

In witness whereof, the Blank Insurance Company has caused this policy to be signed by its president and a secretary at _____ and countersigned on the declarations page by a duly authorized agent of the company.

(FACSIMILE OF SIGNATURE) Secretary

(FACSIMILE OF SIGNATURE) President

[9]

PROLONGED ILLNESS INSURANCE

BY

MARK KORMES

1. INTRODUCTION

In this paper there is described an approach to the coverage for the catastrophic aspect of a serious and prolonged illness as well as the methods used in arriving at a set of rates to be charged therefor. This type of insurance is relatively new and has been initiated by several large Life Insurance companies and Blue Cross-Blue Shield organizations. A paper on the subject by Alan Thaler* appeared in the Transactions of the Society of Actuaries. Mr. Thaler describes the statistics developed from an internal questionnaire of a certain group of the employees of the Prudential Insurance Company and the conclusions as to the rates based on the results of such data.

While most insurance company coverages combine both deductible and coinsurance features, the approach of the Blue Cross-Blue Shield organizations is somewhat different and this paper is devoted to a description of the coverage and ratemaking developed by the Massachusetts Blue Cross-Blue Shield.

I wish to express my sincere appreciation to the managements of the Massachusetts Hospital Service, Inc. and the Massachusetts Medical Service for their kind permission to use their experience and other information.

2. PRELIMINARY CONSIDERATIONS

Inasmuch as the prolonged illness coverage would be available only in conjunction with basic Blue Cross-Blue Shield contracts it is necessary to give a brief outline of the salient provisions of the basic contracts.

The Massachusetts Hospital Service Inc. offers hospital protection contracts with varying amounts of room and board indemnity ($7, $10 and $12 per diem are the most frequent) for a period of sixty (60) days and one half of this amount for an additional sixty (60) days. The extras are covered in full regardless of the daily room and board indemnity and for the entire period of one hundred and twenty (120) days.

The Massachusetts Medical Service provides coverage for surgical expenses (in hospital or in office) in accordance with a fee schedule and medical care while in hospital, the latter being restricted to the first twenty-one (21) days of hospitalization. There are two classes of contracts, A and B, with different rates and different fee schedules but both types are service contracts, that is the scheduled fee is the only fee the surgeon or physician receives if the subscriber is in a certain prescribed income category. Thus plan A provides service benefits

*Group Major Medical Expense Insurance, T.S.A. III, 1951, p. 429 f.f.

if the family income does not exceed $3,000 per annum and plan B if such income does not exceed $5,000 per annum. The monetary limits have been selected upon a careful study of the Massachusetts income statistics and it is estimated that these limits permit the application of service benefits to approximately 85% of the population. When wage data have shown that the limits are not adequate, appropriate changes have been made.

In considering the coverage for prolonged illness the approach was not from the amount of insurance point of view but rather what will be the most essential additional benefits needed to supplement the basic coverage in the event of a serious and prolonged illness. The type and extent of coverage and its underwriting limitations are described in the next section. The contract is a joint obligation of the two corporations permitted by special legislation.

3. SCOPE OF COVERAGE

The coverage may be divided into three (3) categories:

(i) Benefits for hospitalized cases
(ii) Benefits for mental disorders
(iii) Special benefits for specific serious conditions

The first category implements the coverage of the basic contract in that it provides for:

(a) The extension of the physicians services for hospital visits from the 22nd to the 120th day of hospitalization.

(b) An allowance for room and board charges of up to $6.00 per day in addition to the basic allowance from the 61st to the 120th day of hospitalization.

(c) An allowance of 50% of customary charges for private duty registered nurse. This benefit for which a maximum of $300.00 is provided, is restricted to conditions requiring a surgical procedure listed at $175.00 or more in the Blue Shield Plan B schedule of fees. There are at present 256 such procedures and this restriction was selected on the basis of medical opinion as to the real need for private duty nurses in order to avoid abuses.

The benefits for *mental disorders* are as follows:

(a) *Physician Services.*
  (1) Up to $25.00 per treatment (including anaesthesia) for *electric shock therapy* for a hospital in-patient or out-patient. Payments cover associated psychotherapy and are limited to twenty (20) treatments.
  (2) Up to $8.00 per treatment for *insulin shock* therapy to a hospital in-patient. Limit of seventy (70) such shock treatments.

(b) *Room and Board Allowance.* Up to $10.00 a day in a *mental* hospital or up to $10.00 a day in *licensed general* hospital from the 11th day. Maximum allowance $300.00.

(c) *Other hospital charges.*
Full coverage is provided for drugs, dressings, X-rays, pathology examinations and use of equipment to administer insulin shock or electric shock treatment.

The category of special benefits for major injuries and illnesses is applicable to the following diagnoses:

(1) Amputation (where artificial substitute is required)
(2) Cancer
(3) Cerebral hemorrhage, embolism or thrombosis (brain)
(4) Cirrhosis of the liver (with abnormal accumulation of fluid within abdominal cavity requiring puncture of abdominal wall or following an operation to provide compensatory circulation)
(5) Coronary Embolism or thrombosis (heart)
(6) Degeneration of kidney or chronic nephritis
(7) Degeneration of Spinal Cord (producing paralysis of lower limbs)
(8) Fractures
(9) Heart Failure (congestion in circulatory system)
(10) *Hemiplegia* (paralysis of one side of body); *Paraplegia* (paralysis of legs and lower part of body) or *quadraplegia* (paralysis of all four limbs)
(11) Myasthenia gravis (progressive weakness of muscles)
(12) Pemphigus (a grave skin disease)
(13) Polio
(14) Rheumatic Fever and Chorea
(15) Subarachnoid hemorrhage (brain)
(16) Tuberculosis of the Lungs (Active, proved by sputum or gastric tests
(17) Tumors of brain or spinal column
(18) Ulcerative colitis (colon) and regional enteritis (intestine)

The above diseases have been enumerated in the contract not only in order to prevent abuses, but also because, in the opinion of the medical profession, they represent practically all of the known prolonged illnesses.

The coverage provided for these specific diseases embraces the following elements:

(a) *Physicians' Services.* Customary charges for hospital visits beginning with 22nd day up to discharge. Customary charges for medical (non-surgical)* services following discharge from hospital. Payments for X-rays, X-ray therapy, pathology examinations and physical therapy by a registered physical therapist.
(b) *Room and Board Charges.* Up to $6.00 a day in addition to regular Blue Cross allowances from 61st through the 120th day of hospitalization and up to $10.00 a day thereafter. 75% of Room and Board charges up to $6.00 a day in a licensed chronic disease hospital or a convalescent home with which the Blue Cross has a contract.

*Surgical services are covered by basic contract.

(c) *Drugs, Medications, Appliances and Other Ancillary Services.* 75% of cost of drugs, medications and use of the operating room after 120th day of inpatient hospitalization; 75% of cost of drugs and medications requiring prescriptions for use outside of hospital; payment to hospitals for X-rays, X-ray therapy, pathology examinations, use of outpatient department and physical therapy by a registered physical therapist; entire cost of rental or 75% of purchase price of appliances ordered by attending physician.

(d) *Nurse's Services.* 50% of regular charges for services of private duty registered nurse to an inpatient ($300.00 maximum); charges of any Visiting Nurse Association with which the Blue Cross has a contract.

The total benefits under this contract are limited to $2,000.00 for physicians' services and to $3,000.00 for all other services so that the maximum benefit payments cannot exceed $5,000.00.

4. UNDERWRITING LIMITATIONS

In the above description of the benefits the coinsurance features of the various benefits other than physicians' services (except for mental disorders) were indicated. All were predicated on considerations of practical needs and with the object of preventing abuses and unnecessary utilization.

While as large a volume of this coverage as possible is desirable, certain underwriting precautions must be exercised to avoid anti-selection and to insure a sufficiently broad cross-section of the population to obtain an average exposure. For this reason certain further underwriting rules and restrictions were deemed necessary:

(a) In groups of 100 or more, 75% of the total eligible personnel apply for this coverage or in groups of any size if regular underwriting requirements are met and the average age of the applicants does not exceed forty (40) years.

(b) A waiting period of twelve (12) months is provided for all benefits except that immediate benefits are available for certain acute conditions arising after the effective date of the contract such as infections, contagious diseases, traumatic conditions, inflammations unrelated to underlying pathology or defect, primary coronary or cerebral artery occlusion or rupture, certain primary malignant and benign neoplasms.

(c) No benefits will be payable for any condition which has exhibited signs or symptoms prior to the effective date of the coverage.

(d) No benefits will be provided where the insured person would be eligible for full or partial benefits under any municipal, State or Federal law, regulation or agency if this contract were not in effect nor for policemen or firemen for injuries sustained in the line of duty.

(e) In cases where the benefits depend upon diagnosis (18 specific illnesses) no benefits will be provided until the condition has been determined by laboratory examinations or other objective means and unless the initial treatment takes place in a licensed general, mental or contagious disease hospital subsequent to the effective date of the contract and prior to its termination.

(f) In the event of cancellation benefits shall not be provided for expenses incurred later than twenty-four (24) months after the date of the initial hospital treatment, provided that such initial hospitalization took place prior to cancellation.

(g) Benefits will be provided only when the initial hospitalization occurs while the subscriber is employed in the group or within thirty (30) days after leaving such employment. This provision precludes the right of conversion as the issuance of this coverage on other than group basis is considered unsound.

On the whole the above restrictions are reasonable and necessary until such time when the accumulated experience will indicate what changes and modifications can be made.

In general the entire approach to the problem is that of a cautious first major extension of benefits. As the actual experience develops there will be no doubt progressive extensions of the coverage commensurate with demonstrated needs and the ability of the public to absorb the cost.

5. DETERMINATION OF RATES

The problem of rate making for new coverages is of necessity an admixture of a large dose of judgment and such experience as can be utilized which again involves a great deal of actuarial judgment.

Since the policy of the Blue Cross and Blue Shield is not to differentiate the charges for coverage by age or by sex or by the number of children for married employees, the problem resolves itself to the determination of the various cost elements separately for individual employee contracts and for family contracts, that is the employee, his wife and children, if any.

Each benefit or group of benefits requires a separate approach and the various computations and preliminary steps are described in detail below:

(a) Duration Distribution and Cost of Certain Additional Benefits.

One of the most powerful tools in rate computations for sickness and accident insurance is the knowledge of the number of cases for each duration from one day on. For this reason continued statistical analyses and research is being conducted in this direction as changing conditions in medical and surgical techniques have a definite bearing on the length of hospital confinement.

I am showing below a condensed duration distribution for the number of non-maternity in-patient days based on the 1952 experience for Blue-Cross contracts with a daily room and board indemnity of $7.00.

TABLE I

Duration Distribution Based on 1952 Experience of Massachusetts Hospital Service, Inc.

Non-Maternity Inpatient Cases-Group

(1) Duration in days n	Individual Contracts* (2) No. of Cases X_n	(3) $\sum_{120}^{n} X_n$	(4) No. of Days# $\sum_{120}^{n}$ (3)	Family Contracts* (5) No. of Cases X_n	(6) $\sum_{120}^{n} X_n$	(7) No. of Days# $\sum_{120}^{n}$ (6)
1	675	9,213	100,239	12,859	59,280	465,818
2	804	8,538	91,026	5,151	46,421	406,538
3	693	7,734	82,488	4,345	41,270	360,117
...	...	....	.....	.....	.....	.....
21	104	1,107	18,662	427	4,145	59,477
22	79	1,003	17,555	327	3,718	55,332
...	...	....	.....	.....	.....	.....
60	9	126	3,063	20	311	7,259
61	8	117	2,937	10	291	6,948
...	...	....	.....	.....	.....	.....
120	20	20	20	31	31	31
Total	9,213	100,239	—	59,280	465,818	—

*Contracts with a daily allowance of $7.00.
#This column means "number of days contributed by the given day and all following days," as may be easily verified.

Even though condensed, Table I shows a difference in the distribution between individual and family contracts, there being a greater proportion of short duration cases for family contracts. There exists also a variation in the distributions of medical and surgical days and a slight variation for contracts with different daily allowances.

Since in the prolonged illness contract certain additional benefits are provided after 21 days and others after 60 days, I am showing below the ratios of days in excess of 21 days and in excess of 60 days for all classes of contracts combined:

TABLE II

Ratios of Days in Excess of a Given Duration
based on 1952 Duration Distribution of Inpatient Days
All Classes of Contracts — Group

(1) *Item*	(2) *Individual*	(3) *Family*
1. Total Days — Medical Cases*	110,241	452,470
2. Total Days — All Cases	245,882	1,056,908
3. Medical Days in Excess of 21	18,433	61,119
4. All days in Excess of 60	6,083	15,145
5. 3. ÷ 2.	.0750	.0578
6. 4. ÷ 2.	.0247	.0143

*Shown here only to indicate the proportion of days of medical care cases to total days.

Table II permits us to compute the estimated cost of physicians' visits after twenty-one (21) days and the estimated cost of the daily allowance of up to $6.00 for room and board after 60 days. This computation is shown in Table III below:

TABLE III

Calculation of the Estimated Cost of Additional
Physicians Hospital Visits and Room and Board Allowances*

Item	*Individual*	*Family*
1. No. of Contract Years	234,106.	425,627.
2. No. of Inpatient Days	255,946.	1,098,983.
3. Ratio: Medical Days in Excess of 21	.0750	.0578.
4. Ratio: All Days in Excess of 60	.0247	.0143
5. Estimated Physicians' Visits: 2. x 3.	19,196.	63,521.
6. Estimated Cost 5. x $5.00	$95,980.	$317,605.
7. Estimated Days in Excess of 60: 2. x 4.	6,322.	15,715.
8. Estimated Cost 7. x $6.00	$37,932.	$ 94,290.
Cost per Contract per Annum:		
9. Physicians' Visits 6. ÷ 1.	$ .4100	$ .7462
10. Room & Board Allowance 8. ÷ 1.	$ .1620	$ .2215

*Based on Experience for the period July 1, 1952 to June 30, 1953 as of November 30, 1953.

It will be noted that in the above computations it was assumed that there will be a physician's visit for each day of hospitalization in excess of twenty-one (21) and that the full allowance of $6.00 will be paid for room and board for each day in excess of sixty (60). This was done in order to compensate for probable longer durations under the proposed coverage.

(b) Calculation of the Cost of Private Duty Nurse Coverage.

The calculation of this cost consists of two elements. First we have determined the annual frequency of procedures for which the Blue Shield Plan B fee schedule provides $175.00 or more on the basis of experience of two policy years. We then selected the average cost per case of $100.00 based upon a consensus of medical and hospital opinion. The details of calculation are shown in Table IV.

TABLE IV

Calculation of Cost of Private Duty Nurse Coverage
Based on the Blue Shield Experience for policy years
1951 as of 12-31 and 1952 as of 11-30-1953.

Item	*Individual*	*Family*
1. Contract Years Exposed —Plan A . . .	216,692	362,768
2. Contract Years Exposed —Plan B . . .	130,232	233,285
3. Contract Years Exposed —Total . . .	346,924	596,053
4. No. of Eligible Procedures—Plan A . . .	2,756	10,980
5. No. of Eligible Procedures—Plan B . . .	2,034	9,005
6. No. of Eligible Procedures—Total . . .	4,790	19,985
7. Annual Frequency —Plan A . . .	.012719	.030591
8. Annual Frequency —Plan B . . .	.015618	.038601
9. Annual Frequency —Total . . .	.013807	.033529
10. Est. Annual Cost per Contract: 9. x $100 .	$1.3807	$3.3529

(c) Calculation of the Cost of Shock Therapy.

Here again it was necessary to determine the average cost per case by consulting the medical profession or hospital authorities. There being no available experience the annual claim frequency per 1000 contracts was *assumed* at 1 claim for individual and 2.3 claims for family contracts. The calculation is shown in Table V.

TABLE V

Calculation of Cost of
Insulin Shock or Electric Shock Therapy

Item	*Hospital*		*Medical*	
	Individual	*Family*	*Individual*	*Family*
1. Est. Average Cost per Case	$650.00	$650.00	$450.00	$450.00
2. Est. Claim Frequency per Contr.	.0010	.0023	.0010	.0023
3. Est. Annual Cost 1. x 2.	$ .6500	$1.4950	$ .4500	$1.0350

(d) Calculation of Cost of Benefits for Specific Conditions.

In order to arrive at this most important element of cost we were first confronted with the problem of determining the rate of incidence or the claim frequency of cases involving any one of the eighteen (18) specific diagnoses.

Toward this end we have prepared for each of the eighteen (18) diagnoses a duration analysis based on the Blue Cross experience of fiscal year ended June 30, 1953 as of November 30, 1953. A review of this experience led to a judgment decision to assume that all cases where the duration exceeded twenty-eight (28) days are potential cases involving expenditures under the proposed contract. Since the basic contract covers Pulmonary Tuberculosis only for a duration of 10 days, it was decided to use all cases for that diagnosis

The results of this study are summarized in Table VI.

TABLE VI

Estimated Incidence of Special Diagnoses
Based on Blue Cross Experience for
Fiscal Year ending June 30, 1953 as of November 30, 1953.

	(1)	(2)	(3)	(4)
	*Est. Number of Claims**		*Est. Annual Frequency per 1000 Contracts#*	
Diagnosis	*Individual*	*Family*	*Individual*	*Family*
Amputations	See special computation in Table VII			
Cancer	264	578	1.1277	1.3580
Cerebral Hemorrhage . . .	74	165	.3161	.3877
Cirrhosis of Liver	13	21	.0555	.0493
Coronary Embolism	144	529	.6151	1.2429
Chronic Nephritis	4	12	.0171	.0282
Degeneration of Spinal Cord .	6	10	.0256	.0235
Fractures	173	376	.7390	.8834
Heart Failure	13	43	.0555	.1010
Hemiphlegia	2	6	.0085	.0141
Myasthenia gravis	1	3	.0043	.0070
Pemphigus	2	4	.0085	.0094
Polio	1	92	.0043	.2162
Rheumatic Fever	3	85	.0128	.1997
Subarachnoid hemorrhage . .	1	14	.0043	.0329
Tuberculosis of the Lungs .	51	164	.2179	.3853
Tumors of the brain	5	15	.0214	.0352
Ulcerative Colitis	13	61	.0555	.1433
Total	770	2,178	3.2891	5.1171

*Cases with duration of 29 days or more, except for Tuberculosis where all cases are shown.

#Obtained by multiplying columns (1) and (2) by 1000 and dividing by the contract year exposure of 234,106 and 425,627 respectively.

The next step was to determine the average cost per case and this was done on the basis of judgment of the medical profession. In exercising such judgment each diagnosis was considered separately and for each diagnosis separate estimates were made for the cost of medical care and the cost of all other benefits. Such estimated average claim costs and the resulting costs per contract are shown in Table VIII.

As respects amputations it was felt that it will be sufficient to determine the cost of wheel chair or prosthetic appliance and the calculation of this element is shown in Table VII.

TABLE VII

Calculation of Cost of Amputations

Type of Amputation	*(1)* *No. of Claims** *Indiv.*	*(2)* *Family*	*(3)* *Annual Frequency*** *Indiv.*	*(4)* *Family*	*(5)* *Est. Cost#*	*(6)* *Annual Cost per 1000 Contracts* *Indiv.*	*(7)* *Family*
Arm through Humerus	1	2	.00288	.00336	$400.	$ 1.1520	$ 1.3440
Forearm through Radius and Ulna	—	1	—	.00168	350.	—	.5880
Hip Disarticulation	—	5	—	.00839	350.	—	2.9365
Thigh through Femur	20	63	.05765	.10570	400.	23.0600	42.2800
Leg through Tibia and Fibula	4	12	.01153	.02013	275.	3.1708	5.5358
Leg Guillotine	—	4	—	.00671	300.	—	2.0130
Subsequent Reamputation	1	3	.00288	.00503	300.	.8640	1.5090
Ankle through Malleoli of Tibia and Fibula	1	2	.00288	.00336	200.	.5760	.6720
Total	27	92	—	—	—	$28.8228	$56.8783
Annual Cost Per Contract						$ .0288	$ .0569

*Based on 1951 and 1952 Blue Shield Experience.

**Obtained by multiplying columns (1) and (2) respectively by 1,000 and dividing by the 1951-1952 Blue Shield contract year exposure: 346,924 individual and 596,052 family.

#Based on quotations of several manufacturers of prosthetic appliances.

(e) Summary of Costs and Calculation of Rates.

The various costs calculated in the preceding sections can be now summarized and the total pure premiums converted into rates by the application of an appropriate expense loading.

TABLE VIII

Calculation of Cost of Benefits for Specific Conditions

Diagnosis	Est. Av. Case Cost Blue Cross	Est. Av. Case Cost Blue Shield	Annual Claim Incidence Per 1000 Contracts* Individual	Annual Claim Incidence Per 1000 Contracts* Family	Cost per 1000 Contracts per Annum — Blue Cross Individual (2) x (4)	Blue Cross Family (2) x (5)	Blue Shield Individual (3) x (4)	Blue Shield Family (3) x (5)
Amputations	$ #	$ —	.0778	.1544	$ 28.82	$ 56.88	$ —	$ —
Cancer	1,500	500	1.1277	1.3580	1,691.55	2,037.00	563.85	679.00
Cerebral Hemorrhage	2,000	350	.3161	.3877	632.20	775.40	110.64	135.70
Cirrhosis of Liver (Surg.)	2,500	1,700	.0555	.0493	138.75	123.25	94.35	83.81
Coronary Embolism	2,000	350	.6151	1.2429	1,230.20	2,485.80	215.29	435.02
Chronic Nephrosis	2,500	1,700	.0171	.0282	42.75	70.50	29.07	47.94
Degeneration of Spinal Cord	2,500	500	.0256	.0235	64.00	58.75	12.80	11.75
Fractures	500	300	.7390	.8834	369.50	441.70	221.70	265.02
Heart Failure	750	500	.0555	.1010	41.63	75.75	27.75	50.50
Hemiphlegia	2,500	1,700	.0085	.0141	21.25	35.25	14.45	23.97
Myasthenia Gravis	300	500	.0043	.0070	1.29	2.10	2.15	3.50
Pemphigus	2,500	1,700	.0085	.0094	21.25	23.50	14.45	15.98
Poliomyelitis	1,000	250	.0043	.2162	4.30	216.20	1.08	54.05
Rheumatic Fever	2,500	1,700	.0128	.1997	32.00	499.25	21.76	339.49
Subarachnoid Hemorrhage	500	100	.0043	.0329	2.15	16.45	.43	3.29
Tuberculosis of the Lungs	1,500	1,000	.2179	.3853	326.85	577.95	217.90	385.30
Tumor of the Brain	750	150	.0214	.0352	16.05	26.40	3.21	5.28
Ulcerative Colitis	500	500	.0555	.1433	27.75	71.65	27.75	71.65
Total			3.3669	5.2716	$4,692.29	$7,593.78	$1,578.63	$2,611.25
Cost Per Contract Per Year					$4.6923	$7.5938	$1.5786	$2.6113

*From Table VI
#From Table VII

In view of the newness of the coverage and the considerable amount of judgment injected into the calculation of the various cost elements it was decided to use a loading of 20% for expenses and contingencies. The resulting total rates were rounded to the higher 25 cents.

The details of this final stage of computation may be seen in Table IX.

TABLE IX

Summary of Pure Premiums and Calculation of Rates

Item & Table	*Blue Cross*		*Blue Shield*		*Total*	
	Individual	*Family*	*Individual*	*Family*	*Individual*	*Family*
Specific Diagnoses-VIII	$4.6923	$ 7.5938	$2.6113	$2.6113	$6.2709	$10.2051
Shock Therapy-V.....	.6500	1.4950	.4500	1.0350	1.1000	2.5300
Private Nurse-IV.....	1.3807	3.3529	—	—	1.3807	3.3529
Physicians' Visits-III	—	—	.4100	.7462	.4100	.7462
R. & B. Indemnity-III	.1620	.2215	—	—	.1620	.2215
Total Pure Premiums	$6.8850	$12.6632	$2.4386	$4.3925	$9.3236	$17.0557
Monthly Pure Premiums	$ .5738	$ 1.0553	$ .2032	$ .3660	$ .7770	$ 1.4213
Indicated Rates*	$ .717	$ 1.319	$ .254	$ .458	$ .971	$ 1.777
Proposed Rates	$ .75	$ 1.50	$ .25	$. 50	$1.00	$ 2.00

*Expense and Contingency Loading of 20.0%.

The proposed monthly rates of $1.00 for individual and $2.00 for family contracts appear to be very reasonable for the amount of coverage granted. Because of the manner of computation and the generous margin for unknown elements and errors of judgment they should prove to be adequate.

6. CONCLUDING REMARKS

It may be readily seen that the coverage described in this paper provides benefits in serious cases only and that benefits would be payable only after a substantial duration with a few minor exceptions. This will preclude the handling of many small claims which of necessity arise in the case of the usual major medical coverage with a specific deductible because as soon as the total cost of an illness exceeds the deductible amount, there exists some liability in most instances.

The contract became available to the public on October 1, 1954 and it is, therefore, too early to speculate on its acceptance and popularity. It is primarily designed for the general population and the service character must be stressed again although there are sufficient coinsurance safeguards.

It will take a number of years to develop experience which will be of significance. If the circumstances will permit it, I will present another paper dealing with a critical analysis of the estimates in the light of actual experience. In the meantime I hope that the present paper will prove of value to students and others who seek some guide posts for the approach to new and unusual types of coverage.

GROUP ACCIDENT AND HEALTH HOSPITAL THERAPEUTIC BENEFITS — MEASUREMENT OF LOSS COSTS FOR RATEMAKING PURPOSES

BY

P. M. OTTESON

PART I INTRODUCTION

A. COVERAGE DEFINITION

Hospital therapeutics benefits coverage is often referred to as "hospital extras" or "hospital miscellaneous benefits." As defined in our policy it covers "hospital charges for necessary therapeutic services and supplies (including ambulance service, whether or not charged by the hospital)" but does not include hospital charges for room and board and general nursing service.

The amount of this benefit generally is set forth as a certain maximum amount, with all charges payable in full up to this maximum. Sometimes it includes a coinsurance factor beyond a set limit, or a deductible.

This paper will consider hospital therapeutic benefits as a coverage entirely separate and distinct from hospital room and board.

B. OBJECTIVES

The general objective of the thesis is to determine the extent to which individual company loss experience can be used as a basis for hospital therapeutic benefit rates. Consideration will be given both to the securing of necessary loss experience and to the interpretation of this experience for ratemaking purposes.

Parts of the thesis pertaining to development of a plan for accumulation of statistical data will be equally applicable to other group accident and health coverages. The statistical problems will be viewed through the eyes of a company also writing fire and casualty lines.

Certain statistical data will be used to illustrate techniques and approach. This data is not intended to represent typical industry experience.

No consideration is given to any phase of rate regulation.

C. SIGNIFICANCE OF HOSPITAL THERAPEUTIC BENEFITS IN THE OVERALL GROUP ACCIDENT AND HEALTH PICTURE

Group accident and health coverages may be classified into three major areas for purposes of considering loss experience and the general ratemaking problem.

1. Weekly indemnity or loss of time coverage provides indemnity to the claimant to compensate for loss of earnings. It has no direct bearing on the *cost* of medical care.

2. Maternity and obstetrical coverages provide reimbursement of the costs of medical care for child birth. The loss experience problems and patterns are completely different than for coverages providing reimbursement for accident and sickness hazards.

3. Hospital room and board, hospital therapeutic benefits and surgical coverage all have certain common characteristics. They all cover the hazards of accident and sickness, they all cover the cost of medical care and a large proportion of the claims will involve all three coverages.

The term "extras" or "miscellaneous benefits" for hospital therapeutic services may be misleading because these terms imply "secondary" importance. Of the coverages listed in "3" above, therapeutic benefits can be considered as both the most important and the most interesting from the ratemaking standpoint.

The relative amounts involved for each coverage will vary by company in accordance with the types of business written and maximum benefit levels but the following tabulation illustrates the fact that hospital therapeutic benefits can be considered as a "principal" and not a "secondary" coverage.

Federated Mutual
Incurred Losses, Accident Year 1953

Coverage	*Amount of Loss*
Hospital Therapeutic Benefits	$ 451,715
Hospital Room and Board	343,434
Surgical	301,421
Weekly Indemnity	244,970
Maternity & Obstetrical*	187,430
All Other	48,626
Total	$1,577,596

*–Amount of loss on claims hospitalized in 1953.

D. RATING PROBLEM

The hospital therapeutics rating problem is extremely interesting. On hospital room and board coverage the rating problem is limited to claim frequency and average duration of confinement. On most surgical losses the amount of loss paid is the maximum provided by the policy. On hospital therapeutics the amount paid on each loss is generally far below the maximum provided by the policy. This means that the loss costs are very sensitive to inflationary trends and to changes in hospital pricing principles and treatment techniques.

There is a considerable difference in insurance philosophy among companies concerning maximum hospital therapeutic benefits. Some companies do not believe that high benefits can be written safely. Higher maximum benefit levels can throw off the experience of an

individual policy so companies who view rating and underwriting from a "per policy basis" generally favor keeping down the maximum benefit.

On the other hand there has been a tendency by other companies to raise the maximums or even write the coverage unlimited. These higher benefits do provide insurance protection on serious losses where the claimant is really hurt financially by accident or sickness. The argument for higher benefits is that this is the type of insurance protection needed and that group insurance is not worth while if it does not give the policyholder insurance protection when he needs it.

Increased maximum benefit levels definitely increase the value and importance of loss experience statistics set up on a summary rather than individual policy basis.

PART II BASIC PLAN FOR DEVELOPING RATEMAKING STATISTICS

A. GENERAL APPROACH TO THE RATING & STATISTICAL PROBLEM

The basic question of whether or not individual company loss experience can produce information which will be of value in the establishment of rates must be considered carefully. In a coverage like fire insurance for example a company ordinarily would not even entertain any thoughts about establishing rates on the basis of its own experience.

Hospital therapeutic benefits as well as most other group accident and health coverages represent business on which statistics are unusually effective. There are several reasons for this:

1. Exposure units are easily defined and measured.
2. The number of claims in relation to the number of exposure units is unusually high. Annual hospital therapeutic claim frequency can be considered roughly as 1 claim per 10 male employe lives exposed, and 1 claim per 3-4 dependent units (adult and children) exposed.
3. The average claim costs on a "per coverage basis" are relatively low in relation to the total number of claims incurred.
4. A number of factors that determine loss costs per exposure unit can be isolated and measured. Some of these elements are sex, age and territory.
5. Claims are settled without undue delay so there is no problem of claim valuation such as is present in workmens compensation or automobile liability.

However, many companies writing group accident and health insurance do not keep summary statistics for ratemaking purposes. They base their rates entirely on competitive levels with subsequent adjustments based on the loss experience of individual accounts. This may be modified by the use of industrywide statistics such as those prepared by the Society of Actuaries.

B. PLAN — EXPOSURE AND CLAIMS

The statistical plan should be directed toward a measurement of classified exposure and classified claim data. Premiums can be disregarded completely in the program of ratemaking statistics.

A master card plan under most conditions will be practical in producing classified earned exposure totals. When premiums and exposure statements are received the exposure totals for male employes, female employes and dependents are recorded separately by policy number. There is no breakdown or punching of cards for each coverage included in the policy.

Master cards for each policy contain an indication as to what coverages are involved, maximum benefits and also a classification coding. There is one master card for employes and one for dependents. When the codes are gangpunched from the master cards to the detail cards or summary cards it is possible to determine the number of lives exposed for each coverage according to any classification set up on the master cards. This arrangement is both economical and efficient.

Loss payment cards can be punched from the payment drafts in the same manner as on fire and casualty lines. Case estimates of outstanding losses are not necessary as incurred losses can be determined accurately by a projection of payments.

A major problem involves determining number of claims from the statistical cards. It is highly desirable to have a set of cards completely coded on a one card per claim basis. This permits classification by size of claim as well as making it easy to compile frequency and average claim costs according to any kind of classification.

The one card per claim objective can be accomplished through a summarization of multi payment claims by claim number. This is the most accurate and probably the least expensive approach.

Measurement of loss costs should definitely be made on the basis of amount actually charged by the hospital for each claim rather than on the amount paid to the claimant. These two amounts differ only in those cases where the claimant receives the maximum benefit but where this maximum is less than the amount charged by the hospital.

Average claim costs on a "paid to claimant basis" will vary to an uncertain extent with policy maximum benefit levels. On a paid basis it is necessary to classify all loss experience according to maximum benefit level. This makes the entire set-up unwieldy and actually produces statistics on average claim costs which are nearly worthless. There are other factors of more significance than maximum benefit levels in determining average claim costs.

The proportion of claims for which the amount charged by the hospital exceeds the amount paid to the insured varies in accordance with the maximum benefit levels written. If the business is written at high average benefit levels the number of these claims will be very small. In our own case there were 465 claims that occurred in 1953 for which the amount charged by the hospital exceeded the amount paid to the claimant. This represents about 5% of the total claims.

Continuation of the present policy of increasing maximum benefits will reduce this percentage in 1954.

Checking each claim in the branch offices as to whether the payment was at the maximum will add another procedure complexity. Therefore, we follow the plan of sorting out all cards where the loss payment is equal to *any* maximum benefit level written by the company. These cards are then checked against the files to determine amount charged.

(In contrast to the policy of using amount charged on therapeutic benefits there appears to be no need for recording this information on hospital room and board. On room and board computations the claim frequency multiplied by average number of days confinement per claim will produce a "per dollar a day" pure premium.)

Another basic element in the statistical plan is the classification of protected persons and claimants. For employes it is highly desirable to classify exposure and losses as to male and female. This permits computation of a separate pure premium for male and female employes. The necessary female loading can then be determined by a comparison of male and female pure premiums.

Separate classification of adult dependent and childrens claims is advisable because of the difference in the loss experience pattern from both a frequency and severity standpoint. Analysis of dependent claim experience would be limited without this breakdown. For example, a decrease in claim costs might be the result of an unusually high proportion of children's claims.

If a master card for each policy is set up, a great deal of classification information as to type of group, industry, or location can be made available at very little cost. These master cards can also carry adequate coding as to policy provisions pertinent to the development of ratemaking statistics.

C. EXPERIENCE PERIOD

Separate calculation of claim frequency and average claim costs makes it possible to use different periods in measuring these two component parts of the pure premium. This flexibility has advantages, but there is also an advantage in being able to relate pure premium directly to a period of time so that 1953 can be compared with 1952, and so forth. Also, frequency must be related to a definite period of time to be compared with exposure totals. Further, there is always the problem of the possible interplay between frequency and average claim costs; the question of whether or not frequency in itself is a factor that influences average claim costs must be kept in mind in analyzing loss experience.

The policy year concept is unnecessary because there is no problem of waiting for final audits to determine correct exposures. Also, the exposure totals recorded on the books are earned so there is no problem of computing earned from written.

The calendar year basis for losses has the disadvantages of having to contend with errors in loss reserves at both the beginning and the end of the period. Also, it does not produce frequency figures comparable with earned exposure totals.

Earned-accident-year is the most practical experience period to work with. The major problem is the development of incurred frequency and amounts from payments made during the accident year in question and during a loss develoment period in the following year.

The most accurate figures of course are obtained by waiting for a loss development of several months. However, 1953 experience may be needed badly for policy decisions or revised rates in March or April. Waiting for perfection of the figures is expensive.

The incurred loss experience figures used in this study are for accident year 1953 developed through February 28, 1954. The estimate of 1953 claims outstanding February 28, 1954 was computed according to a simple projection formula.

An important problem to consider in estimating unpaid losses is the fact that the proportion of long duration cases may be higher than average even after a two months' development. For example, a confinement of sixty days beginning in December would just barely be completed by the end of February. These long duration cases can be expected to develop higher than average costs per claim.

Therefore, it is well to make a separate projection of claims of different confinement durations. The classification basis for claims in this study is:

1. 0- 7 Days
2. 8-14 Days
3. 15-21 Days
4. 22 Days and Over

Separate average claim costs for each of the above classifications were used in projecting incurred losses by size of claim.

The projection method used considered the following factors:

A. First 6 months 1953 accidents (each duration classification separately)
   1. Claims paid through August 1953
   2. Claims paid September 1953 through February 1954
   3. Outstanding February 28, 1954 (Estimate derived from Company loss reserve projection. Amounts and numbers involved very small).

B. Second 6 months 1953 accidents paid through February 1954

$$\text{Factor } F = \frac{A_1 + A_2 + A_3}{A_1}$$

Losses Outstanding on 1953 claims $= (A_3) + (BF - B)$

It is possible to calculate reasonably accurate frequency and claim cost figures on hospital therapeutics after a two months' development. In analyses which compare one segment or classification against another (as in Part III) the losses outstanding are disregarded. However in computing the pure premiums that go into the final rate computations it is very essential that outstanding losses are included.

PART III LOSS EXPERIENCE CHARACTERISTICS

The remaining subject matter will consider the analysis, interpretation and use of loss experience statistics for ratemaking purposes.

A statistical description of hospital therapeutic losses is helpful as a starting point. The data on male employe claims with hospitalization and with surgery illustrates claim characteristics of this coverage. The *average* claim costs constantly used are not *typical* claim costs. The dispersion is high even when the sample is limited to one type of claim. The frequency distribution is heavily skewed positively.

Male Employes, Claims with Hospitalization, with Surgery

Number of Claims in Sample:		832
Average Cost per Claim:	Mean	$109.44
	Median	68.00
	Mode	45.00
Standard Deviation		136.38

The main emphasis in working with individual company statistics is to develop homogeneity in classification. Industry tabulations are representative of *overall* conditions but they can easily cover up pertinent factors that cause differences in loss costs for companies writing a specialized type of business or in a limited territory.

Tabulation A presents a rough perspective as to the extent that different types of business can cause different loss patterns.

Federated Mutual — Tabulation A

1953 Claims Paid Through February 28, 1954

Hospital Therapeutic Benefits

	Type of Claimant	a Amount of Loss Paid Claimant	b Amount of Loss Chgd. by Hospital	c Number Losses	d Number Days Hosp.	a÷b	b÷c	b÷d	d÷c
Segment A	Male Employe	$92,378	$110,998	1,427	11,154	83.2	77.78	9.95	7.82
	Dep.-Adult Female	98,424	108,210	1,509	9,765	91.0	71.71	11.08	6.47
	Dep.-Children	62,325	64,420	1,873	5,888	96.7	34.39	10.94	3.14
Segment B	Male Employe	15,819	18,441	291	1,846	85.8	63.37	9.99	6.34
	Dep.-Adult Female	14,644	15,487	223	1,391	94.6	69.45	11.13	6.24
	Dep.-Children	9,639	9,703	310	836	99.3	31.30	11.61	2.70
Segment C	Male Employe	12,658	13,051	129	965	97.0	101.17	13.52	7.48
	Dep.-Adult Female	12,686	12,855	144	1,139	98.7	89.27	11.29	7.91
	Dep.-Children	6,602	6,603	161	514	100.0	41.01	12.85	3.19
Segment D	Male Employe	21,298	26,727	296	2,418	79.7	90.29	11.05	8.17
	Dep.-Adult Female	10,014	10,716	122	902	93.4	87.84	11.88	7.39
	Dep.-Children	4,153	4,243	111	424	97.9	38.23	10.01	3.82
Segment E (Canada)	Male Employe	7,530	8,270	186	1,448	91.1	44.46	5.71	7.78
	Dep.-Adult Female	6,119	6,599	158	1,239	92.7	41.77	5.33	7.84
	Dep.-Children	5,471	5,494	258	1,112	99.6	21.29	4.94	4.31

Tabulation A summarizes in a general way the differences in maximum benefit levels, loss severity, and hospital charges of segments of a book of business. A year to year comparison of this type, particularly when related to claim frequency, is useful in getting a general perspective of variations in loss experience by type. There is always a question of business being good or bad and also of whether a single set of rates can be used for all segments of the business.

The facts suggest that there are causative factors that bring about different loss experience for different types of business. The discussion following will consider a few of these causative factors.

Tabulation B represents a type of loss classification which is useful in the analysis of loss experience. It groups claims according to whether or not the claim involved surgery and also whether or not the employe was confined to the hospital for one or more days.

Federated Mutual — Tabulation B

1953 Claims Paid Through February 28, 1954

United States Only — Hospital Therapeutic Benefits

	a # *Claims*	*b* # *Days*	*c* *Amt. Chgd. by Hospital*	*c÷a*	*c÷b*	*b÷a*
			Male Employes			
Outpatient-no surgery	204	—	$ 4,053	19.87	—	—
Hosp. confinement-with surgery	832	8,064	90,529	108.81	11.23	9.69
Hosp. confinement-no surgery	990	8,299	72,550	73.28	8.74	8.38
Outpatient-with surgery	116	—	2,086	17.98	—	—
	2,142	16,363	169,218	79.00	—	—
			Dependents-Adult Female			
Outpatient-no surgery	131	—	3,191	24.36	—	—
Hosp. confinement-with surgery	1,116	8,353	102,035	91.43	12.22	7.48
Hosp. confinement-no surgery	686	4,834	40,676	59.29	8.41	7.05
Outpatient-with surgery	64	—	1,366	21.34	—	—
	1,997	13,187	147,268	73.74	—	—
			Female Employes			
Outpatient-no surgery	59	—	981	16.63	—	—
Hosp. confinement-with surgery	323	2,376	29,193	90.38	12.29	7.36
Hosp. confinement-no surgery	228	1,794	13,792	60.49	7.69	7.87
Outpatient-with surgery	17	—	514	30.24	—	—
	627	4,170	44,480	70.94	—	—
			Dependents-Children			
Outpatient-no surgery	186	—	2,322	12.48	—	—
Hosp. confinement-with surgery	1,263	3,681	53,204	42.13	14.45	2.91
Hosp. confinement-no surgery	776	3,980	26,197	33.76	6.58	5.13
Outpatient-with surgery	230	—	3,247	14.12	—	—
	2,455	7,661	84,970	34.61	—	—

This type of classification is valuable in analyzing loss costs by individual policy or for various segments of business. Further, it indicates certain loss experience characteristics quite definitely:

1. Outpatient claims represent about 3.5% of the *total* amount for adults and 6.5% for children. Possibly these claims could be best excluded in analyzing frequency and claim costs. Variation in numbers of these small claims can distort the averages. The cost of these claims could be figured on an overhead basis.

2. Average cost on claims involving surgery and hospitalization run about 50% higher for all adult claimant classifications than for claims without surgery.

3. The average higher duration on male claims and the high proportion of surgical claims for females becomes significant in the analysis of experience by age.

A comparison of 1954 claims set up on the same basis as the above tabulation will provide a much more accurate measurement of trends in claim costs than would a comparison of overall averages. In the writing of new groups also, the proportion of surgical claims could be expected to run higher than in older groups. Therefore, as these new groups mature the average claim cost could decrease because of a decrease in the proportion of surgical claims and this may tend to offset an increase in average cost caused by other factors.

It is generally believed that average claim costs are lower in the Southeastern states than in the balance of the United States. Industry figures comparing average costs by geographical region were published in an article by Stanley W. Gingery in the Society of Actuaries Transactions Volume 3 published in 1952. A comparison of these costs is shown on pages 109-110. It shows the average amount charged on male claims in the Southeast to be $54.18 as compared with $67.88 in the Midwest. The fact that average claim costs are lower in the Southeastern Region brings up the question as to whether or not this difference in average claim costs should be reflected in rate level. The lower average claim cost could possibly be offset by higher frequency as it is possible that increased use of the hospitals for minor illness could bring about shorter hospital stays with small average claim costs but with resulting higher frequency.

Tabulation C examines this problem from an individual company experience standpoint in greater detail. The sample of business selected is homogeneous from a type of business standpoint and it is expected that the comparison between these two sections of country should be reasonably fair.

Federated Mutual — Tabulation C

Hospital Therapeutic Benefits — Outpatient Claims Excluded
Male and Female Employe and Adult Female Dependent Claims
1953 Claims Paid Through February, 1954

	(a) Number of Claims	(b) Amount Charged by Hospital	(c) Number of Days Hosp.	b÷a	b÷c	Frequency*
		1 Day Claims — No Surgery				
Southeast	30	$ 627.	30	20.90	20.90	.27
Middle West	109	2,685.	109	24.63	24.63	.34
		2-7 Day Claims — No Surgery				
Southeast	279	$ 11,735.	1,117	42.06	10.51	2.50
Middle West	650	26,913.	2,228	41.40	12.08	2.02
		Over 7 Day Claims — No Surgery				
Southeast	110	$ 12,673.	1,763	115.21	7.19	.98
Middle West	319	38,611.	5,598	121.04	6.90	.99
		1 Day Claims — With Surgery				
Southeast	41	$ 1,066.	41	26.00	26.00	.37
Middle West	147	4,112.	147	27.97	27.97	.46
		2-7 Day Claims — With Surgery				
Southeast	206	$ 12,080.	850	58.64	14.21	1.84
Middle West	555	36,040.	2,414	64.94	14.93	1.71
		Over 7 Day Claims — With Surgery				
Southeast	188	$ 27,811.	2,904	147.93	9.58	1.68
Middle West	520	82,596.	7,642	158.84	10.81	1.61
		Grand Total				
Southeast	854	$ 65,992.	6,705	77.27	9.84	7.64
Middle West	2,300	190,957.	18,138	83.02	10.53	7.13

*–Number of claims per month per 1,000 weighted exposure units.
Exposures weighted as follows:

1 Male employe month	1.00
1 Female employe month	1.35
1 Dependent unit month	1.46

Weights based on 1953 experience.

The loss experience pattern for these two regions runs extremely close. The best measure of comparative cost levels is column (b) ÷ (c) representing the claim cost related to number of days hospitalized. The evidence that lower claim costs per unit of exposure can be expected in the Southeast is not convincing. Although the Southeastern average claim cost in total is lower — this is offset by a higher frequency. The Southeastern pure premium excluding outpatient claims adds up to $.590 while the corresponding Midwestern pure premium adds up to $.592. Southeastern frequency ran higher in the non surgical claims which produced lower average claim costs.

It is possible that varying proportions of rural and large city business can influence regional cost variations. Canadian costs, however, definitely are different.

One of the most interesting and important factors in the determination of loss costs is the age distribution of protected persons.

Tabulation D indicates the importance of age in determining both frequency and claim costs. The sample involved is small (we are just now working on this project) but nevertheless the message conveyed is definite and certain.

Federated Mutual — Tabulation D

Male Employes — Hospital Therapeutic Benefits

Selected Sample — Midwestern U. S.

1953 Claims Paid Through February, 1954

Age	(a) No. of life months exposed	(b) No. of Claims	(c) No. of Days Hosp.	(d) Amt. Chgd. by Hosp.	Freq. 1000 X b÷a	Severity d÷b	Severity c÷b	Severity d÷c
<20	1,427	6	20	$ 191.	4.20	31.83	3.33	9.55
20—29	22,269	114	682	7,386.	5.12	64.79	5.98	10.83
30—39	37,070	205	1,082	11,519.	5.53	56.19	5.28	10.65
40—49	32,169	208	1,588	15,533.	6.47	74.68	7.63	9.78
50—59	22,044	164	1,535	14,124.	7.44	86.12	9.36	9.20
60—69	10,279	110	1,247	13,049.	10.70	118.63	11.34	10.46
70 and Over	3,085	56	707	6,448	18.15	115.14	12.63	9.12
	128,343	863	6,861	68,250	6.72	79.08	7.95	9.95

There are a number of "traps" to be considered in working on the problem of age distribution as a factor in the rating plan. The group life insurance carrier will likely have available a distribution of *total* employes (male and female combined) by age because this is the basis of life insurance rates. This distribution is of no use in accident and health insurance because here it definitely is necessary to have male and female employes separate. The age distribution for female employes is entirely different than for males.

The loss costs on wives does not increase with age to the same extent as on male employes. This is illustrated in Tabulation E.

Federated Mutual — Tabulation E
Adult Female Dependents — Hospital Therapeutic Benefits
Selected Sample — Midwestern U. S. (Same as above)
1953 Claims Paid Through February, 1954

Age	*(a) No. of Claims*	*(b) No. of Days Hosp.*	*(c) Amt. Chgd. by Hospital*	*c÷a*	*b÷a*	*c÷b*
<20	17	94	$ 1,484.	87.29	5.53	15.78
20—29	179	997	11,531.	64.42	5.57	11.57
30—39	299	1,838	20,508.	68.59	6.15	11.16
40—49	228	1,648	18,720.	82.11	7.23	11.36
50—59	150	1,276	12,432.	82.88	8.51	9.74
60—69	55	396	3,923.	71.33	7.20	9.91
70 and Over	17	171	1,364.	80.24	10.06	7.98
	945	6,420	69,962.	74.03	6.79	10.90

In analyzing Tabulation E it is helpful to refer back to Tabulation B to compare the surgical claims of adult females as compared to male employes.

The measurement of childrens' claims in relation to the age of the father or mother becomes a further problem. As the age of the parents increases beyond the fifty year mark it is reasonable to expect the number of protected children to decrease. On the above sample there were 883 claims for children under ten years of age and only 355 claims on children ten years of age and over.

The effect of age on other coverages must be considered carefully. A high average age distribution for male employes should mean a low loss cost on dependent maternity and obstetrical coverages.

The illustrated statistical data indicates that average age distribution will have its most pronounced effect upon male employe loss costs. The problem of working out a factor in the employe rates does not appear difficult for groups made up mostly of male employes. However, the female loading calculations would be distorted.

The problem of working out the age factor for dependent rates with the problem of offsets in both maternity and children claims would become more challenging. Also, the solution would depend upon whether dependents rate were figured on a composite or split basis.

The approach followed in considering problems in age distribution and geographic location can be followed in a study of other pertinent factors. One of these other factors which is considered important is "newness" of the policy. How much "extra" loss costs are involved in first year policy experience?

PART IV — TRANSLATION OF LOSS EXPERIENCE INTO PURE PREMIUMS

The first and most important step in gathering together the loss experience for ratemaking or rate review purposes is to decide what constitutes homogeneous classifications.

After deciding this, tabulations are run by size of claim separately for each of the following types of claimants:

1. Male Employes
2. Female Employes
3. Adult Dependents
4. Children

A worksheet can then be set up showing the average claim costs according to maximum benefit levels. An abbreviated example of an actual case follows.

Tabulation F

Average Claim Costs by Maximum Benefit Level
1953 Incurred Claims (Selected Sample)

Male Employes

Maximum Benefit	*Paymts. Under Max.*		*Paymts. at Max.*		*Total Cost*	*Av. Cost Per Claim*
	No.	*Amount*	*No.*	*Amount*		
20	182	$ 1,932	817	$16,340	$18,272	$18.29
50	471	11,546	528	26,400	37,946	37.98
100	775	32,857	224	22,400	55,257	55.31
200	926	53,642	73	14,600	68,242	68.31
500	992	73,887	7	3,500	77,387	77.46
Unlimited	999	78,893	—	—	78,893	78.97

On the basis of the above tabulation the rate differentials according to maximum benefit level can be determined. For example, the loss costs at a $500 maximum are 40% higher than at a $100 maximum.

In establishing pure premium for policies with no female loading we have considered the sex distribution to be:

94% Male
6% Female

Assuming a monthly frequency of 8.00 claims per 1,000 lives on male employes and 11 claims per 1,000 lives on female employes the frequency factor would be:

$$.94 \times .008 = .0075$$
$$.06 \times .011 = .0007$$
$$.0082$$

The employe pure premium for a $500 maximum benefit would then be:

$$.0082 \times 77.46 = \$.635$$

On dependent rate computations the pure premimus for adult dependents and children are computed separately. The resulting pure premiums are combined in order to produce a composite pure premium rate. On policies where the dependent rate is on a "split" basis, the adult and children losses must be kept separate and related back to classified exposure data.

Deductible Provisions

Information in Tabulation F can provide the basis for determining the effect that a deductible will have upon pure premiums.

Male Employes

Maximum Benefits	*Claim Costs No Deductible*	*% Reduction in Claim Costs from $20 Deductible*
$100	$55,257	33.1%
200	68,242	26.8
500	77,387	23.6

A comparable study on 1952 claim experience resulted in a reduction factor for a $20 deductible at the $500 maximum benefit level of 25.2% for male employes and 28.7% for dependents.

The entire concept of a deductible is extremely interesting and this may be the factor that will permit hospital therapeutics to be written for benefit levels that provide real protection and at the same time at a cost that is reasonable.

The loss cost for a $20 deductible, $500 maximum is nearly the same as for a $100 maximum without the deductible.

The adding of a deductible in itself may affect claim costs through affecting either or both frequency and amount charged. (In this respect the limited experience we have had has been favorable.)

It is important that claims incurred under policies with a deductible

provision be kept *entirely separate* from claims incurred under policies without a deductible. Otherwise both the frequency and the average claim costs will be upset.

Coinsurance

A tabulation classifying claims according to size will contain the basic information necessary in the determination of changes in loss costs resulting from coinsurance provisions.

Number of Days

Some thought has been given to setting maximum benefits at a specified number of dollars per day. There are policies written on this basis.

Although number of days serves a useful purpose as a rough measurement of severity, Tabulation G indicates that this could become a "trap" when used as a rating factor.

Federated Mutual — Hospital Therapeutic Benefits
1953 Claims Paid Through February 1954
Average Amount Charged Per Day Hospitalized

Duration of Confinement (Days)	*Number of Claims*	*Average Amount Charged* — *Mean*	*Median*	*Standard Deviation*
	Adult Claimants — With Surgery			
1	262	$29.80	$26.12	$15.78
2—7	1,048	16.53	14.40	8.43
8—14	638	12.05	10.25	6.48
15 +	314	10.73	9.07	7.28
	Adult Claimants — No Surgery			
1	180	24.97	20.77	17.80
2—7	1,111	12.39	9.92	7.75
8—14	348	8.48	8.79	5.83
15 +	259	7.60	5.34	8.06
	Children — With Surgery			
1	741	26.82	25.70	10.34
2—7	427	15.97	14.32	7.81
8—14	61	9.93	7.58	5.48
15 +	31	8.15	7.00	4.80
	Children — No Surgery			
1	163	18.57	15.00	13.78
2—7	463	8.48	6.83	6.16
8—14	104	6.14	4.90	4.58
15 +	43	5.17	4.43	3.74

Tabulation G indicates definitely that the average charge for extras per day decreases as the duration of confinement increases. This factor could have a tendency to increase durations in cases where the average *daily* benefit was high.

Reduction of amounts charged to a per day basis does reduce both the elements of skewness and dispersion. The relative amount of deviation from mean costs, however, is still surprisingly large on a "charged per day" basis. Factors other than number of days definitely affect claim costs. Many of these must still be considered as unknown.

Tabulation H further illustrates how the "per day" maximum benefit level basis would affect different types of claims. A per day maximum benefit would fall far short on certain types of claims particularly those involving surgery.

% of claims that would be 100% covered at indicated "per day" maximum benefit levels

Duration of Confinement (Days)	*Maximum benefit per day*		
	$10	*$15*	*$20*
	Adult Claims — No Surgery		
1—7	47.8%	68.4%	81.3%
8 and over	81.3	93.1	97.1
	Adult Claims — With Surgery		
1—7	19.4	47.7	70.1
8 and over	58.9	83.3	93.8
	Childrens Claims — No Surgery		
1—7	64.7	80.4	89.5
8 and over	92.7	97.2	99.4
	Children Claims — With Surgery		
1—7	11.9	30.2	47.4
8 and over	73.6	90.1	96.7

The entire question of loss costs by maximum benefit levels is becoming more interesting and more important as more business is written at higher levels. Many interesting research studies can be made to fill in the gaps left in this general review of the overall rating and statistical problem.

THE BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN

BY

ROBERT B. FOSTER

The Boiler and Machinery Premium Adjustment Rating Plan of the National Bureau of Casualty Underwriters is a retrospective type plan that is available on an optional basis in all States for the large Boiler and Machinery risks on either an intrastate or interstate basis. The Plan was introduced in 1947 and at the present time it provides about 15% of the Boiler and Machinery premium volume. As with other retrospective rating plans, the premium for a risk is determined, within maximum and minimum limits, by the losses incurred during the policy period. To be eligible a risk must have a three-year Standard Premium of at least $25,000 for all States except New Jersey and Texas, where the eligibility requirements are less stringent.* Currently one out of every four or five risks that are eligible are written under the Plan. The Standard Premium for a risk is the premium prior to the application of any premium gradation. The policies of two or more carriers covering the same exposures may be combined for rating under the Plan, if this is acceptable to the carriers involved. The Plan must be elected prior to the policy period that is to be covered.

The formula used to determine the premium after the expiration of the policy is:

$$R = (B + C \times L)\ (1/1 - T),\ H \leqq R \leqq G,$$

using standard notation.** Here R is the Retrospective Premium for the risk as determined by the formula. The Fixed Charge (Basic Premium), B, is that part of the Standard Premium, to be designated by P, which provides for all expenses, other than taxes, that are not related to losses. The Loss Adjustment and Inspection expenses, which are related to losses, are provided for by C, which is called the Loss Conversion Factor. C is applied to the losses, L, which are incurred in the policy period and which are limited to a certain amount for any one accident. Since taxes vary with the final premium charged, i.e. the Retrospective Premium, R, they are provided for by means of a Tax Multiplier, 1/(1–T). H is the Minimum Premium limitation on R and G is the Maximum limitation. G and H are determined from Selected Maximum and Minimum loss ratios.

In Boiler and Machinery insurance there are two types of coverage,

* In New Jersey a three-year Standard Premium of at least $25,000 is required except that a risk with loss experience that is worse than average may qualify with a three-year Standard Premium of $5,000. In Texas all risks with a three-year Standard Premium of at least $5,000 are eligible for the Plan.

** "An Actuarial Analysis of Retrospective Rating" by Thomas O. Carlson in the *Proceedings*, Vol. XXVIII, p. 283.

Direct Damage coverage, providing insurance for property damaged by an accident to an insured object, and Indirect Damage insurance, of various kinds, which can be provided by endorsement to the Boiler and Machinery policy. The kinds of Indirect Damage coverage and their definitions are as follows:

Use and Occupancy—This is the most important form of Indirect insurance. It reimburses the assured for loss of earnings resulting from his inability to use or occupy the premises because of a Boiler or Machinery accident.

Outage—This form of Indirect insurance provides indemnity for each hour an object is disabled by an accident to the object.

Consequential Damage—This form provides indemnity against loss by spoilage of property from lack of power, light, heat, steam or refrigeration.

Power Interruption—This coverage applies when there is an Indirect type of loss because of an accident to the physical equipment of a Public Utility supplying service to the assured.

Because of the different nature of these coverages a separate limitation of losses to be included in the rating formula is made for Direct Damage and for each type of Indirect Damage coverage. For Use and Occupancy, Outage and Power Interruption, there is, in addition, a Maximum limitation on the amount of Daily Indemnity to be included. The combined limits for all coverages for any one accident cannot be greater than 80% of the Selected Maximum loss ratio times the Standard Premium, P, except that the Direct Damage limit must be at least $5,000 (the basic limit), and each type of Indirect Coverage may have a limit of $5,000 regardless of the 80% limitation. The primary reason for the accident limitation of the Plan is to separate those losses of a magnitude which could be considered normal from those which are abnormally high. The purpose of the 80% limitation is to prevent any one loss from producing the Maximum Premium.

Because of the restrictions on L, the Standard Premium, P, is computed in two parts, one for the accident limits within the Plan, which will be designated by Pl, and the other for the portion of P in excess of the accident limits, which will be designated by Pe. To illustrate, let us assume the following:

1. A Direct Damage limit per accident of $500,000 for the policy,
2. Use & Occupancy Rating Daily Indemnity of $2,000 and a limit of loss of $200,000 for the policy,
3. Accident limits within the Plan of $5,000 for Direct Damage losses and 5 days at $2,000 per day, or $10,000, for Use & Occupancy.

For this particular risk, we would then have:

a)	Standard Premium Within Accident Limitations, Pl	
	1. Location Charge for $5,000 Accident Limit . .	$ 16
	2. Boiler Object Charges	5,400
	3. Machinery Object Charges	14,000
	4. Use & Occupancy $2,000 per day for 5 days . .	22,050
		$41,466
b)	Standard Premium in Excess of Accident Limitation, Pe	
	1. Location Charge over $5,000 Accident Limit .	$ 269
	2. Boiler Excess Limits Charge 5,400 × .08 . .	432
	3. Machinery Excess Limits Charge 14,000 x .08	1,120
	4. Use & Occupancy $2,000 per day for 95 days over 5 days	19,320
		$21,141
c)	Total Standard Premium, P	$62,607

Having determined the Pl, it is necessary to calculate the Expected Losses, i.e. the expected value of L. Since the Inspection cost varies with each type of object and the Inspection and loss elements combined are a fixed percentage, 49%, of the Standard Premium, the loss element also varies. To facilitate the determination of Expected Losses, Table C, showing the Expected Loss Factors, is shown in Appendix III.

The determination of the rating values is best illustrated by following a sample calculation. The form used is shown on the next page.

Items 1 and 2 are the Standard Premiums, P and Pl, previously calculated.

Item 3 is the sum of the Expected Losses for the various Expected Loss groups underlying Pl. In this case, the Expected Loss Factor for the Location Charge is .12 and produces Expected Losses of $2. The Boiler and Machinery objects have various Expected Loss Factors with Expected Losses of $4,744 and the Use and Occupancy Expected Loss Factor is .44 producing Expected Losses of $9,702. Their sum equals $14,448.

Item 4 is the provision in P for Administration and Production Expenses, and Profit and Contingencies. The premium is graded on these items with the standard expense provision of 45% for the first $3,000 of Standard Premium and 21% for the Standard Premium in excess of $3,000. The makeup of the expense ratios is as follows:

Expense Item	*Percent of Standard Premium*	
	First $3,000	*Over $3,000*
Administration	12.5%	5.625%
Production	30.0	13.500
Profit and Contingencies	2.5	1.875
	45.0%	21.000%

$(45\% \times 3{,}000 + 21\% \times 59{,}607 = 13{,}867)$

The expense provisions may be adjusted to meet any exceptional requirements of individual risks in most states.* This item is part of B, the Fixed Charge, and because it was determined on the total Standard Premium, P, it provides for the Administration, Production and Profit & Contingencies for Pe as well as for Pl.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN
FORM I — CALCULATION OF RATING VALUES

Rating Data

1.	Total Initial Standard Premium	$62,607
2.	Portion of (1) Within Accident Limitations	$41,466
3.	Expected Losses in (2) (based on Table C factors)	$14,448
4.	Provision in (1) for Admin. and Production Expenses, Profit and Contingencies	$13,867
5.	Portion of Inspection and Claim Expense Provision in (2) to be charged in Proportion to Losses (not over 50%)	33%
6.	Selected Maximum Loss Ratio	.350
7.	Selected Minimum Loss Ratio	.050

Determination of Loss Conversion Factor

8.	Provision in (2) for Inspection and Claim Expenses [(2) × .51] – (3)	$ 6,700
9.	Portion of (8) in Loss Conversion Factor (8) × (5)	$ 2,211
10.	Loss Conversion Factor [(9) ÷ (3)] + 1.0	1.153

Determination of Insurance Charge

11.	Expected Loss Factor (3) ÷ (1)	.231
12.	Ratio of Maximum Rated Losses to Expected Losses (6) ÷ (11)	1.515
13.	Excess Charge from Table A entered with (3) and (12)	.091
14.	Ratio of Minimum Rated Losses to Expected Losses (7) ÷ (11)	.216
15.	Loss Saving from Table B entered with (3) and (14), not to exceed (13)	.001
16.	Insurance Charge [(13)–(15)] × (11) × (10)	.024

* All States except Florida, Kansas, Louisiana, New York, North Carolina, South Carolina, Tennessee, Texas, and Virginia.

Determination of Fixed Charge, Maximum and Minimum Premium Ratios (Expressed as Ratios to Total Standard Premium)

17.	Provision for Losses and Inspection and Claim Expenses in Premium in Excess of Accident Limitations [(1) – (2)] × .51	$10,782
18.	[(4)+(8)–(9)+(17)]÷(1)	.465
19.	Fixed Charge (16) + (18)	.489
20.	Maximum Premium Prior to Tax Multiplier [(6)×(10)]+(19)	.893
21.	Minimum Premium Prior to Tax Multiplier [(7)×(10)]+(19)	.547
22.	Maximum Premium (20) × 1.042	.931
23.	Minimum Premium (21) × 1.042	.570

Item 5 is the portion of the combined Inspection and Claim expense provision in Pl that is to be related to the losses, L. This ratio is limited to 50% since part of the Inspection and Claim expense elements are assumed not to vary with losses.

Items 6 and 7 are selected as values that will give the desired Maximum and Minimum Premiums.

Items 8, 9, and 10 are used to determine C, the Loss Conversion Factor.

Item 8 determines the Inspection and Claim expenses available in Pl. Since in Boiler and Machinery insurance the fixed ratio of .51, related to ungraded Manual premium, is for losses, Inspection, and Claim expenses combined, the provision for the Inspection and Claim expense portion is determined by deducting the Expected Losses determined in Item 3 from .51 of Pl.

Item 9 gives the amount of Inspection and Claim expenses which would be provided by C if the losses, L, should equal the Expected Losses.

Item 10 is the Loss Conversion Factor to be applied to the losses, L.

Items 11 through 16 are used to determine the Insurance Charge, which is required because the Retrospective Premium, R, cannot be greater than the Maximum Premium, G, nor less than the Minimum Premium, H. The limitation H provides a saving which is used to partly or wholly offset the charge required because of the limitation G.

Item 11 relates the Expected Losses for Pl to the total Standard Premium, P.

Item 12 relates the Selected Maximum loss ratio to the Expected Loss Factor of Item 11.

Item 13 gives the charge for limiting the losses to the ratio of Item 12. Because the amount of the charge required is related to the size of the Expected Losses—the larger the Expected Losses the less likely a variation in loss ratio great enough to exceed the ratio of Item 12—a table of ratios of Maximum Rated Losses to Expected Losses for various Expected Loss sizes is used. This table, Table A, is shown in Appendix I. It is to be noted that for Expected Losses in excess of $25,000, the $25,000 value is to be used. The reason for this is that for the multiplicity of exposures for Boiler and Machinery risks, there is a certain residual variation in Expected Losses above this area of value regardless of Expected Loss size.

Item 14 relates the Selected Minimum loss ratio to the Expected Loss Factor of Item 11.

Item 15 makes use of another table, Table B, to determine the premium saving because of the Minimum. Table B is shown in Appendix II. In no event is the saving to exceed the charge of Item 13. This is a practical underwriting consideration since the loss of premium because of a negative Insurance Charge would only be recovered if the risk earned less than the Minimum.

Item 16, the Insurance Charge, is the net of Items 13 and 15, increased for the corresponding Loss Adjustment expenses and related to the total Standard Premium, P. This item cannot be negative because of the restriction on Item 15.

Item 17 is for losses and Inspection and Claim expenses in Pe.

Item 18 is the expense ratio, related to P, of all items except taxes and the expenses included by the Loss Conversion Factor, and includes an amount to cover the losses, Inspection and Claim expenses of Item 17.

Item 19 is the Fixed Charge which, in addition to the expenses of

Item 18, includes the Insurance Charge computed in Item 16.

Item 20 is the sum of the Fixed Charge ratio and the Selected Maximum loss ratio multipled by C in order to include the related Claim and Inspection expenses.

Item 21 is the sum of the Fixed Charge Ratio and the Selected Minimum loss ratio multiplied by C.

Item 22 is the Maximum Premium ratio, including taxes. The premium tax rate is 4%; hence the Tax Multiplier is $1/(1-.04) = 1.042$.

Item 23 represents the Minimum premium, including taxes, payable in the event the losses are equal to or less than the Selected Minimum loss ratio times P.

If Direct Damage Deductible Insurance is afforded, the National Bureau determines the Expected Losses and the provision for Inspection and Claim expenses to be used. The calculation of rating values follows the same procedure as for full coverage, except that the expenses are handled in such a way as to produce the same expense allowance as under full coverage. In the States permitting adjustment of the expense items, the Administration expense is generally related to the deductible Standard Premium instead of the full coverage Standard Premium. The Production, Profit and Contingencies, and tax elements are always related to the deductible Standard Premium.

A special endorsement is prepared for policies to which the Boiler and Machinery Premium Adjustment Rating Plan is applied. The standard endorsement form is shown on the next page. Note that the Deposit Premium for the risk is the Standard Premium adjusted for premium gradation. Thus the same Advance Premium applies as though the policy were written under the Guaranteed Cost Plan. Because the assured has some control over the determination of the amount of loss, a clause is included providing for notification to the insurer within 60 days following the date of an accident. This is important in order for the risk experience and accident prevention procedures to be properly appraised. In addition, the endorsement gives the date of the first adjustment of premium to be charged the risk, and the provisions for subsequent adjustments. Once the rating values are established, they are not subject to modification during the policy term. Special provision is made in the endorsement to cover the possibility of cancellation by the assured or the company.

Tables A and B are more familiarly known as Table M, which is the table used to determine the Insurance Charge for retrospectively rated Workmen's Compensation and Liability risks. Analyses of average claim costs and underwriting judgment indicated that the ratio of losses in excess of a given ratio was equally applicable to Boiler and Machinery Insurance as to the Workmen's Compensation line. Hence, the Table was adopted without change except for the $25,000 end point. The use of Table M was extended to the Liability lines in Plan D in 1949. The end point of Table M is higher because Experience Rating of large Workmen's Compensation and Liability risks reduces the divergence between actual and expected loss costs.

At the time of the first adjustment, which is within six months after the expiration of the policy period, the losses are analyzed, and those losses within the accident limitations are put into the rating formula. The Standard Premium is revised, if there were exposure changes, and the rating values are applied to the adjusted Standard Premium. A calculation of the Retrospective Premium is shown below.

Assuming no change in the Standard Premium and total losses of $10,000 with no losses in excess of the accident limitations for the Plan, we would have the following calculation of Final (Retrospective) Premium.

(Boiler and Machinery)

ENDORSEMENT
PREMIUM ADJUSTMENT RATING PLAN

ENDORSEMENT NO.....

This Endorsement forms a part of Policy No. ..... and is effective from noon of .....

Assured .....

DEPOSIT PREMIUM

A. The Assured shall pay to the Company as a Deposit Premium, as of the effective date of the policy, the initial Standard Premium modified by the application of Premium Gradation, which Deposit Premium shall be modified throughout the term of the policy for changes in insurance

EARNED PREMIUM

B. The Earned Premium as developed by this Endorsement is the [amount obtained by the application of the Tax Multiplier to the] [1] sum of:

(1) The Fixed Charge, and

(2) .....% of the Incurred Losses.

The Earned Premium so developed is the premium for the policy, but shall not be less than the Minimum Premium nor more than the Maximum Premium, each as defined herein:

Minimum Premium. The Minimum Premium is .....% of the Standard Premium.

Maximum Premium. The Maximum Premium is .....% of the Standard Premium.

ELEMENTS IN DEVELOPMENT OF THE EARNED PREMIUM

C. The computation of the Earned Premium shall be based upon the following elements:

(1) **Standard Premium.** The Standard Premium is the premium developed for the insurance afforded during the term of the policy in accordance with the provisions of the policy, other than this Endorsement and exclusive of application of Premium Gradation.

(2) **Fixed Charge.** The Fixed Charge is .....% of the Standard Premium.

[(3) **Tax Multiplier.** The Tax Multiplier is the factor .....] [1]

(4) **Incurred Losses.** The Assured shall notify the Company of intention to file claim for loss, as specified herein, and shall make tentative estimate of the amount of such loss, within sixty days following the date of the Accident; but this requirement does not modify any policy provision for Notice of Accident to the Company. Incurred Losses shall mean the actual paid losses and the reserves as estimated by the Company for unpaid losses and any allocated loss expense under the policy, as of the computation dates hereinafter specified, provided that:

(a) the limit of such reserves and paid losses to be included herein shall be $..... for any One Accident arising out of the insurance afforded under Coverages [A, B, C, D, E and F] [2] of the Insuring Agreement of the policy [, and

(b) the limit of such reserves and paid losses to be included herein shall be $..... for each Day of Total or Partial Prevention of Business and $..... for all Prevention of Business because of any One Accident arising out of the insurance provided under any Use and Occupancy Endorsement made a part of the policy.] [3]

COMPUTATION OF EARNED PREMIUM

D. The Company shall make an initial computation of the Earned Premium as soon as practicable after the termination or expiration of the policy or not

(Boiler and Machinery)

ENDORSEMENT
PREMIUM ADJUSTMENT RATING PLAN
(Continued)

later than six months thereafter. In this computation the Incurred Losses shall be valued as of the date selected for such initial computation. The Earned Premium determined by the initial computation shall be the final premium for the policy unless further adjustment is requested either by the Company or by the Assured upon notifying the other party within sixty days of the promulgation of the results of such initial computation. Any further adjustments shall be governed by a like procedure. All adjustments hereunder are subject to the Minimum Premium and to the Maximum Premium, as herein defined.

PAYMENT OF EARNED PREMIUM

E. After the Company has made the initial computation of the Earned Premium as provided for in this Endorsement, the Assured shall immediately pay to the Company the difference between such Earned Premium and the premium previously paid to the Company, if the Earned Premium so determined is greater than the premium previously paid. The Company shall return to the Assured the difference between such Earned Premium and the premium previously paid to the Company, if such Earned Premium is less than the premium previously paid. Corresponding adjustments shall be made at the time of any subsequent computation of the Earned Premium.

CANCELATION OF ALL OR PART OF THE POLICY

F. The cancelation or termination of all or part of the policy of which this Endorsement forms a part shall not be deemed to affect such computations of Earned Premium as are provided for in this Endorsement and, to the extent that the terms of this paragraph are contrary to the terms of the Cancelation Condition of the policy, such Condition is hereby modified:

(1) **Cancelation by the Assured or Cancelation by the Company in the event of Non-Payment of Premium.** In the event of such cancelation the Earned Premium shall be determined in accordance with the provisions of this Endorsement except that:
   (a) The Minimum Premium, or the portion of it applicable to such canceled insurance, shall not be less than the amount obtained by the application of Premium Gradation to the Standard Premium developed for such canceled insurance.
   (b) The Maximum Premium shall be based upon the Standard Premium which would have been developed for the policy if such insurance had not been canceled.

(2) **Cancelation by the Company.** In the event of cancelation of the policy by the Company for reasons other than non-payment of premium, the Earned Premium shall be determined in accordance with the provisions of this Endorsement and the term of the policy as referred to in Paragraph C, Section (1) shall be the period that the policy has been in force.

[Countersigned by ..... BLANK INDEMNITY COMPANY ..... Authorized Representative][4]

REFERENCE NOTES

1—If a Company includes the Tax Multiplier in the Fixed Charge and in the Loss Conversion Percentage the matter in brackets is to be omitted.
2—The matter in brackets is dependent upon the coverages included within the General Boiler and Machinery Policy.
3—The matter in brackets is to be included when Use and Occupancy Insurance is involved and if other Indirect Damage coverages are involved the matter in brackets should be correspondingly amended to denote the type of coverage involved to which the loss limitation applies.
4—The matter in brackets and the position thereof and capacity of the person is at the option of the Company in accord with the Company's usual practices.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN

FORM II — CALCULATION OF FINAL PREMIUM

1.	Total Standard Premium	$62,607
2.	Actual Losses Within Accident Limitations, Including Allocated Claim Expense	$10,000
3.	Loss Conversion Factor (Form I, Item 10)	1.153
4.	Fixed Charge (Form I, Item 19)	.489
5.	Maximum Premium Ratio (Form I, Item 22)	.931
6.	Minimum Premium Ratio (Form I, Item 23)	.570
7.	Converted Losses (2) $\times$ (3)	$11,530
8.	Fixed Charge (1) $\times$ (4)	$30,615
9.	$[(7) + (8)] \times 1.042$	$43,915
10.	Maximum Premium (1) $\times$ (5)	$58,287
11.	Minimum Premium (1) $\times$ (6)	$35,686
12.	Final Premium is (9) subject to Maximum in (10) and Minimum in (11)	$43.915

Using symbols, we have:

$$R = (30{,}615 + 1.153 \times 10{,}000)\ (1.042) = 43{,}915$$
$$35{,}686 \leqq R \leqq 58{,}287$$

A "Preliminary Application for Determining Rating Values" must be submitted to the National Bureau of Casualty Underwriters at least ten days prior to the effective date of the Plan. A copy of this form is shown on the next page. Within 30 days after the beginning of the rating period a Supplementary Application must be submitted. This is a duplicate of Form 1 — Calculation of Rating Values except for additional information giving the name and address of the insured, forms of insurance to be included, effective and expiry dates, and accident limitations within the Plan for Direct Damage and for Indirect Damage.

The essential differences between this Plan and Plan D are:

1. One set of rating values as compared with three (or more), which is possible because the Standard Premium can be accurately determined in advance.
2. The total premium for the risk is made a part of the rating

formula, whereas in Plan D the premium in excess of the accident limits for the Plan is handled separately.

3. Although the Loss Conversion Factor for Plan D can be varied, this is not done to as great an extent on individual risks as in the Boiler and Machinery Plan where the Inspection portion of a Boiler and Machinery risk is an important one.

4. The limitation, on the loss limits that may be included in the Plan, to 80% of the Selected Maximum losses (the Selected Maximum loss ratio times the total Standard Premium).

5. In general, much higher eligibility requirements.

The Premium Adjustment Rating Plan offers the better than average risk an opportunity to reduce the cost of his insurance, particularly since there is no experience rating plan for Boiler and Machinery insurance and also makes insurance more readily obtainable for other risks by providing a premium for each risk that is more in keeping with the actual costs. Its use is limited, however, even for many risks that are eligible. This is because of the nature of Boiler and Machinery insurance which is essentially a low frequency, high average claim cost line. For the Boiler Direct Damage coverage the inspection element in the premium is of major importance and the loss element is relatively small. However, risks with considerable Machinery and Indirect Damage exposure do have a reasonably large loss element with higher loss frequency. The loss frequency for all Boiler objects covered for accident years 1948-1952 was 3.6 claims per 1,000 object years. The comparable figure for Machinery objects was 16.1 claims per 1,000 object years.* A multiple location risk is more suited to the Premium Adjustment Rating Plan because of the reduced catastrophe exposure for risks of the same premium size. Because of the Maximum premium feature the Plan is considered to have an advantage over Guaranteed Cost deductible insurance since there is no limit to the number of deductible amounts which the insured must pay in addition to the fixed premium. It can reasonably be concluded that the Premium Adjustment Rating Plan is an important consideration in the underwriting of large Boiler and Machinery risks.

Perhaps inspired by the tabular retrospective rating plans which have been used successfully for Workmen's Compensation risks for some time, a simplified version of the Premium Adjustment Rating Plan, in the form of a tabular plan, is currently being considered for adoption for risks with a Standard Premium of $3,000 or more. If adopted it would make retrospective rating available to a great many risks not eligible at present and would be a useful supplement to the Premium Adjustment Rating Plan.

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*1953 Compilation of Boiler and Machinery Experience — National Bureau of Casualty Underwriters.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN

Preliminary Application for Determining Rating Values

Send two copies to:
National Bureau of Casualty Underwriters
60 JOHN STREET
New York 38, N. Y.

Date.....

1. Name of insured.....
.....

2. Address of insured's headquarters.....
.....

3. Location of all plants or exposures to be rated, including name under which operated .....
.....

4. Forms of Boiler and Machinery insurance to be included in the Plan
.....

5. The percentage of undiscounted standard premium for:

	First $3000	Over $3000
Administration expense	.....%	.....%
Production Cost	.....%	.....%
Profit and Contingencies	.....%	.....%
Total	.....%	.....%

6. Names of all carriers during past year of exposures to be rated and expiration dates of policies .....

7. Effective date of Plan.....Expiration date of Plan.....

Submitted by.....Co.

Address.....

Signed.....

Approved by National Bureau of Casualty Underwriters
per .....
Date .....

S. B. 121A

Appendix I

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN Sheet 1

TABLE A

Table of Charges for Losses in Excess of Ratio R

(Charges Expressed as Ratios to Expected Losses)

Ratio R	Risk Expected Losses							
	$500	$1,000	$1,500	$2,000	$3,000	$4,000	$5,000	$6,000
.80	.611	.552	.516	.493	.455	.432	.413	.397
.81	.608	.547	.512	.489	.449	.427	.408	.392
.82	.605	.543	.508	.484	.444	.422	.403	.387
.83	.602	.540	.504	.480	.440	.418	.399	.383
.84	.599	.536	.500	.476	.436	.413	.394	.378
.85	.596	.533	.496	.472	.432	.409	.390	.374
.86	.593	.529	.493	.468	.428	.405	.386	.370
.87	.590	.526	.489	.464	.424	.401	.382	.366
.88	.588	.522	.485	.459	.420	.397	.377	.361
.89	.585	.519	.481	.455	.416	.393	.373	.357
.90	.583	.516	.477	.451	.412	.389	.369	.353
.91	.580	.512	.473	.447	.408	.385	.365	.349
.92	.578	.509	.469	.443	.405	.381	.361	.345
.93	.575	.505	.465	.439	.401	.377	.357	.340
.94	.573	.502	.462	.436	.398	.373	.353	.336
.95	.570	.499	.458	.432	.395	.370	.349	.333
.96	.568	.496	.455	.429	.391	.366	.346	.329
.97	.565	.493	.452	.425	.388	.362	.342	.325
.98	.563	.490	.449	.422	.385	.359	.338	.321
.99	.560	.487	.446	.419	.382	.356	.334	.318
1.00	.558	.484	.443	.416	.379	.352	.331	.314
1.01	.556	.482	.440	.413	.376	.349	.327	.310
1.02	.553	.480	.438	.410	.373	.345	.323	.307
1.03	.551	.477	.435	.407	.370	.342	.320	.303
1.04	.549	.475	.432	.404	.367	.339	.317	.300
1.05	.548	.473	.430	.401	.364	.336	.313	.296
1.06	.546	.470	.427	.398	.361	.333	.310	.293
1.07	.544	.468	.425	.395	.359	.330	.307	.289
1.08	.542	.465	.422	.393	.356	.327	.304	.285
1.09	.540	.463	.420	.390	.353	.324	.300	.282
1.10	.538	.462	.418	.388	.350	.321	.297	.279
1.11	.537	.460	.416	.386	.347	.318	.294	.275
1.12	.535	.458	.414	.383	.344	.315	.291	.272
1.13	.533	.457	.412	.381	.341	.312	.288	.269
1.14	.532	.455	.410	.378	.339	.309	.285	.266
1.15	.530	.454	.408	.376	.337	.307	.282	.263
1.16	.528	.452	.406	.374	.334	.304	.279	.260
1.17	.527	.450	.404	.372	.332	.302	.277	.257
1.18	.526	.449	.402	.370	.329	.299	.274	.254
1.19	.525	.447	.401	.368	.327	.297	.271	.251
1.20	.524	.446	.399	.366	.325	.294	.269	.248
1.21	.522	.444	.397	.365	.322	.291	.266	.245
1.22	.521	.442	.395	.363	.320	.289	.263	.242
1.23	.520	.441	.393	.361	.317	.286	.260	.239
1.24	.519	.439	.392	.359	.315	.284	.258	.237
1.25	.518	.438	.390	.357	.313	.281	.255	.234

R - Ratio of Maximum Rated Losses to Expected Losses

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 2

TABLE A

Table of Charges for Losses in Excess of Ratio R

(Charges Expressed as Ratios to Expected Losses)

R - Ratio of Maximum Rated Losses to Expected Losses

Ratio	Risk Expected Losses							
	$500	$1,000	$1,500	$2,000	$3,000	$4,000	$5,000	$6,000
1.26	.516	.438	.388	.356	.310	.279	.253	.231
1.27	.515	.434	.386	.354	.308	.276	.250	.229
1.28	.514	.433	.385	.352	.306	.274	.248	.227
1.29	.513	.432	.383	.350	.303	.272	.245	.224
1.30	.512	.431	.382	.348	.301	.269	.243	.222
1.31	.510	.430	.380	.347	.299	.267	.241	.219
1.32	.509	.428	.379	.345	.297	.265	.238	.217
1.33	.508	.427	.377	.343	.295	.262	.236	.215
1.34	.507	.426	.376	.341	.293	.260	.234	.212
1.35	.506	.425	.374	.340	.291	.258	.231	.210
1.36	.505	.424	.373	.338	.289	.256	.229	.208
1.37	.503	.423	.371	.336	.287	.254	.227	.206
1.38	.503	.422	.370	.334	.285	.252	.225	.204
1.39	.502	.421	.368	.332	.283	.250	.223	.201
1.40	.502	.420	.367	.331	.281	.247	.220	.199
1.41	.501	.419	.365	.329	.279	.245	.218	.197
1.42	.500	.418	.364	.327	.277	.243	.216	.195
1.43	.500	.417	.363	.325	.275	.242	.214	.193
1.44	.499	.416	.361	.324	.273	.240	.213	.191
1.45	.499	.415	.360	.323	.272	.238	.211	.190
1.46	.498	.414	.359	.321	.270	.236	.209	.188
1.47	.497	.413	.358	.320	.268	.234	.207	.186
1.48	.497	.412	.357	.318	.266	.232	.205	.184
1.49	.496	.411	.355	.317	.264	.230	.203	.182
1.50	.496	.410	.354	.316	.263	.228	.201	.180
1.52	.494	.408	.352	.313	.259	.225	.198	.176
1.54	.493	.406	.349	.310	.256	.222	.195	.173
1.56	.492	.404	.347	.307	.253	.219	.191	.170
1.58	.491	.402	.345	.304	.250	.216	.188	.166
1.60	.490	.400	.342	.302	.247	.213	.185	.163
1.62	.488	.398	.340	.299	.244	.210	.181	.160
1.64	.487	.396	.337	.297	.241	.207	.178	.157
1.66	.486	.394	.335	.295	.238	.203	.175	.154
1.68	.485	.392	.333	.292	.235	.200	.173	.151
1.70	.484	.390	.330	.290	.232	.198	.170	.148
1.72	.482	.388	.328	.287	.230	.195	.167	.146
1.74	.481	.386	.325	.285	.227	.192	.165	.143
1.76	.480	.384	.323	.283	.224	.189	.162	.140
1.78	.479	.382	.321	.280	.222	.187	.159	.138
1.80	.478	.380	.318	.278	.219	.185	.157	.135
1.82	.477	.378	.316	.276	.217	.182	.154	.133
1.84	.475	.376	.315	.273	.215	.180	.152	.131
1.86	.474	.374	.311	.271	.212	.177	.150	.128
1.88	.473	.373	.309	.268	.210	.175	.147	.126
1.90	.472	.371	.307	.266	.207	.172	.144	.123

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 5

TABLE A

Table of Charges for Losses in Excess of Ratio R

(Charges Expressed as Ratios to Expected Losses)

R - Ratio of Maximum Rated Losses to Expected Losses	Risk Expected Losses							
	$500	$1,000	$1,500	$2,000	$3,000	$4,000	$5,000	$6,000
1.92	.471	.369	.305	.264	.204	.169	.142	.121
1.94	.470	.368	.303	.261	.202	.167	.140	.119
1.96	.469	.367	.301	.259	.200	.165	.138	.117
1.98	.468	.365	.299	.257	.198	.163	.136	.115
2.00	.466	.364	.297	.254	.195	.161	.133	.113
2.02	.467	.362	.295	.252	.193	.158	.131	.110
2.04	.466	.361	.293	.250	.191	.156	.128	.108
2.06	.465	.359	.291	.247	.188	.154	.126	.106
2.08	.464	.358	.289	.245	.186	.151	.124	.104
2.10	.464	.357	.287	.242	.183	.149	.122	.102
2.12	.463	.355	.285	.240	.181	.147	.120	.099
2.14	.462	.354	.283	.238	.179	.145	.117	.097
2.16	.462	.353	.281	.236	.176	.142	.115	.095
2.18	.461	.351	.279	.233	.174	.140	.113	.093
2.20	.461	.350	.277	.231	.172	.138	.111	.092
2.22	.460	.348	.275	.230	.170	.136	.109	.090
2.24	.459	.347	.274	.228	.168	.134	.107	.088
2.26	.459	.346	.272	.226	.165	.131	.105	.087
2.28	.458	.345	.270	.224	.163	.129	.103	.085
2.30	.458	.344	.269	.222	.161	.127	.101	.083
2.32	.457	.342	.267	.220	.159	.126	.100	.082
2.34	.456	.341	.265	.218	.157	.124	.098	.080
2.36	.456	.340	.264	.217	.155	.122	.097	.079
2.38	.455	.339	.262	.215	.153	.120	.095	.077
2.40	.455	.338	.260	.213	.151	.118	.093	.076
2.42	.454	.336	.258	.211	.149	.116	.091	.074
2.44	.453	.335	.257	.209	.148	.115	.090	.073
2.46	.453	.334	.255	.208	.146	.113	.089	.071
2.48	.453	.333	.255	.206	.144	.112	.087	.069
2.50	.452	.332	.252	.204	.142	.110	.086	.068
2.55	.451	.329	.247	.199	.137	.106	.082	.065
2.60	.450	.326	.243	.195	.133	.102	.078	.062
2.65	.449	.323	.239	.191	.129	.098	.075	.059
2.70	.448	.320	.235	.187	.125	.094	.071	.056
2.75	.447	.317	.231	.183	.121	.090	.068	.054
2.80	.447	.315	.228	.179	.117	.086	.065	.052
2.85	.446	.312	.224	.175	.114	.083	.062	.050
2.90	.445	.309	.220	.171	.110	.080	.059	.048
2.95	.445	.306	.216	.167	.107	.077	.057	.046
3.00	.444	.303	.212	.163	.103	.075	.055	.044

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 4

TABLE A

Table of Charges for Losses in Excess of Ratio R

(Charges Expressed as Ratios to Expected Losses)

Ratio R	Risk Expected Losses							
	$7,000	$8,000	$9,000	$10,000	$12,500	$15,000	$20,000	$25,000
.80	.386	.375	.363	.356	.339	.324	.311	.298
.81	.381	.370	.358	.351	.333	.319	.306	.293
.82	.376	.365	.353	.346	.328	.314	.300	.287
.83	.371	.360	.349	.341	.324	.309	.295	.281
.84	.367	.355	.344	.337	.319	.304	.290	.276
.85	.362	.351	.339	.332	.314	.299	.285	.271
.86	.356	.346	.334	.327	.309	.295	.280	.265
.87	.354	.342	.330	.322	.305	.290	.275	.260
.88	.349	.337	.325	.318	.300	.285	.270	.254
.89	.345	.333	.321	.314	.296	.280	.265	.249
.90	.341	.329	.317	.310	.292	.276	.260	.244
.91	.337	.325	.313	.306	.288	.272	.256	.239
.92	.333	.321	.309	.301	.284	.268	.251	.234
.93	.328	.316	.304	.297	.279	.263	.247	.230
.94	.324	.312	.300	.293	.275	.259	.242	.225
.95	.320	.308	.296	.289	.271	.255	.238	.220
.96	.316	.304	.292	.285	.267	.251	.233	.216
.97	.312	.300	.288	.281	.263	.247	.229	.211
.98	.309	.296	.284	.277	.259	.243	.225	.207
.99	.305	.293	.281	.273	.255	.239	.220	.202
1.00	.302	.289	.277	.269	.251	.235	.216	.198
1.01	.298	.286	.273	.266	.247	.231	.212	.194
1.02	.294	.282	.270	.262	.243	.227	.208	.190
1.03	.291	.278	.266	.259	.240	.223	.204	.186
1.04	.287	.275	.263	.255	.236	.219	.200	.182
1.05	.284	.271	.259	.251	.232	.215	.196	.178
1.06	.280	.268	.256	.248	.229	.211	.192	.174
1.07	.276	.264	.252	.244	.225	.207	.188	.170
1.08	.273	.260	.248	.241	.221	.203	.185	.166
1.09	.269	.257	.245	.237	.218	.200	.181	.162
1.10	.266	.254	.241	.233	.214	.196	.177	.158
1.11	.263	.250	.238	.230	.211	.193	.174	.155
1.12	.259	.246	.234	.226	.207	.189	.170	.151
1.13	.256	.243	.231	.223	.204	.186	.167	.148
1.14	.253	.240	.228	.220	.200	.183	.164	.145
1.15	.250	.238	.225	.217	.197	.179	.160	.142
1.16	.247	.235	.222	.214	.194	.176	.157	.138
1.17	.244	.232	.219	.211	.191	.173	.154	.135
1.18	.241	.229	.216	.208	.187	.170	.151	.132
1.19	.238	.226	.213	.205	.184	.167	.148	.129
1.20	.235	.223	.210	.202	.181	.163	.145	.126
1.21	.232	.220	.207	.198	.178	.160	.142	.123
1.22	.229	.217	.204	.195	.175	.157	.139	.120
1.23	.227	.214	.201	.193	.171	.154	.136	.117
1.24	.224	.211	.199	.190	.168	.151	.133	.114
1.25	.221	.209	.196	.187	.166	.149	.130	.112

R - Ratio of Maximum Rated Losses to Expected Losses

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I

TABLE A Sheet 5

Table of Charges for Losses in Excess of Ratio R

(Charges Expressed as Ratios to Expected Losses)

Ratio R	Risk Expected Losses							
	$7,000	$8,000	$9,000	$10,000	$12,500	$15,000	$20,000	$25,000
1.26	.219	.206	.195	.184	.165	.146	.128	.109
1.27	.216	.203	.190	.181	.160	.143	.125	.106
1.28	.214	.201	.188	.179	.157	.140	.122	.104
1.29	.211	.198	.185	.176	.154	.137	.119	.101
1.30	.208	.195	.182	.173	.152	.134	.117	.099
1.31	.206	.193	.179	.170	.149	.131	.114	.097
1.32	.204	.190	.177	.168	.146	.129	.112	.094
1.33	.201	.188	.175	.166	.144	.127	.109	.092
1.34	.199	.185	.172	.163	.142	.124	.107	.090
1.35	.196	.183	.169	.160	.139	.122	.105	.088
1.36	.194	.180	.166	.157	.136	.120	.103	.086
1.37	.192	.178	.164	.155	.134	.117	.100	.084
1.38	.190	.176	.162	.153	.131	.115	.098	.082
1.39	.187	.173	.159	.150	.129	.113	.096	.080
1.40	.185	.171	.157	.148	.127	.111	.094	.078
1.41	.183	.168	.154	.146	.125	.109	.092	.076
1.42	.181	.166	.152	.143	.123	.106	.090	.074
1.43	.179	.164	.150	.141	.121	.104	.088	.072
1.44	.177	.162	.148	.139	.119	.102	.086	.070
1.45	.175	.160	.146	.137	.117	.100	.084	.068
1.46	.173	.158	.144	.135	.115	.098	.082	.067
1.47	.171	.156	.142	.133	.113	.096	.081	.065
1.48	.169	.154	.140	.131	.111	.094	.079	.064
1.49	.167	.152	.138	.129	.109	.092	.077	.062
1.50	.165	.150	.136	.127	.107	.091	.076	.060
1.52	.161	.147	.132	.124	.104	.087	.073	.058
1.54	.158	.144	.129	.121	.101	.084	.070	.055
1.56	.155	.140	.126	.118	.098	.081	.067	.052
1.58	.152	.137	.122	.114	.094	.078	.064	.050
1.60	.148	.133	.119	.111	.091	.075	.061	.048
1.62	.145	.130	.116	.108	.088	.072	.059	.045
1.64	.142	.128	.114	.105	.085	.069	.056	.043
1.66	.140	.125	.111	.103	.083	.066	.054	.041
1.68	.137	.122	.108	.100	.081	.064	.052	.039
1.70	.134	.119	.105	.097	.078	.062	.050	.038
1.72	.131	.117	.102	.094	.075	.060	.048	.036
1.74	.129	.114	.100	.092	.073	.058	.046	.034
1.76	.126	.111	.097	.090	.071	.055	.044	.033
1.78	.123	.109	.095	.087	.069	.053	.042	.031
1.80	.121	.107	.092	.085	.067	.052	.041	.030
1.82	.119	.104	.090	.082	.065	.050	.040	.029
1.84	.116	.102	.088	.080	.063	.048	.038	.028
1.86	.114	.100	.085	.078	.061	.047	.037	.027
1.88	.112	.097	.083	.076	.059	.045	.035	.025
1.90	.109	.095	.081	.074	.056	.043	.034	.024

R - Ratio of Maximum Rated Losses to Expected Losses

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I

TABLE A

Sheet 6

Table of Charges for Losses in Excess of Ratio R

(Charges Expressed as Ratios to Expected Losses)

R - Ratio of Maximum Rated Losses to Expected Losses	Ratio R	Risk Expected Losses							
		$7,000	$8,000	$9,000	$10,000	$12,500	$15,000	$20,000	$25,000
	1.92	.107	.093	.079	.072	.054	.041	.032	.023
	1.94	.105	.091	.077	.070	.053	.040	.031	.022
	1.96	.103	.089	.075	.068	.051	.038	.029	.021
	1.98	.101	.087	.073	.066	.049	.037	.028	.020
	2.00	.099	.085	.071	.064	.047	.035	.027	.019
	2.02	.096	.083	.069	.062	.046	.034	.026	.019
	2.04	.094	.081	.068	.061	.044	.033	.025	.018
	2.06	.093	.079	.066	.059	.042	.031	.024	.017
	2.08	.091	.077	.064	.057	.041	.030	.023	.016
	2.10	.089	.075	.062	.055	.039	.029	.022	.015
	2.12	.087	.074	.061	.054	.038	.028	.021	.014
	2.14	.085	.072	.059	.052	.037	.027	.020	.014
	2.16	.083	.070	.058	.051	.036	.026	.019	.013
	2.18	.081	.068	.056	.050	.034	.025	.019	.013
	2.20	.079	.067	.054	.048	.033	.024	.018	.012
	2.22	.078	.065	.053	.047	.032	.023	.017	.012
	2.24	.076	.063	.051	.045	.031	.022	.016	.011
	2.26	.074	.062	.050	.044	.030	.021	.016	.010
	2.28	.073	.061	.048	.042	.029	.021	.015	.010
	2.30	.071	.059	.047	.041	.028	.020	.015	.010
	2.32	.069	.057	.045	.039	.027	.019	.014	.009
	2.34	.068	.056	.044	.038	.026	.019	.014	.009
	2.36	.067	.055	.043	.037	.025	.018	.013	.008
	2.38	.065	.053	.042	.036	.024	.018	.013	.008
	2.40	.064	.052	.040	.035	.024	.017	.012	.008
	2.42	.062	.051	.039	.034	.023	.016	.012	.007
	2.44	.061	.049	.038	.033	.022	.015	.011	.007
	2.46	.060	.048	.037	.032	.022	.015	.011	.007
	2.48	.058	.047	.036	.032	.021	.015	.010	.006
	2.50	.057	.046	.035	.031	.021	.014	.010	.006
	2.55	.054	.044	.033	.029	.019	.013	.009	.005
	2.60	.052	.042	.031	.027	.017	.012	.008	.005
	2.65	.049	.040	.029	.025	.016	.011	.007	.004
	2.70	.047	.038	.028	.024	.015	.010	.007	.004
	2.75	.045	.036	.026	.023	.014	.009	.006	.003
	2.80	.043	.034	.025	.021	.013	.008	.005	.003
	2.85	.041	.032	.023	.020	.012	.007	.005	.002
	2.90	.039	.031	.022	.019	.011	.006	.004	.002
	2.95	.038	.030	.022	.019	.011	.006	.004	.002
	3.00	.037	.029	.021	.018	.010	.006	.004	.002

Note: If the selected ratio to expected losses is between two successive ratios shown in the Ratio R. column, the charge for the higher of the two ratios shall apply. The charge shall be interpolated for risk expected losses lying between two successive expected loss amounts appearing in the table. If the risk expected losses are in excess of $25,000, use the $25,000 column. If the risk expected losses are below $500, refer to the rating organization.

Appendix II

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN Sheet 1

TABLE B

Table of Savings in Losses Below Ratio S

(Savings Expressed as Ratios to Expected Losses)

Ratio S	Risk Expected Losses							
	$500	$1,000	$1,500	$2,000	$3,000	$4,000	$5,000	$6,000
.01	.001	.001	.001	.000	-	-	-	-
.02	.003	.002	.001	.001	-	-	-	-
.03	.004	.002	.001	.001	-	-	-	-
.04	.006	.004	.002	.001	-	-	-	-
.05	.009	.005	.003	.002	-	-	-	-
.06	.011	.007	.005	.003	.001	-	-	-
.07	.014	.008	.006	.004	.001	.001	-	-
.08	.017	.010	.007	.005	.002	.001	.001	.001
.09	.020	.011	.008	.006	.002	.001	.001	.001
.10	.023	.013	.009	.007	.003	.002	.001	.001
.11	.027	.015	.010	.008	.004	.003	.002	.002
.12	.030	.017	.012	.009	.005	.004	.003	.002
.13	.033	.019	.013	.010	.006	.004	.003	.002
.14	.037	.022	.015	.011	.007	.005	.004	.002
.15	.040	.024	.016	.013	.008	.006	.004	.003
.16	.044	.026	.018	.014	.009	.006	.004	.003
.17	.048	.028	.019	.015	.010	.007	.005	.003
.18	.052	.030	.021	.017	.012	.008	.006	.004
.19	.056	.033	.023	.018	.014	.010	.007	.005
.20	.060	.036	.025	.020	.016	.011	.008	.006
.21	.064	.038	.027	.022	.017	.012	.008	.006
.22	.068	.042	.029	.024	.019	.013	.009	.006
.23	.073	.045	.032	.026	.021	.015	.011	.008
.24	.079	.049	.035	.029	.023	.017	.012	.009
.25	.083	.053	.039	.032	.026	.019	.014	.010
.26	.087	.057	.042	.035	.028	.021	.016	.012
.27	.092	.061	.046	.038	.030	.023	.017	.013
.28	.097	.065	.050	.041	.032	.025	.018	.014
.29	.102	.069	.053	.044	.034	.027	.020	.015
.30	.107	.074	.057	.047	.037	.029	.022	.017
.31	.112	.078	.061	.050	.040	.031	.024	.019
.32	.117	.083	.065	.053	.042	.034	.026	.021
.33	.122	.087	.069	.056	.045	.036	.028	.022
.34	.128	.092	.073	.060	.048	.038	.031	.024
.35	.133	.097	.077	.064	.051	.041	.033	.027
.36	.138	.102	.081	.068	.054	.044	.036	.029
.37	.143	.107	.086	.072	.057	.047	.038	.031
.38	.149	.112	.090	.076	.060	.050	.041	.034
.39	.154	.117	.094	.079	.063	.053	.044	.036
.40	.160	.122	.098	.083	.067	.056	.047	.039

S - Ratio of Minimum Rated Losses to Expected Losses

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 2

TABLE B

Table of Savings in Losses Below Ratio S

(Savings Expressed as Ratios to Expected Losses)

S - Ratio of Minimum Rated Losses to Expected Losses	Ratio S	Risk Expected Losses							
		$500	$1,000	$1,500	$2,000	$3,000	$4,000	$5,000	$6,000
	.41	.166	.127	.103	.087	.070	.059	.049	.041
	.42	.172	.132	.108	.091	.073	.062	.052	.044
	.43	.177	.138	.112	.095	.076	.065	.055	.046
	.44	.183	.143	.117	.100	.080	.068	.058	.049
	.45	.189	.149	.122	.104	.083	.071	.061	.052
	.46	.195	.154	.127	.108	.086	.074	.064	.055
	.47	.201	.159	.131	.112	.090	.078	.067	.059
	.48	.206	.165	.136	.117	.094	.082	.071	.062
	.49	.212	.170	.141	.122	.098	.086	.075	.066
	.50	.218	.176	.147	.127	.103	.090	.079	.070
	.51	.224	.181	.152	.132	.107	.094	.083	.073
	.52	.230	.186	.157	.137	.111	.098	.086	.077
	.53	.236	.192	.162	.142	.116	.102	.090	.080
	.54	.242	.197	.167	.147	.120	.106	.094	.084
	.55	.248	.203	.173	.152	.125	.110	.098	.087
	.56	.254	.208	.178	.158	.130	.115	.102	.091
	.57	.261	.214	.183	.163	.134	.119	.106	.095
	.58	.267	.219	.189	.168	.139	.123	.110	.099
	.59	.273	.225	.194	.173	.144	.128	.114	.103
	.60	.280	.231	.200	.179	.149	.132	.118	.107
	.61	.286	.237	.206	.185	.154	.137	.123	.111
	.62	.292	.243	.212	.190	.159	.142	.127	.115
	.63	.299	.249	.217	.196	.164	.146	.131	.119
	.64	.305	.255	.223	.201	.168	.150	.135	.123
	.65	.312	.261	.229	.207	.173	.154	.139	.127
	.66	.318	.267	.235	.213	.178	.159	.144	.132
	.67	.324	.273	.241	.218	.183	.164	.148	.136
	.68	.331	.279	.247	.224	.189	.169	.153	.141
	.69	.337	.285	.253	.230	.194	.174	.158	.145
	.70	.344	.291	.258	.235	.199	.179	.162	.149
	.71	.350	.297	.264	.241	.204	.184	.167	.154
	.72	.356	.303	.270	.246	.209	.189	.172	.158
	.73	.363	.309	.276	.252	.215	.194	.177	.163
	.74	.370	.315	.282	.258	.220	.199	.182	.168
	.75	.377	.321	.287	.264	.226	.205	.187	.172
	.76	.383	.327	.293	.270	.232	.210	.192	.177
	.77	.390	.333	.299	.275	.237	.216	.198	.182
	.78	.397	.339	.305	.281	.243	.221	.203	.187
	.79	.404	.345	.311	.287	.248	.227	.208	.192
	.80	.411	.351	.316	.293	.253	.232	.213	.197

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 3

TABLE B

Table of Savings in Losses Below Ratio S

(Savings Expressed as Ratios to Expected Losses)

S - Ratio of Minimum Rated Losses to Expected Losses	Ratio S	Risk Expected Losses							
		$500	$1,000	$1,500	$2,000	$3,000	$4,000	$5,000	$6,000
	.81	.418	.357	.322	.299	.259	.237	.218	.202
	.82	.425	.363	.328	.304	.264	.242	.223	.207
	.83	.432	.370	.334	.310	.270	.248	.229	.213
	.84	.439	.376	.340	.316	.276	.253	.234	.218
	.85	.446	.383	.346	.322	.282	.259	.240	.224
	.86	.453	.389	.353	.328	.288	.265	.246	.230
	.87	.460	.396	.359	.334	.294	.271	.252	.236
	.88	.468	.402	.365	.339	.300	.277	.257	.241
	.89	.475	.409	.371	.345	.306	.283	.263	.247
	.90	.483	.416	.377	.351	.312	.289	.269	.253
	.91	.490	.422	.383	.357	.318	.295	.275	.259
	.92	.498	.429	.389	.363	.325	.301	.281	.265
	.93	.505	.435	.395	.369	.331	.307	.287	.270
	.94	.513	.442	.402	.376	.338	.313	.293	.276
	.95	.520	.449	.408	.382	.345	.320	.299	.283
	.96	.528	.456	.415	.389	.351	.326	.306	.289
	.97	.535	.463	.422	.395	.358	.332	.312	.295
	.98	.543	.470	.429	.402	.365	.339	.318	.301
	.99	.550	.477	.436	.409	.372	.346	.324	.308
	1.00	.558	.484	.443	.416	.379	.352	.331	.314

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 4

TABLE B

Table of Savings in Losses Below Ratio S

(Savings Expressed as Ratios to Expected Losses)

S - Ratio of Minimum Rated Losses to Expected Losses: Ratio S	Risk Expected Losses							
	$7,000	$8,000	$9,000	$10,000	$12,500	$15,000	$20,000	$25,000
Below .08	-	-	-	-	-	-	-	-
.08	.001	.001	.001	.001	.001	.001	.001	-
.09	.001	.001	.001	.001	.001	.001	.001	-
.10	.001	.001	.001	.001	.001	.001	.001	-
.11	.002	.002	.002	.001	.001	.001	.001	-
.12	.002	.002	.002	.002	.001	.001	.001	-
.13	.002	.002	.002	.002	.001	.001	.001	-
.14	.002	.002	.002	.002	.001	.001	.001	-
.15	.003	.002	.002	.002	.001	.001	.001	-
.16	.003	.002	.002	.002	.001	.001	.001	-
.17	.003	.002	.002	.002	.001	.001	.001	-
.18	.003	.003	.002	.002	.001	.001	.001	-
.19	.004	.003	.002	.002	.001	.001	.001	-
.20	.005	.004	.003	.003	.002	.001	.001	-
.21	.005	.004	.003	.003	.002	.001	.001	-
.22	.005	.004	.003	.003	.002	.001	.001	-
.23	.006	.005	.004	.003	.002	.001	.001	-
.24	.007	.006	.004	.004	.002	.001	.001	-
.25	.008	.007	.005	.004	.003	.002	.001	.001
.26	.010	.008	.006	.005	.003	.003	.002	.001
.27	.011	.009	.007	.006	.004	.003	.002	.001
.28	.012	.010	.008	.007	.005	.004	.002	.001
.29	.013	.011	.009	.008	.006	.005	.003	.002
.30	.015	.013	.011	.010	.007	.006	.004	.003
.31	.017	.015	.013	.012	.009	.007	.005	.003
.32	.019	.017	.014	.013	.011	.008	.006	.004
.33	.020	.018	.015	.014	.012	.009	.007	.005
.34	.022	.019	.017	.016	.013	.011	.008	.006
.35	.024	.021	.019	.018	.015	.012	.009	.007
.36	.026	.023	.021	.020	.017	.013	.010	.007
.37	.028	.025	.022	.021	.018	.014	.011	.008
.38	.031	.027	.024	.023	.020	.015	.012	.009
.39	.033	.029	.026	.025	.021	.016	.013	.009
.40	.035	.031	.028	.026	.023	.017	.013	.010
.41	.037	.033	.030	.028	.024	.018	.014	.010
.42	.039	.035	.032	.030	.026	.019	.015	.011
.43	.042	.038	.034	.032	.028	.021	.017	.013
.44	.045	.040	.036	.034	.029	.023	.018	.014
.45	.048	.043	.038	.037	.031	.025	.020	.015

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 5

TABLE B

Table of Savings in Losses Below Ratio S

(Savings Expressed as Ratios to Expected Losses)

S - Ratio of Minimum Rated Losses to Expected Losses: Ratio S	Risk Expected Losses							
	$7,000	$8,000	$9,000	$10,000	$12,500	$15,000	$20,000	$25,000
.46	.051	.046	.040	.039	.033	.026	.021	.016
.47	.054	.048	.043	.041	.035	.028	.023	.017
.48	.057	.051	.046	.043	.037	.030	.024	.018
.49	.060	.054	.048	.046	.039	.032	.026	.020
.50	.064	.057	.051	.048	.041	.034	.027	.021
.51	.067	.060	.054	.051	.043	.035	.029	.022
.52	.070	.063	.056	.053	.045	.037	.030	.023
.53	.073	.066	.059	.056	.047	.039	.032	.025
.54	.076	.069	.062	.059	.049	.041	.034	.026
.55	.080	.073	.065	.061	.052	.043	.036	.028
.56	.084	.076	.068	.064	.054	.046	.038	.029
.57	.088	.080	.072	.067	.056	.048	.040	.031
.58	.091	.083	.075	.070	.059	.051	.042	.033
.59	.095	.087	.079	.073	.062	.053	.044	.035
.60	.099	.090	.082	.077	.064	.055	.046	.037
.61	.103	.094	.086	.080	.067	.058	.048	.039
.62	.106	.098	.089	.083	.070	.060	.051	.041
.63	.110	.101	.092	.086	.073	.063	.053	.043
.64	.114	.105	.096	.089	.076	.065	.056	.046
.65	.118	.109	.099	.093	.079	.068	.058	.048
.66	.122	.113	.103	.097	.082	.071	.061	.051
.67	.127	.117	.107	.101	.085	.074	.064	.053
.68	.131	.121	.111	.105	.089	.078	.067	.057
.69	.135	.125	.115	.109	.093	.081	.070	.060
.70	.139	.129	.119	.112	.097	.084	.073	.063
.71	.143	.133	.123	.116	.100	.088	.077	.066
.72	.148	.138	.127	.120	.104	.091	.080	.069
.73	.153	.142	.132	.125	.108	.095	.083	.072
.74	.157	.147	.136	.129	.112	.099	.087	.075
.75	.162	.151	.141	.133	.116	.103	.091	.079
.76	.166	.156	.145	.137	.120	.107	.095	.083
.77	.171	.160	.149	.142	.124	.111	.099	.086
.78	.176	.165	.154	.147	.129	.115	.103	.090
.79	.181	.170	.159	.151	.134	.120	.107	.094
.80	.186	.175	.163	.156	.139	.124	.111	.098
.81	.191	.180	.168	.161	.143	.129	.116	.103
.82	.196	.185	.173	.166	.148	.134	.120	.107
.83	.201	.190	.179	.171	.154	.139	.125	.111
.84	.207	.195	.184	.177	.159	.144	.130	.116
.85	.212	.201	.189	.182	.164	.149	.135	.121

Note: See sheet 6 for notes on interpolation.

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLAN I Sheet 6

TABLE B

Table of Savings in Losses Below Ratio S

(Savings Expressed as Ratios to Expected Losses)

S - Ratio of Minimum Rated Losses to Expected Losses	Ratio S	Risk Expected Losses							
		$7,000	$8,000	$9,000	$10,000	$12,500	$15,000	$20,000	$25,000
	.86	.218	.206	.194	.187	.169	.155	.140	.125
	.87	.224	.212	.200	.192	.175	.160	.145	.130
	.88	.229	.217	.205	.198	.180	.165	.150	.134
	.89	.235	.223	.211	.204	.186	.170	.155	.139
	.90	.241	.229	.217	.210	.192	.176	.160	.144
	.91	.247	.235	.223	.216	.198	.182	.166	.149
	.92	.253	.241	.229	.221	.204	.188	.171	.154
	.93	.258	.246	.234	.227	.209	.193	.177	.160
	.94	.264	.252	.240	.233	.215	.199	.182	.165
	.95	.270	.258	.246	.239	.221	.205	.188	.170
	.96	.276	.264	.252	.245	.227	.211	.193	.176
	.97	.282	.270	.258	.251	.233	.217	.199	.181
	.98	.289	.276	.264	.257	.239	.223	.205	.187
	.99	.295	.283	.271	.263	.245	.229	.210	.192
	1.00	.302	.289	.277	.269	.251	.234	.216	.198

Note: If the selected ratio to expected losses is between two successive ratios shown in the Ratio S column, the saving for the higher of the two ratios shall apply.
The saving shall be interpolated for risk expected losses lying between two successive expected loss amounts appearing in the table. If the risk expected losses are in excess of $25,000, use the $25,000 column. If the risk expected losses are below $500, refer to the rating organization

Sheet 1

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLANS

TABLE C

Expected Loss Factors

Type of Object	Expected Loss Factor*	Type of Object	Expected Loss Factor*
Oil or Gas Drilling Boilers	34%ø	Steam Engines	38%
Track Locomotive Boilers	7 ø	Reciprocating Compressors-Steam Type	39
Steel Boilers Class 1, H and S	4 ø	Reciprocating Pumps-Steam Type	21
Fire Tube Boilers over 15 lbs.Pressure	9 ø	Internal Combustion Engines	40
		Reciprocating Compressors and Pumps-Internal Combustion Type	25
Water Tube Boilers over 15 lbs.Pressure		Reciprocating Compressors and Pumps-Separately Driven Type	29
4000 sq. ft. or less	9 ø	Centrifugal or Rotary Pumps - except Deep Well	16
4001 - 10,000 sq. ft.	14 ø	Centrifugal or Rotary Compressors	34
Over 10,000 sq. ft.	19 ø	Centrifugal Pumps - Deep Well Type	26
Cast Iron Boilers	4 ø	Fans and Blowers	33
Fired Objects - N.O.C.	14 ø	Miscellaneous Machines	
Unfired Vessels - Type 1	8	Type 1	19
Type 2	8	Type 2 - Enclosed Gear Sets	38
Type 3	8	- Gear Wheels	33
Type 4	12	- Other	33
Type 5	14	Type 3	38
Refrigerating Vessels and Piping		Wheels	
Compression Type	31	Type 1	16
Absorption Type	28	Type 2	16
Boiler Piping	†	Type 3	24
		Shafting	39
Auxiliary Piping		Steam or Water Turbines - Breakdown - Driven Electric Generators	
Exhaust Piping	24	100 kw. or less	26
Other Auxiliary Piping	24	101 - 1000 kw.	31
Residence Boilers and Vessels		1001 - 9000 kw.	36
Blanket Coverage	23	Over 9000 kw.	41
Explosion Only Policy	49		
Furnace Explosion	49	Steam or Water Turbines - Breakdown - Other Driven Objects	
Indirect Insurance, Boiler	44	100 kw. or less	21
		101 - 1000 kw.	27
		1001 - 9000 kw.	32
		Over 9000 kw.	38

*The factor to obtain the inspection cost provision is 49% minus the expected loss factor for the object involved.

øStandard Coverage only - for Broad Coverage add 40% of the difference between Object Rates for Broad and Standard Coverage.

†Same expected loss factor as the Object determining the rate.

February 1, 1952

BOILER AND MACHINERY PREMIUM ADJUSTMENT RATING PLANS

TABLE C

Expected Loss Factors

Type of Object	Expected Loss Factor*	Type of Object	Expected Loss Factor*
Steam or Water Turbines - Limited Breakdown		Synchronous or Rotary Converters & Dynamotors	
100 kw. or less	20%	100 kw. or less	30%
101 - 1000 kw.	25	101 - 1000 kw.	35
1001 - 9000 kw.	30	Over 1000 kw.	40
Over 9000 kw.	35		
Steam or Water Turbines - Combined Coverage		Transformers & Induction Feeder Regulators	
100 kw. or less	20	25 kw. or kva. or less	15
101 - 1000 kw.	25	26 - 200 kw. or kva.	25
1001 - 9000 kw.	30	201 - 1000 kw. or kva.	35
Over 9000 kw.	35	Over 1000 kw. or kva.	39
Steam or Water Turbines - Explosion Coverage		Deep-Well Pump Units	34
100 kw. or less	5	Small Refrigerating Machines	15
101 - 1000 kw.	11	Small Compressing Machines	9
1001 - 9000 kw.	16		
Over 9000 kw.	21		
Electric Generators		Air Conditioners	20
100 kw. or less	20	Miscellaneous Electrical Apparatus	25
101 - 1000 kw.	29	Indirect Insurance, Machinery	44
1001 - 9000 kw.	34		
Over 9000 kw.	39		
Electric Motors and Synchronous or Rotary Condensers		Premium from Application of Location Charges, Portable Object Charges and Excess Limit Factors	12
5 h. p. or less	15		
6 - 25 h.p.	26		
26 - 100 h.p.	31		
101 - 1000 h.p.	36		
Over 1000 h.p.	41		

*The factor to obtain the inspection cost provision is 49% minus the expected loss factor for the object involved.

February 1, 1952

A CREDIBILITY FRAMEWORK FOR GAUGING FIRE CLASSIFICATION EXPERIENCE

BY

ROBERT L. HURLEY

PART ONE — BACKGROUND AND PHILOSOPHY OF FIRE CREDIBILITIES

The need for "credibility" judgments in fire insurance is inescapable. However, it is not necessary, nor is it a common custom, always to express credibility evaluations in mathematical language. In his daily work, the underwriter soon acquires the habit of accepting certain evidence as credible and dismissing others as untrustworthy. Now, these personal evaluations will vary not only from underwriter to underwriter; but even the same man may, at different times, employ different standards in similar situations because of purely subjective conditionings on each of the particular occasions. Probably no one will be amazed at this familiar observation, and few will find the underwriter's vacillations on credibility in any way reprehensible as long as his fund of common sense and knowledge of the business allows the company a profitable operation.

However, this purely subjective evaluation of credibility becomes unworkable when overall loss experience must be appraised from time to time for rating or policy underwriting decisions as contrasted with the underwriter's every day risk decisions. In his habitual review of risk offerings, the underwriter's faulty evaluations of credibility in a small number of situations will not necessarily mean unprofitable operations. But an incorrect decision on rate level or underwriting policy because of a misreading of credibility requirements can have serious repercussions on a company's results.

At the national level, there seems to be no inclination for the fire insurance industry to recognize officially any standards of credibility. It is true that some company executives have occasionally protested against proposed fire classification revisions on the plea that loss experience on such a statistical system would have no credibility. But to my knowledge, these verbal admonitions have never been followed with any mathematical or other logical demonstrations; and seldom, if at all, have the supervisory authorities taken serious issue with these undocumented representations.

It is interesting to note that the New York Insurance Department in its 1951 rate revision negotiations with NYFIRO used the following credibility table without differentiation for all occupancy classifications.

5 yr. Premium ($1000)	*Credibility*	*5 yr. Premium ($1000)*	*Credibility*
Under 50	5%	1,800-2,500	60
50- 200	10	2,500-3,200	70
200- 450	20	3,200-4,000	80
450- 800	30	4,000-5,000	90
800-1,250	40	5,000 & over	1.00
1,250-1,800	50		

In the 1951 *Proceedings* of the Casualty Actuarial Society, it was observed that there was no mathematical support for these tabular data. Nor was any clue afforded as to what logic lay behind the figures —presupposing that the data were the consequence of some formal reasoning process.

It is probably safe to say that there is no such thing as a formal mathematical theory of fire credibilities. Even the literature on this subject is scanty — an understandable neglect in view of the familiar adequacies of fire rates in the past. But as the rates approach the break even point, the companies may display a livelier interest in discovering a predictable relationship between their pricing practices and the actual loss experience.

It is unlikely, however, that the various credibility standards developed for certain casualty coverages can be automatically transferred over to our fire insurance rating problems. We would hardly be justified in assuming identical parameters for both loss distributions, as we suspect that the average chance of loss as well as the spread of the losses about the average expectation would probably be much different for fire than for automobile or workmen's compensation experience. Nevertheless, the attack on the problem should be identical in both instances.

It is obviously not possible for us, nor are we inclined, to dismiss the question of fire credibilities as solely an academic problem for which there is no satisfactory solution. We are even less disposed to slight the mathematical approach as of secondary importance to an approximate language understanding of credibility. For although our ultimate decision may be a qualitative one, (i.e., to accept or to reject certain evidence), the development of standards is necessarily quantitative (i.e., mathematical).

It has been discovered in other lines of endeavor that satisfactory solutions are often found by reorienting the statement of a problem so that it may be resolved with available techniques rather than searching for some abstruse methodology which, even if found, would not be generally intelligible. We suspect that at least a measure of truth, if not always of respectability, can be predicated of the theory that a "correct" answer is sometimes achieved by staking out the area within which a solution will be acceptable and then turning to a workable method for developing this answer. Certainly, this type of approach can not be regarded as incompatible with the pursuit of an immateriality such as "credibility" or more popularly, "belief."

Now, this "credibility" or belief is essentially the degree of assurance that a person must have in order to do something. In fire insurance rating, it is the confidence we have in the loss experience (with reference only to its statistical implications) to which we should adjust rates or revise underwriting policies. Naturally the degree of assurance required before venturing upon any commitment will be a function of each individual's personality. Perhaps there would even be a wide variation in the demands of individual respondents. Nevertheless, there is likely a neighborhood in which the demands will converge. Within this area, we shall set our standard of credibility as the common level having the minimum departures from a unanimity of opinion.

Sometimes we have better luck with a problem by marking out, first of all, the range of possible solutions rather than concentrating our attention solely on the one "best" solution. We will not get very far in fire insurance credibilities by searching for that very point at which the experience becomes trustworthy with all experience based on any lesser number of observations being automatically rejected. We would rather try our fortunes on the possibility of describing a range of credibility values from "0%" to "100%". It is not expected that we would achieve a complete agreement at any point of the scale. But it is even less likely that many people would ask that our standards for 10% and 90% credibilities be reversed. And as we shade our credibilities through the various tones of grey on the way from black to white, we have a better chance of approximating the true values than by positing a standard at which confidence must be conceded by arithmetical fiat. Although it may be the most obvious of mathematical tricks, this theory of the "continuous function" enables us to explain phenomenon which otherwise would not be intelligible without laborious counting of discrete observations.

PART TWO — STANDARDS FOR FIRE CREDIBILITIES

Let us, therefore, preface our mathematical development by defining the two extremes of "insignificant" or "zero" credibility and its antithesis "Fully Significant" or "100%" credibility. It matters not that neither end actually exists. It will suffice that we recognize that the one is the extreme position from the other and that, if needs be, we can imagine an infinite sequence of values between. Just one more time, we can position these fiducial limits to reflect whatever degree of confidence a person may be in need of. The ideas are the same, and so too the theory and the development — only the figures will change.

Thus we shall define "Insignificant or Non-Credible" experience to be a summary of loss experience based on such a number of independent risks that with any lesser number of risks one could not, in two out of three instances, reasonably expect that the true loss ratio would be less than 10% above the indicated figure.

Although tortuous, this definition is not beyond our working it out. First of all, there is no explicit restriction on the time interval over which the experience is to be collected. In pure theory the number required for credibility need not be visualized as a factor of any particular extension in time. The actual loss ratio for the period reviewed is to be taken as one sample of the various possible loss ratios which could have been experienced within this identical time.

The statistical method, then, indicates the credibility of the developed experience considering it solely as a sample from the universe of all possible loss ratios which could have occurred under the influence of the identical inherent hazard to loss. The mathematics do not establish the representativeness of the particular time interval reviewed. It is up to the rater to say whether or not this particular time interval is sufficiently representative to be used to set his prices for future coverage.

It should be noted that our definition sets the upper limit to Non-Credibility. With any greater number of risks, we are not to consider the statistics as non-credible. But with any lesser number, the experience is to be completely rejected.

The need for "personal assurance", an aspect of credibility to which we have previously alluded, helps to set the "two out of three" and the "10% above indicated" standards appearing in the definition. Although other figures could have been used, these values are arbitrary only in the sense that one person will demand a greater degree of probability (i.e., assurance) than another, before doing something. Actually in our important decisions, most of us require a relatively favorable degree of certainty. Few people would jeopardize a substantial portion of their funds on only a 5% chance of a successful outcome. On the other hand, the cost (even including monetary costs) of absolute certainty would be prohibitive, and the effort to attain such assurance is needless.

Consequently, we have set up our statistical requirements for fire credibilities so that the play of chance losses will not typically move the loss ratio more than 10% above the "true" loss ratio (i.e., inherent hazard of the particular universe). We can, if it is desired, reduce the allowable chance swing from 10% to 5% or 1% about the "true" average — but the narrower the desired control band, the greater the number of risks for credibility (i.e., at each level of the credibility scale). Likewise, the degree of assurance, the "two out of three instances" of our definition, can be increased to "three out of four" or "nine out of ten" or even more rigorous fiducial limits. But again, the greater the degree of certainty required, the greater the number of risks for each of the various credibility values.

You will note that our credibility standard is geared to a restriction in the swing of the loss ratio on solely the *top* side of the "true" figure. The possible play of the variation is unrestrained on the side *under* the central point. It is true that commonly the control limit is established as an equal range *both* above and below the mean position.

Such an added restriction could have been imposed in this problem. But again, the greater the limitations the greater the number of risks for credibility. Although the exposition is worked out in terms of the values outlined above, credibility tables can readily be developed for varying "fiducial limits" and "average departures from true values".

Now that we are familiar with the terms, let us proceed without further comment to define "Fully Significant" or "100%" credibility. Then we may proceed to examine with some care the backgrounds of our statistical thinking.

"Fully Significant or 100% Credible" experience is 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.

It will be noted that although we have used here the same standard for the allowable departures from the indicated loss ratio, the fiducial limits have been made much more rigorous. The previous "two out of three" break point for the "zero credibility" was deemed a sufficient "assurance" level only for the least possible value for credibility. And for the other extreme of "Full Credibility", the relatively severe "more than ninety-seven out of one hundred" standard was selected. The manner in which the credibility values are to be graduated between these two positions will be reviewed in a subsequent section.

PART THREE — MATHEMATICAL THEORY OF FIRE CREDIBILITIES

Although the idea may be anathema to underwriters and loss prevention engineers, our credibility tables are based on the premise that fire losses are inevitable. Every class (occupancy, construction, geographical) is viewed as possessing a certain inherent hazard to loss. But the loss potentials of these various classifications are not uniformly active within any specified time interval. Why and under what circumstances, any single unit's inherent hazard to loss jumps from the solely potential state into a real existence is not our concern here. It is enough that each class have its own characteristic loss potential.

We do not even have to know aforehand the value of the inherent hazard of the class. From the observation of prior happenings we establish its most likely average. And actually little harm is done if the "true" value does not exactly coincide with our approximation thereto. With an estimate to the probability of a loss (i.e., inherent hazard) we can build up a range within which the occurrence values will typically swing about its true value.

For example, a class with a 1% inherent hazard to loss will not likely produce exactly 10 losses on 1000 exposures for every period reviewed. In one case there may be no loss occurring; whereas in another there may be 20. Generally, the observations will tend to cluster about the true inherent hazard of 10 losses per 1000 exposures, and the departures from this average may be treated as responsive to a describable statistical pattern.

Let us tie down this term "inherent hazard" a little closer to our

fire insurance statistical problem. This expression immediately suggests the "likelihood of loss". But such a concept would be only an imperfect representation of "inherent hazard" in fire insurance. Since over 75% of all fire losses account for less than 5% of the total payments, the rater will have but incidental interest in the total number of losses. The controlling element in fire insurance is the chance of a medium size or severe loss in view of the fact that, excluding the dwelling classification, well over half of all payments are traceable to losses over $10,000 each. Therefore in the subsequent development we shall intend by "inherent hazard" the likelihood of suffering a fire loss other than a trivial loss.

As previously noted, we propose that each fire classification has its own individual potentiality for non-trivial fire losses. This tendency to loss is not uniformly realized over each successive time interval, but rather makes its appearance in a seemingly haphazard fashion — but actually capable of being described and anticipated according to a precise statistical model. This model is constructed upon the fundamental mathematical logic which lies behind all those exercises in coin tossing. The chance of averaging 3 or fewer heads in 5 tosses of ten coins can be predicated by the so-called Binomial Theorem. We can also measure the expected spread of the results about the mean position. Actually our credibility standard is set not directly on the measure of the inherent hazard, but rather upon the expected spread of the results about this average value.

For any small number of samples, the Binomial Distribution of rare events is apt to be quite non-symmetrical; that is, the curve representing the distribution of losses will be humped toward either the lower or the upper end of the scale. Such a situation may first seem somewhat of an annoyance statistically; but fortunately as the number of samples is increased, the curve representing the distribution of even rare events approaches the normal or symmetrical form. This fact is indicated algebraically by the demonstration that the Normal Curve has a Beta One (B_1) of zero and a Beta Two (B_2) of three which also is the limiting position of these ratios for the Binomial Distribution as the number of samples "n" approaches infinity.

$$B_1 = \frac{(q-p)^2}{npq}$$

where p = chance of loss $q = 1 - p$

$$B_2 = 3 + \frac{(1-6pq)}{pqn}$$

As you recall, we have in our development visualized the actual loss ratio for any defined extension in time as only one of an infinite number of possible occurrences which could have taken place under the same inherent hazard to loss in the identical time interval. Consequently, we have set up our problem so that our "n" approaches infinity as a limit.

PART FOUR — DEVELOPMENT OF FORMULAS

In the Binomial Distribution the *arithmetic average* (m) is given by: $m = np$ where:

n = number of observations in sample.
p = chance that the event will occur.
$(1-p)$ or q = chance that event will not occur.

The spread of values about the average (m) is measured by the *standard deviation* (s) which is equal to the square root of the sum of the squares of the deviations from the average.

$$s = \sqrt{npq}$$

Our credibility standard was geared to a maximum tolerance of 10% above the indicated loss ratio. Now since our measure is expressed in terms of a maximum allowable increase in loss ratio, we have cancelled out the rate as a function in our solution. And our credibility criterion thus becomes solely the number of risks needed so that the losses will typically not exceed 110% of their expected value.

We have discussed heretofore the proposal that each class has its own inherent hazard to loss (i.e., non-trivial losses). We have not insisted that these losses (non-trivial losses) be segregated by size groups, each of which is to be graduated by its own probability of loss. Rather we prefer to establish a relative likelihood of occurrence for a non-trivial loss, as an entity per se. We are aware that there is no precise value corresponding to this mathematical abstraction. But we know that the probability even of the most frequent "non-trivial losses" is of such a low order of probability, that to attempt to graduate the probabilities of the less frequent "non-trivial" losses could well be a needless gesture.

Therefore, we are to think of the loss ratio as the result of the occurrence of a predetermined number of non-trivial losses corresponding to the inherent loss characteristic of the class plus additional "non-trivial" losses due solely to the operation of chance. These chance losses are, by our standard, not to be so frequent as to increase the losses (i.e., loss ratio) by 10%. The expected number of non-trivial losses is given by our "m" (i.e., np) and the allowable chance deviation is set at a maximum of 10%.

Now, let us recall that in setting our upper limit for "Insignificant or Non-Credibility" we geared our 10% deviation to an assurance level i.e., fiducial limit) of "two out of three times". We know that in the Normal Curve (i.e., the limiting position of the Binomial as "n" approaches infinity) that about 30% of all occurrences are beyond a point corresponding to one-half a standard deviation above the arithmetic mean. Consequently, slightly more than two-thirds of the observations will lie to the left (i.e., the lower portion of the scale) of this point. And therefore the chances are two to one, or two out of three, that at this point the losses (or the loss ratio) will not exceed the average or expected number by more than 10%.

Or, in symbols:

for $\left(+\frac{x}{s}\right)$ above np, the area under the normal curve to the right of this point equals (1−0.69146) or 30% approximate.

$x = 10\%$ of average or $x = \frac{np}{10}$

$s = \sqrt{npq}$

$\frac{x}{s} = \frac{1}{2}$ or $\sqrt{npq} = \frac{2np}{10}$ or $n = 25\,\frac{q}{p}$ and since $q = (1-p)$, $n = 25\left(\frac{1}{p} - 1\right)$
or letting $\frac{1}{p} = k$, $n = 25(k-1)$

Now if "p" the chance of loss is 1% the experience cannot be considered "Non-Credible" if the number of risks exceeds 2475 (i.e., 25×99). Consequently we can express "zero credibility" limits as a variable of "p" the chance or the inherent hazard to loss. To translate these criteria to premium dollar figures we would multiply the number of risks times an average rate and policy size for each classification.

The procedure for "Fully Significant" or "100%" credibility is identical to the above approach. However, our 10% loss ratio tolerance is now geared to the more rigorous (i.e., 97 out of 100) assurance level. At 2s above np, the area under the normal curve to the right of this point equals (1 − 0.97725) or 2.3%.

$$x = 10\% \text{ of average, or } x = \frac{np}{10}\ s = \sqrt{npq}$$

$$\frac{x}{s} = 2 \text{ or } x = 2s \text{ or } \frac{np}{10} = 2\sqrt{npq}$$

$$n = 400\,\frac{q}{p} \text{ or } n = 400\,(k-1) \text{ where } k = \frac{1}{p}$$

Consequently, if "p" the chance of loss is 1%, the data would comply with the requirements for "Fully Credible" with 39,600 (i.e., 400×99). Again we can express "full credibility" requirements in terms of "p" the chance or inherent hazard to loss. And these standards can be expressed in terms of equivalent premium dollars by extending the number of risks by the average rate and policy size for each classification.

PART FIVE — CONSTRUCTION OF FIRE INSURANCE CREDIBILITY TABLES

With the development of the two equations for "zero" and "full" credibility, we are in a position to set these limiting standards in terms of the inherent hazard (chance of non-trivial loss). There are various methods by which the credibilities can be graduated from 100% down to 0%. On casualty lines the credibility is characteristically introduced at a decreasing rate with increasing exposures. This approach makes sense for those lines wherein there is a frequency of small and medium size losses which have a predominating influence on the total loss payments.

In this respect, the theory may not exactly fit the fire insurance field. But by excluding trivial losses, we might, with greater justification, think of these residual fire losses as being scaled similarly to the casualty loss pattern, but only at a higher level of loss cost per occurrence. Consequently, we have adopted a modified $\frac{p}{p+k}$ formula with $Z = \frac{N-C}{N-C+A}$ below the Focal Point of the graduation curve.

In the above equation N is the number of risks required for credibility (Z). Of the two constants, C is determined so that the curve will start at the statistical norm for zero credibility, while A is a constant such that the point of 67% credibility in linear interpolation would coincide with the corresponding 67% value from the above equation. Above the Focal Point the credibility values have been taken from the straight line joining the points 25 (k-1) and 400 (k-1). The graduations are developed in a supplementary section.

It may be a more rewarding effort to assign the major fire occupancy classification groups to inherent hazard values by some rough statistical estimates from summary data, than to attempt to measure this factor directly. Mainly as a trial to illustrate the approach, out of a relatively small sample of 14,500 mercantile policies in earned annual exposure, 585 losses were suffered, or a frequency ratio of .039.

Over a longer period, of 5306 mercantile losses, 409 exceeded $5,000 each or a severity ratio of .077. Thus the estimated chance of suffering a mercantile loss over $5,000 is the product of:

1. that a loss will occur = .039
2. that if it occurs, the loss will exceed $5,000 = .077

Thus the chance of a non-trivial loss (i.e., inherent hazard) of the mercantile classes is $.039 \times .077 = .0030$, or approximately 0.3%.

Let us now construct a sample credibility table by fire major classification groups on the basis of the following averages:

Fire Classification	*Inherent Hazard*	*Annual Rate*	*Ave. Policy*	*Ave. Premium*
Mercantile Contents	.003	.80	15,000	120
Manufacturing	.002	.75	40,000	300
Dwellings	.005	.20	12,500	25

Credibility Table

Credibility	*Dwellings*	*Mercantile Contents*	*Manufacturing*
10	$ 193,000	$ 1,549,000	$ 5,819,000
20	280,000	2,241,000	8,421,000
30	391,000	3,130,000	11,770,000
40	539,000	4,316,000	16,224,000
50	746,000	5,976,000	22,455,000
60	1,057,000	8,466,000	31,811,000
70	1,430,000	11,454,000	43,039,000
80	1,617,000	12,948,000	48,653,000
90	1,803,000	14,442,000	54,267,000
100	1,990,000	15,936,000	59,880,000

PART SIX — CRITICAL APPRAISAL OF THEORY

Before any comment on the statistics, it might be desirable to question some aspects of the theory advanced in the previous argument. Even granting that a reasonable defensible mathematical expression could be found to measure "credibility", a person might doubt that any advantage would thereby accrue to management. Fundamentally, any mathematical or other schematic approach to problems limits the range of judgment. Of course, there are situations wherein such restrictions are not only inescapable but are actually desirable. We all recognize that certain basic relationships must be taken for granted, if we are to avoid the chaos of a constant experimentation to find out what has already been long known. A reasonable man cannot afford to ponder each detail of his daily living. But it would be equally unwise for anyone to so condition his mind that he responded with a mechanical-like reflex in all situations.

Now, various statistical tests can be used to identify significant differences in a series of data. As an example, these methods would indicate that the loss ratio on Class A is really better than on Class B. But the tests do not hold conversely. Just because the formulas do not indicate that "A's" loss ratio is significantly different from "B's", one cannot infer that the classes are essentially similar. In other words, the two classes may be really different, but mathematics cannot be used to prove it.

This corollary from the statistician's so called "Null Hypothesis" bears out a long standing belief of management. There is no rule or equation which will automatically solve our problems. Each situation

must be thought out on its own merit in its own particular environment. There are instances wherein a person with intimate understanding of the underwriting facts will know that one type of risk is to be preferred to another, regardless of what the mathematics may say. Any research analyst who would slight the significance of the underwriting "know-how" is obviously unfamiliar with the insurance field. The successful underwriting manager is too busy guiding his men to select the profitable types of risks to bother with credibility tables which may, in his eyes, best be used as a crutch for the unsuccessful to explain their failures.

Possibly one might view the concept of the "non-trivial" fire loss as an abstraction of questionable validity. There can be no doubt, of course, that the preponderance of dollars paid is traceable to a relatively small number of losses. This observation is supported by the fact that about 75% of all losses by number constitute only 5% of all loss payments by amounts. But this characteristic distribution of fire losses does not, per se, prove the objective merit of the "non-trivial" fire loss. The very fact that fire losses can be demonstrated to follow a graduation from small through medium-sized to large means, in turn, that the large losses too must observe a graduation by size. There is no such thing as a single loss size which can be taken as typical of all non-trivial fire losses. As an alternative method, one might study the areas under the curve of fire losses by amount of loss. It is possible, of course, that the curve of actual fire loss distribution by amounts may be so skewed and so irregular (multi-modal) that it would not lend itself to statistical projections.

There is also some question on the merit of using the simple "Binomial Distribution" to develop fire credibilities. If the chance of event is remote (less than 5%) and the number of observations is small, the binomial distribution is very markedly skewed. In such an instance, the area under the curve is quite irregular and the distribution of the frequencies is a fairly inexact representation of the corresponding expectations under the normal curve.

Now it is true that, even with a very small "p" (chance of loss) the binomial approaches the normal curve at the limit as the size of the sample becomes infinitely large. But at the limit both the mean (np) and the standard deviation $\sqrt{npq}$ also approach infinity, and there is some doubt whether or not the theory is usable at this extreme position. Anyway, it appears somewhat fanciful to view the experience for any prescribed period as a sample of an infinite number of possible loss ratios which could have happened in the identical time interval due to the same inherent hazard to loss.

As for the choice of formula, the Binomial Distribution presupposes that the chance of loss (p) is constant from sample to sample within any set, and also from set to set. If "p" varies from sample to sample but is constant from set to set, we have a Poisson distribution. And if, conversely, the "p" is constant from sample to sample but varies from set to set, we have a third type, or Lexis distribution.

Although the means are same for all three distributions (np), the standard deviations (s) are different:

$$\text{Binomial } S_b^2 = npq$$

$$\text{Poisson } S_p^2 = npq - \sum_{i=1}^{n} (P_i - p)^2$$

$$\text{Lexis } S_L^2 = npq + \frac{n^2 - n}{r} \sum_{i=1}^{r} (P^i - p)^2$$

Consequently it appears to be a gratuitous assumption to treat fire losses as corresponding to the Binomial Distribution.

Considerable exploration has been made in Casualty insurance of the possibilities of the Poisson Exponential $p = \frac{e^{-m}\, m^r}{r!}$

This equation has been successfully employed in fields other than insurance to describe situations wherein the probability of the given event is very remote. For example, this method has been used to estimate the likelihood of multiple dialing of the same telephone number at exactly the same time. Since fires are a rare event, it would seem that the Poisson exponential would have been a good approach to this credibility problem.

These criticisms will be considered in the following section.

PART SEVEN — REPLY TO COMMENTARY ON THEORY

We should first like to consider the question of the statistical methods. The precise equation to be used is admittedly not the most fundamental aspect of our credibility problem. But if we can cover this phase in a few general observations, we will avoid the typical mathematical colloquy with its almost endless formulas.

It is to be granted that the Binomial Distribution is badly skewed and only an imperfect representation of the Normal Curve if the event is rare. (i.e., "p" is very small) and the number of observations is not large. However, our problem was set up so that the number would be very large, but not necessarily infinite. Under such conditions, the Binomial does approach the Normal Equation ($p = ce^{-k x^2}$) and our projections from this curve appear to be serviceable approximations.

We are not disposed to slight the caution that the occurrence of fire losses may not best be described through Binomial sampling (i.e., the chance of the event ("p") is constant from sample to sample and from set to set). It is possible that fire losses may be characterized by Poisson or Lexis sampling wherein the chance of the event ("p") is not constant. But once we investigate the possibility of a variation

in our "p" values, we must logically persevere in our theory and express "p" not as a constant within any set or for any group of samples within sets but rather as the function of multiple factors. And in establishing our "p" value not as a constant but instead as an exercise in multiple correlation, we are burdened with a cumbersome and unsatisfactory artifice.

In regard to the suggestion that the Poisson exponential $\frac{e^{-m}\, m^r}{r!}$ be used as a basis for fire credibilities, a glance at the Poisson tables will show that for moderate and large "n" values the distribution of events observes a symmetrical pattern. And with the Poisson, we shall not obtain an answer of a less demanding order of magnitude than that indicated with the Binomial (i.e., "n" very large).

Basically one's reaction to this study will be influenced by his attitude to the idea of "credibility". If the reader considers "credibility" as a valid concept which may assume under varying conditions different values, he will favorably regard a theory which would propose to measure its quantitative characteristics. He, of course, may not agree with the precise values or formulas used herein, but on the basic facts that the incidence of loss is relatively small, sporadic in its chance application, and potentially affecting a very large number of units (i.e., risks) he must necessarily gravitate towards the various limiting mathematical processes treated herein. And, most important, he must conclude that but little mathematical credibility can be attached to detailed classification experience based on an obviously small number of risks.

On the other hand, this mathematical approach and its consequent conclusions will hardly persuade the reader who considers "credibility" as only a language attempt at a subjective conditioning which is so a part of personality that no communication of its quantitative character is possible. Such a person will instinctively use "credible" and "not credible" as opposite poles of conviction with no intermediary mental way stations. This resoluteness of mind is characteristic of the active temperament which gets things done — often with a heavy dependence on personal judgment. We have witnessed too many successes of the leadership and too many failures of the contemplative personality not to be impressed with this power of independent judgment. But these experiences have not yet taken from the writer the conviction that each excellence is effective only in its own field.

For example, an underwriter, after reviewing a tabulation of insignificant experience, may conclude that Class #A is a profitable field to cultivate — and he may be right. His correct conclusion could be due to an intimate (but non-statistical) knowledge of the loss character and the general rate level of the class. Or, his success may stem from his being one of those rare individuals whom Fortune, that lord of chance, never allows to make a mistake. But this success is not due to his reading, by some mystic power, significance in a set of data which possesses no mathematical credibility!

SUPPLEMENT

Graduation Work Papers

Full and Zero Credibility set from area under Limit of Binomial Curve as m ∞

Various Focal Points investigated.

The Focal Points are expressed in varying fractions of the range from zero to Full Credibility.

Graduation Formula $Z = \dfrac{N - C}{N - C + A}$

Where

Z = Credibility
N = Number of Risks
A = Constant for each "P"
C = Constant in order to start curve at statistical norm for Zero Credibility: C = 25 (k-1)

Our first effort is to test above curve for each "P" (i.e., inherent hazard to loss) and varying Focal Points.

Number of risks for Zero Credibility = N_o = 25 (k-1)
Number of risks for Full Credibility = N_f = 400 (k-1)
Graduation Range = $N_f - N_o$ = 375 (k-1)
Where K = 1/P and P = chance of Non-Trivial Loss.
Focal Point of Graduation = N_g = G(375) (k-1) + C.
Where $0 < G < 1$
If Focal Point = 90%; Ng = (.90) (375) (k-1) +25 (k-1)
N_g = 363 (k-1)

	N_g = 90%		*N_g = 80%*		*N_g = 66⅔%*	
P	*N*	*A*	*N*	*A*	*N*	*A*
.010	35,937	3,718	32,175	7,425	27,225	12,375
.005	72,237	7,474	64,675	14,925	54,725	24,875
.003	120,516	12,468	107,900	24,900	91,300	41,500
.002	181,137	18,740	162,175	37,425	137,225	62,375
.001	362,637	37,518	324,675	74,925	274,725	124,875

Tables of "N" — For Various Focal Points — For "P" = .003

Z	*N_g = 90%*	*N_g = 80%*	*N_g = 66⅔*
.10	9,685	11,063	12,911
.20	11,416	14,525	18,675
.30	13,642	18,982	26,086
.40	16,611	24,908	35,967
.50	20,767	33,200	49,800
.60	27,000	45,650	70,550
.70	37,390	66,392	105,133
.80	58,170	107,900	174,300
.90	120,500	232,400	381,800

Graduating Credibility over entire range according to Formula

$$Z = \frac{N - C}{N - C + A} : \text{Focal Point} = 66\tfrac{2}{3}\%.$$

Number of Risks for Varying "P's"
Focal Point = 66⅔%

Z	*.005*	*.003*	*.002*	*.001*
.10	7,736	12,911	19,399	38,836
.20	11,194	18,675	28,069	56,194
.30	15,646	26,086	39,234	78,546
.40	21,567	35,967	54,079	108,267
.50	29,850	49,800	74,850	149,850
.60	42,287	70,550	106,037	212,287
.70	63,008	105,133	157,996	316,308
.80	104,475	174,300	261,975	524,475
.90	228,850	381,800	573,850	1,148,850

If values above the Focal Point (66⅔%) are taken from the straight line which passes through the points 25 (k-1) and 400 (k-1), then the Upper Limits of the above table become

Z	*.005*	*.003*	*.002*	*.001*
.70	57,216	95,450	143,465	287,215
.80	64,680	107,900	162,178	324,678
.90	72,144	120,350	180,890	362,141
1.00	79,600	132,800	199,600	399,600

DISCUSSIONS OF PAPERS READ AT THE MAY AND NOVEMBER 1953 MEETINGS

COMPARISON OF WORKMEN'S COMPENSATION COSTS

ROGER A. JOHNSON

Volume XL, Page 10

DISCUSSION BY R. P. GODDARD

With characteristic modesty Mr. Johnson did not present his method for determining average manual rate index numbers until 1953, although his original studies were made in 1948. The publicity which has been given to his work indicates the need for index numbers of this type, which can be very useful for reinsurers, self-insurers and legislators. Compensation actuaries generally have shied away from the preparation of figures like these, which, from their very nature, do not lend themselves to actuarial niceties. There has been some hesitancy in setting aside the microscope in favor of the aerial camera and the field glasses, but if the industry itself does not prepare practical comparisons of Workmen's Compensation costs in the various states, others outside the industry will do it for us, with results which may be somewhat less than satisfactory.

Mr. Johnson has boldly, (and properly, in my opinion), rejected the idea of using all classifications in determining a grand average rate or pure premium as a basis of comparison. By selecting 45 typical classifications he has paved the way for a comparison of the actual effective benefit levels of the various states. True, Mr. Johnson does not claim that his tables measure variations in benefit levels, but his adherents may well make greater claims for his tables than he does himself. Certainly we cannot ignore a consistent relationship, year after year, in the levels of manual rates as an indication of the level of benefits.

If, then, we propose to compare the effective benefit levels of a group of states, we should rigidly exclude any local industries, such as Textiles in South Carolina or Oil Refining in Texas, which would reflect accident frequency or severity rather than benefit level. Our search should be for classifications which will fairly reflect the whole range of the Workmen's Compensation law and its administration. If we can find a group of classifications which are of approximately the same importance within each state, and from state to state, which have rates neither too high nor too low, and which reflect approximately the same accident-producing conditions in various parts of the country, we will have a satisfactory base for preparing index numbers.

With few exceptions, the 45 classifications selected by Mr. Johnson are admirably suited for the purpose at hand. One might question the inclusion of Clothing Mfg. since this is much more important in New

York than in most other states and, for exactly the opposite reason, the Foundry classifications which can be of much greater prominence in states like Pennsylvania and Michigan than in New York. One might also question the inclusion of Clerical Office Employees, because the rates are so low in some states that a change of only one cent can distort the final result. As a matter of fact, if we carefully picked a group of "abnormally normal" classifications which have no outstanding characteristics in any state and which have rates neither too high nor too low, we might be able to produce an unweighted index which would be satisfactory for all practical purposes. It would be safe to use such an unweighted index if the actual weights were practically uniform to begin with.

With this in mind a hasty test has been made of an unweighted index, using the classifications selected by Mr. Johnson, with the exception of eight which appear not to be typical in all states. The unweighted index numbers determined by the 1952 rates for these 37 classes are shown below, together with the comparable National Council Benefit Index and Mr. Johnson's Weighted Manual Rate Index.

	National Council Benefit Index July 15, 1952	*Weighted Average Manual Rate Index July 1, 1952 45 Classes*	*Unweighted Average Manual Rate Index July 1, 1952 37 Classes**
New York	1.000	1.000	1.000
Massachusetts	1.129	.733	.714
New Jersey	.940	.547	.532
Texas	.743	.517	.493
California	.867	.504	.499
Wisconsin	1.234	.492	.463
Connecticut	.872	.478	.465
Missouri	.905	.415	.398
Maryland	.904	.358	.341
Illinois	1.021	.320	.325
Michigan	.928	.295	.276
Iowa	.849	.289	.266
Indiana	.861	.288	.273
Virginia	.837	.259	.255
Alabama	.691	.237	.222
Pennsylvania	.830	.213	.218

*Same as the original 45 classes, but excluding, as not typical in all states, Clothing Mfg., Logging and Lumbering, Foundries (iron, steel and non-ferrous), Chauffeurs and their Helpers, Salesmen, and Clerical Office.

The similarity of the weighted and unweighted indices is at once apparent, and it remains only to comment on the figures for Texas, Wisconsin and Iowa, where the greatest differences occurred. The differences are attributable primarily to the inclusion of Class 8742, Salesmen, in the weighted index numbers. This class apparently had a relatively low rate in New York on July 1, 1952, and if this class had not been used, the difference between the weighted and the unweighted indices would have been less than .020 in every instance.

The introduction of the unweighted index numbers in this discussion is not intended in any way to detract from the value of the weighted index numbers where Mr. Johnson has dared to pioneer. Rather, it is hoped that the unweighted indices will corroborate the weighted and indicate the weaknesses of the National Council Benefit Index numbers, which must be misleading to a great many people. Undoubtedly the National Council figures had considerable value in the early days when there were many states without Workmen's Compensation laws, and some basis had to be found for an initial set of rates as each law was adopted. The need for this type of index number has now passed, and it would seem that the proper time has arrived for everybody to rally around some set of figures based upon actual manual rates which can be justified as accurate enough for the purposes at hand. We must all congratulate Mr. Johnson on his boldness in selecting a comparatively few classifications as a basis for his pioneering work. I would hope that we could go even a step further and experiment with unweighted index numbers which would do substantially the same job. The very simplicity of the result should not cause us to be afraid of it. As Mr. Johnson points out, there could actually be a great deal of actuarial science in the initial selection of the classes to be used but, once completed, we would have a very valuable tool which everybody could use and understand. I, for one, would be very happy to see a set of weighted or unweighted index numbers, based on manual rates, given official approval by the insurance industry as the standard method for comparing workmen's compensation costs.

THE UNIFORM STATISTICAL PLAN FOR FIRE AND ALLIED LINES

BY CLYDE H. GRAVES

Volume XL, Page 40

DISCUSSION BY L. H. LONGLEY-COOK

Dr. Graves is to be congratulated on his clear and comprehensive paper describing the Uniform Statistical Plan for Fire and Allied Lines. The paper brings together in one place not only the details of the plan but also its historical development. This latter feature of the

paper is most valuable and will do much to help the student to understand the plan.

There is an allied plan, which is used by the National Board of Fire Underwriters but not by the Mutual Insurers, called the Statistical Plan for Expenses. It would be most valuable if someone would prepare a sister paper describing this plan.

Dr. Graves lists eighteen items to which consideration was being given by the N.A.I.C. in order to bring experience and rating systems in closer harmony. It seems desirable to set out in this discussion the results of this consideration as reported a year ago to the Rates and Rating Organizations Committee of the N.A.I.C. by the subcommittee of Casualty and Fire Insurance Rate Analysts of Zone 5.

> "In regard to Item 4, (Amend the Dwelling and Apartment House definitions in the statistical plan to conform with the filed rating plan definitions.) the Bureaus informed the Conference that the proposed procedure is receiving attention and that adjustments are being made as rate revisions are filed."
>
> "With respect to Item 5, (Collect experience for residential and farm property in accordance with the classifications and territories contemplated by the filed rating plans.) the Bureau representatives informed the Conference that the Farm Underwriters Association might furnish experience on farm property and the department representatives requested the respective rating bureaus to secure and furnish such information as soon as possible. Thus far, only two states, namely Kansas and Nebraska, have received the experience. The consensus of the Conference is that the experience on residential and on farm property should be recorded and reported according to the classifications in the schedules."
>
> "With respect to Item 7, (Collect experience separately on property rated under the Analytic Schedule and property rated under Special Schedules, such separation to be in accord with the filed rating plans.) bureau representatives advised the Conference that separation is now possible and that the bureaus were in the process of compiling statistics in such form. The compilation is to be furnished to the states when available."
>
> "On Item 9, (Collect Public Building experience in accordance with the definition thereof in states where special rate consideration is afforded such property.) it was pointed out that, for the most part, a segregation of experience on public buildings is available under the 115 Classifications of Occupancy Hazards statistical plan."
>
> "With respect to Items 10 and 11, (Item 10 — Collect Automatic Sprinkler experience for "Manufacturing" and "Other than Manufacturing" risks by Normal and Abnormal classification, determination of such classification to be made by each

state.) (Item 11 — Collect "Superior Form" Automatic Sprinkler experience separately from ordinary sprinkler risk experience.) bureau representatives advised the Conference that additional information in regard to these topics is now available from Factory Insurance Association and from Improved Risk Mutuals; that such information would be furnished to the departments by the rating organizations and that the indicated adjustments would be made when the necessary data is compiled. To date this information has not been received by any state."

"With respect to Item 13, (Collect Extended Coverage experience separately by Building and by contents.) the collection of extended coverage experience separately by buildings and by contents, the bureaus offered several reasons why there should be no rate differential and such experience should not be collected separately. The first reason was that there is more or less a catastrophe hazard involved. Another was that whereas the extended coverage contents rates have been the same as extended coverage building rates, there is with the introduction of the deductible, a differential in the premium rate because the deductible does not apply to contents but the contents rate is the same as the building rate with the deductible. A further reason was that the preparation of statistics to substantiate or disprove a further differential would require the broadening of classifications to a tremendous extent. The Chairman requested the bureau representatives to furnish such factual information as might be obtained from fire departments and from other sources. This information will be reviewed at a later time along with the Wisconsin and Texas results, which two states are now collecting experience separately for buildings and contents. However, no information has been received from the bureaus up to this time. According to informed sources, the extended coverage loss ratio on dwellings contents is a great deal lower than on the dwellings themselves."

"As respects Item, 13, it is the consensus at this time that extended coverage experience on dwellings and extended coverage experience on contents of dwellings should be reported under separate codes in order to justify the extended coverage rate on contents and so that the statistics on each subject matter may be considered separately."

"With respect to Item 14, (To facilitate the review of experience for ratemaking purposes, it is recommended that the statistical agencies combine the classes, the sums of which reflect the experience of the rating plan involved, and submit such combined total to the individual states.) the bureau representatives advised the Conference that provisions had been made for the consolidation of experience for rating class divisions and that consolidated underwriting experience would be furnished to the

individual states by the respective bureaus as soon as the compilation was completed."

"With respect to Item 16, (Should the fire rate differential between approved roofs and unapproved roofs on dwellings be abolished? If not, should statistics be collected to determine and justify a proper rate differential?) bureau representatives advised the Conference that a fire rate differential between approved and unapproved roofs was necessary because of the spark hazard and the conflagration hazard. Upon discussion it developed that the spark hazard has disappeared and there is no record of a recent dwelling conflagration anywhere in Zone 5. It was generally agreed that the differentials now in use are based upon judgment of long ago underwriters; that conditions have changed materially since the differentials were established; and that the differentials are without factual data or loss statistics for foundation. The rating bureau representatives offered to collect and furnish data on roof fires from fire departments and other sources as a means of formulating a factual study for the use of this Conference and the respective states individually. The Chairman requested that the data be forwarded at an early date but the information has not yet been received by any state. There is no information or reason to indicate or substantiate a continuation of a fire rate differential between approved and unapproved dwelling roofs and it is the opinion of the Conference that the differential should be abolished. It is the concensus of the Conference that if any consideration is to be given to the use of a differential in the future, the fire experience on dwellings with approved and with unapproved roofs should be recorded and reported separately in order that the proper differential may be determined and supported."

"In regard to Item 17, (Should there be a differential in the extended coverage rate on shingle roofs and on composition roofs?) it was felt that there is justification for a differential in the extended coverage rate on shingle roofs and on composition roofs. It is the concensus that statistics or other evidence should be gathered and reported, in order that the proper rate differential, if any, may be determined."

"With respect to Item 18, (Is the rate credit offered under the Automobile Filling Station Form No. 6 justified? What experience, if any, is available to support the credit? Should statistics be required to ascertain and support a proper credit?) the bureau representatives advised the Conference that they were prepared to submit experience to substantiate the rate credit. However, this experience has not been received by any state."

As so many of the members of the Society are mainly concerned with casualty insurance problems, it is as well to point out that the loss frequency in fire insurance is very different from that commonly

experienced in casualty insurance. For this reason the problem of devising a satisfactory statistical plan for fire insurance is, in many ways, more difficult than for many casualty lines. So many factors enter into fire insurance rate making that any attempt to provide in the statistical plan justification for each rate making factor is quite impractical. It serves no useful purpose to so subdivide the data that the resulting figures have little or no credibility.

Anyone who has attempted to make fire insurance rates is aware that the present statistical plan is not perfect, particularly in its treatment of the dwelling classes where the body of statistics is sufficiently large to provide credible answers to a number of important questions. Dr. Graves has limited his paper to a factual description of the plan and it would be wrong for me to wander into this wider field in my discussion.

When I say that the plan is not perfect, I do not wish it to be thought I am critical of the plan. The Uniform Statistical Plan is far superior to the corresponding plan for fire insurance in use in any other country. We can say with real assurance that we have a plan of which we can be proud. But it would be wrong for us to be content with what we have and not strive for something better in the future.

REVIEWS OF PUBLICATIONS

CLARENCE A. KULP, Book Review Editor

Fire Insurance Inspection and Underwriting. W. O. Lincoln, J. T. W. Babcock and G. W Tisdale. Seventh Edition. Chilton Company, Philadelphia. 1953. Pp. 1335.

This book is a revision of the sixth edition by Dominge and Lincoln in 1948. Since Mr. Dominge was unable to collaborate with Mr. Lincoln in the seventh revision, the services of Mr. George W. Tisdale and Mr. John T. W. Babcock were obtained for this purpose. These men have spent the greater portion of their working lives in fire insurance inspection and underwriting.

The book was designed for the use of the "beginner as well as the advanced student of fire insurance." It was written mainly for "fieldmen, inspectors, engineers and underwriters in the fire insurance business." As stated on the title page it is: "A non-technical encyclopedic handbook describing processes, materials and chemicals used in mercantile and manufacturing establishments together with their relation to fire hazards, schedule rating procedure and modern methods of fire prevention and fire protection." The book also "includes a discussion of the lessons learned from outstanding fires, an analysis of special forms of insurance and definitions of terms used in the fire insurance policy."

To carry out the objectives of the book there are included approximately 5,400 topics, listed alphabetically, covering more than 1,300 pages. Many of the topics are covered so briefly that little help is offered either the beginner or the experienced reader.

A number of topics are treated in a comprehensive manner, including those relating to fire loss prevention and insurance. The descriptions covering materials, chemicals and processes, and related fire hazards, should be particularly valuable to fieldmen and underwriters, although much of the information about fire loss prevention and insurance is available in other publications devoted exclusively to these subjects.

On the whole, the objectives of the book are achieved in a fairly adequate manner. Explanations are in non-technical language and much pertinent information is included. Probably the most valuable contribution of the book is the information relating to inspection and underwriting which comes from personal experiences of the authors. The book also has the advantage of presenting to the busy insurance man, in a single source, practical information arranged systematically for ready reference.

CHESTER A. KLINE*

*Guest Reviewer

Insurance Words and Their Meanings. Vincent L. Gallagher. Rough Notes, Indianapolis, 1954. Pp. 82.

Insurance terms are little understood by the public and are loosely used by insurance men. A glossary should serve to inform the public and improve usage in the business. *Insurance Words and Their Meanings* might have been a good start in these directions had it been more carefully prepared.

The first requirement of a definition is accuracy. Perfect accuracy is not to be expected in any glossary prepared by a human, but too many inaccuracies are found in the present definitions. The first, of *abandonment,* defines *constructive total loss* incorrectly and states, again incorrectly, that the policyholder, under a marine-insurance contract, "may surrender the salvage to the underwriter and collect a total loss."

Liability insurance is defined as "insurance which reimburses the policyholder. . . . " A *reserve* is "A sum set aside. . . " The "capital funds of an insurance company are said to be impaired when its liabilities are so great that it has no surplus left" The " 'Joint Committee on Interpretation and Complaint' adopted a standard definition of marine insurance." The *omnibus clause* in an automobile policy "protects the policyholder for liability when the car is being driven by anyone with the owner's permission." The *Surety Association of New York* is named as the rating bureau in the bonding field. *Title insurance* "guarantees the owner of real estate that his clear ownership of property will not be upset by the discovery of faults in his title." The *York Antwerp Rules* "govern the method of applying General Average to Marine insurance."

In many cases only one meaning is given of a term that is variously used. For example *"Loading* — An additional amount added to an insurance rate because of some more than ordinary hazard or expenses."

These are but examples. This glossary should be thoroughly revised in the interest of accuracy of language and completeness of definition.

RALPH H. BLANCHARD

Population Statistics and Their Compilation. Hugh H. Wolfenden. Society of Actuaries, Chicago, 1954. Pp. xxiii, 258.

In 1925 the Actuarial Society of America published Actuarial Study No. 3 as its standard textbook on population statistics or, to use the more modern term, demography. In the three decades that have elapsed there have been intensive and extensive studies in this field so that a revision of this book seemed called for. Not only has there been a great improvement in the statistics available, but also many new methodological developments have taken place.

The revised edition, it should be noted, covers only a part of the field of demography, but as far as actuaries are concerned the part covered is that of greatest interest, namely census and vital statistical data and the application of statistical and actuarial methods thereto. Although written from an actuarial point of view, the book's use is by no means limited to actuaries. It represents a unique combination of an extensive reference and research source for demographers and a textbook for advanced students in demog-

raphy. Some portions of the book are quite easily readable for the average person with mathematical training. There are other portions dealing with the construction of life tables and graduation of data in connection therewith that will be very difficult going for all but the most mathematically inclined and equipped. The person who must prepare life tables can probably find nowhere else such an extensive treatment of this subject. Thus the author deals at great length, and with a wealth of references, with work that has been done throughout the world on errors and bias in census and registration statistics. Then he goes into detail on how to adjust for such errors and bias and finally how to construct mortality tables from the corrected data. As would be expected, there is no single standard method for constructing a population life table; rather the author presents a wide variety of methods and the reader may select those that are appropriate or applicable to the particular data and problem dealt with.

The book is divided into 16 sections and there is an appendix by Dr. W. Edwards Deming on *Some Theories in Sampling of Human Populations.* Section I is a relatively brief statement of the purpose of the book and the portion of the demographic field to be dealt with. Section II briefly deals with census fundamentals: the history of census taking and the general ways in which various censuses are taken; there is also a listing of censuses by country throughout the world. Section III deals with the parallel subject of registration of vital statistics; Section IV with the errors and bias present in census and registration data.

Sections V, VI and VII, which account for almost half the text, are concerned with an extensive treatment of census and registration statistics in the development of mortality tables. Also, incorporated in Section V are several pages on population projections which, although not treating the subject fully, give quite a number of valuable references. The discussion of the various formulas for mortality rates, depending upon how the basic data are arranged, and of various graduation and curve fitting methods is extremely extensive (perhaps too detailed and complex for most students).

Section VIII has to do with the construction of abridged life tables, which, although widely used by demographers, are not generally of value in actuarial work. Nonetheless the actuarial student should have at least as much knowledge of the subject as may be obtained from this brief treatment. The same general comments apply to the relatively short but thorough treatment in Sections IX to XIII and in XV respectively: comparison of mortality in various populations; forecasting mortality rates; mortality by cause of death; occupational mortality; demographic rates other than mortality; and sickness data. In most of these sections very adequate references are given so that more complete study is possible. The section on sickness data, consisting of only three pages, is however quite limited for such an important field.

Section XIV deals rather briefly but adequately with measurements of reproduction, combining fertility and mortality. Although this subject does not enter into the usual work of the actuary, this reviewer believes that most actuaries will find it to be quite a fascinating topic.

ROBERT J. MYERS

How to Lie with Statistics. Darrell Huff. W. W. Norton & Co., Inc., New York, 1954. Pp. 142.

Every once in a while a master criminal reforms and writes a book exposing to the public all the tricks of his particular criminality. Some very revealing books have been done on house-breaking and safe-cracking which, one may assume, were gobbled up with gusto by the police to the bitter frustration of the remaining unregenerate renegades. Occasionally one reads that such an author-informer has had his throat slit or a slug deposited in his brain, because it is almost axiomatic in an organized society that trade secrets are not themselves objects of trade, or, as the Chinese put it, no man has the right to break the rice bowl of another.

In *How to Lie with Statistics* Darrell Huff has "squealed to the dicks," he has sold out most of our best-kept trade secrets, he has badly cracked the statistician's rice bowl. Hereafter, casualty actuaries may expect more trouble than ever, if that is possible, from state supervisors, company executives and underwriters. These gentlemen now know our tricky little ways and can guard themselves from being taken in.

Nevertheless, Mr. Huff has done an entertaining and quite honest job. His chapter headings give an intriguing glimpse of the sort of stuff the book is made of. Here they are:

1. The Sample with the Built-in Bias
2. The Well-Chosen Average
3. The Little Figures that Are Not There
4. Much Ado about Practically Nothing
5. The Gee-Whiz Graph
6. The One-Dimensional Picture
7. The Semiattached Figure
8. Post Hoc Rides Again
9. How to Statisticulate
10. How to Talk Back to a Statistic

In these 10 chapters the author has exposed just about every unsound practice to which statisticians resort, whether consciously or unconsciously. Many of his examples are familiar to most of us. In the 1936 *Literary Digest* presidential poll of telephone and *Digest* subscribers he points out as a prime example a sample with a built-in bias. He finds semiattached figures in such claims as that made by the manufacturer of a juice extractor when he advertised that his device "extracts 26 per cent more juice." And when Old Gold was widely advertised as having less nicotine than all other cigarettes as reported in a *Reader's Digest* test, he calls it "much ado about practically nothing," since all brands tested showed results that were virtually identical.

Mr. Huff has been kind to the insurance industry and has in general left us out in selecting his horrible examples. There are others, however, who have accused us at one time or another of every offense listed in Mr. Huff's catalog of crimes. A few years ago we traced the sorry upswing of Massachusetts compulsory automobile insurance rates from the low level at which we found them in 1927. The New York Insurance Department has claimed that we built in a bias when we selected 1927 as our base year, the year the compulsory law became effective and one when the rates had been drastically and arbitrarily reduced by the Superintendent of Insurance in expectation of a beneficial effect from the new law. The New York Department itself might possibly be accused of building in a reverse bias when it developed the Massachusetts figures from 1937, a year of high rates. And how about the rosy picture we paint of living costs rising in recent years while workmen's compensation insurance rates have been valiantly holding their own or nearly so? Rates per hundred of payroll, of course; nobody said anything about the dollars of premium paid by the insuring public. Mr. Huff, if he were to catch on, might claim a certain amount of semi-attachment. Some time ago one insurance company's advertising department in all innocence, but without consulting its actuary, seized upon this gratifying relationship and spread it over the national magazines in an elegant Gee Whiz graph with the cost of living going through the roof and rates rising as gently as the grades on the Pennsylvania turnpike. To its credit I should state that when the fallacy was pointed out the company withdrew the advertisement from further circulation.

Everybody in my office insists on working every computation to two decimal places regardless. At latest report Hurricane Hazel produced in one of our accounts a loss ratio of 3,022.72%. Significant, that .72%, and absolutely true — looks scientific. This is one of the ways we statisticulate. You probably are guilty of it too, even though you cannot pronounce the word right the first time.

Read the book, if you haven't already done so. It's a lot of fun and contains a heap of truth in the bargain.

DUDLEY M. PRUITT

Insurance Accounting — Fire and Casualty. Insurance Accounting and Statistical Association. The Spectator Press, Philadelphia, 1954. Pp. 351

From time to time I have been faced with certain aspects and problems of accounting which, not being able to refer to an authentic text, I managed to solve by improvised methods. I have reviewed the book on the basis of whether it provides the answer to this or to that particular problem that I have been faced with or which I have known.

The book has been prepared in a manner which gives both the major requirements of an insurance accounting system and a wealth of detail of procedure. The style, for a book on a subject which can be and usually is dull, is exceptionally lucid and in many cases interesting. To illustrate, a paragraph will open (p. 113): "As salaries are generally confidential, a common practice is to develop the payroll coding from a listing of employees

furnished by the Salary Department." This could have easily been shortened to a bare statement that payrolls are coded, and thereby have lost the interest evoked by the explanatory words: "As salaries are generally confidential."

I was particularly interested in the chapter on *Loss and Loss Expense Reserves.* I have a criticism of this not perhaps as to the propriety but what might be called the naiveté of some of the suggestions; for example, allowing a re-insurer to assist the primary carrier in establishing reserves. But many re-insurance treaties provide for adjustment of premiums on the basis of experience and in this respect the executives of small or moderate-sized carriers often approach the problem in exactly the same manner as an assured. If the rate is going to go up because of a reserve, the primary insurer wants the reserve kept as low as possible. In turn the re-insurer wants adequate reserves and especially so if its rates are to be predicated upon such reserves.

I do not think a primary carrier should go to its re-insurer for help in establishing reserves, particularly if its rates are to be based thereon. Each carrier should establish its own reserves, and if there is then a significant difference between primary and re-insurer the matter can be argued. Possibly re-insurers are responsible for this suggestion. In the light of what happened a few years back, who can blame them now, but certainly a number of years back their own reserves did not take into account the effects of inflation.

When one considers the great amount of procedural detail in other chapters, the relatively broad generalizations in this chapter are a let-down. Mention at least could have been made of such standard tables as those for valuing New York Compensation cases or for disabled lives, or of some of the various schedules of average claim cost especially property damage liability used by many companies. Some of the methods at least for setting reserves on the basis of averages used by so many companies could have been explained. When one compares the generalizations on loss reserves with the details on factors, tables and examples contained in the chapter on *Unearned Premium Reserves,* the point becomes abundantly clear. Since in the preface there is the statement that ". . . the book may act as a guide and provide assistance to the I.A.S.A. membership, students and others . . ." it is doubly regrettable that so little reference material is given on loss reserves.

A bibliography of books, articles and discussions would in my opinion have served to round out the book, for students as well as others. While there are a few references to other articles and books, a bibliography has not been included.

Many of the chapters are so full of detail as to constitute a working manual of procedure. This is particularly true of *Unearned Premium Reserves* and *Investment Income and Expenses.* Unfortunately these are not the matters that give accountants and actuaries their worst headaches.

The book contains many examples of forms, schedules and punch card layouts in use by companies. While in my experience I have never found any one company system that was exactly similar to that of another, these forms nevertheless should be extremely useful, particularly to someone

needing such information as a basis for installing or modifying a company procedure.

If my recollection is correct, the last book devoted primarily to *Casualty Insurance Accounting* was written by R. S. Hull and published in 1930. That was over 25 years ago. The new book is certainly needed and fills a long-felt gap.

—J. J. SMICK

PUBLICATIONS RECEIVED

Life and Other Contingencies.
Hooker and Longley-Cook. Cambridge University Press, Cambridge, England, 1953

Property and Casualty Insurance.
Philip Gordis. Rough Notes Indianapolis, 1953

Workmen's Compensation.
Somers and Somers. John Wiley and Sons, NYC, 1954

C A S NOTES — A publication of the Casualty Actuarial Society

The Special Committee on Membership recommended that the Society introduce an informal publication to be published periodically by an inexpensive process. The purpose of this publication would be (1) to keep the Society and the work of its members before the insurance industry and (2) to be of value to the membership by the publishing of timely articles and notes of current interest.

Favorable action on this recommendation was taken by the Council at the meeting of the Society in Lenox, Massachusetts last May and C. H. Graves was appointed to serve as Editor of the new publication with Laurence Longley-Cook, John Rowell and Ruth Salzmann as Associate Editors.

The new publication is not in any way to conflict with the *Proceedings* of the Casualty Actuarial Society. The emphasis of the new publication is to be on articles and notes of current interest — news of members — reports on research projects — legal notes, etc. Material, similar to that which was included in the *Proceedings* under the heading "Current Notes" and "Legal Notes", is to be presented in the new publication. Procedures followed by various organizations in actuarial training would be presented in the new publication. Information on new policies — important rate revisions and manual changes — list of articles in other publications are examples of the type of material to be used.

With respect to format and costs the Council has adopted the following recommendations of the Committee on Publications:

(1) "C. A. S. NOTES" to be printed in three columns on 8½ x 11" paper in units of four pages. (This would be similar to the "Interpreter" of the Insurance Accounting and Statistical Association.)

(2) One copy of each publication to be distributed through the office of the Secretary of the Society to members without charge. Copies to be made available to non-members and extra copies to members at a price of $5.00 for four publications.

The success of the "C. A. S. NOTES" will depend on the cooperation of all members in supplying items of interest and in furnishing articles for publication.

REPORT ON THE FIFTY-YEARS JUBILEE MEETINGS OF THE NORWEGIAN SOCIETY OF ACTUARIES AND THE SWEDISH ACTUARIAL SOCIETY

The actuarial societies of Norway and Sweden, which are separate organizations, were both founded in 1904 and accordingly celebrated their 50th anniversaries this year. The programs in honor of these events were coordinated such that meetings were held in Oslo on August 23 and 24 and in Stockholm on August 26 and 27. About 15 foreign actuarial societies accepted the invitation to send official delegates. I was honored by being appointed to represent the Casualty Actuarial Society. Mr. Walter Klem, Senior Vice-President and Actuary of the Equitable Life Assurance Society of the United States attended as the official delegate of the Society of Actuaries.

At both meetings there were impressive opening ceremonies with appropriate messages of congratulation from the foreign delegates. Mr. Klem eloquently expressed the combined greetings of the Society of Actuaries and the Casualty Actuarial Society.

As to the business portion of the meetings, in both Oslo and Stockholm one technical topic was presented for discussion. In Oslo this subject was "Scientific Requirements in the Actuarial Profession," centered around a paper prepared by Professor E. Sverdrup. Widely different views were presented, with no definite conclusions being agreed upon. In general, the British and American actuaries (including a discussion by Mr. Klem) believed that actuarial training should be of a quite practical nature without too much emphasis on theory. Some of the Continental actuaries expressed a preference for a very considerable amount of training in theoretical mathematics and statistics so that the actuary could really be considered as a scientist. It should be noted, however, that not all of the Continental actuaries shared this latter view.

The discussion in Stockholm was focused on an extensive report by Mr. H. Prawitz, "Investigation of Mortality from Different Causes of Death as a Basis for Forecasting the Future Trend." This report described a very interesting and extensive research project conducted recently in Sweden. Causes of death were classified into several groups, and projections were then made by use of Makeham curves. The discussion concerned not only various technical points, but also the general thesis of whether future mortality could be predicted by strict mathematical models. My participation in this discussion was limited principally to the technical features of the problem such as future trends in mortality from tuberculosis and the question of how

much refinement of method was desirable for the younger ages where mortality is already near the minimum.

The meetings and the social entertainment were extremely well planned. The foreign visitors were given the invaluable opportunity of developing close personal and professional contacts with many of the Scandinavian actuaries who, as is well known, possess a very high degree of professional ability. All in all, attendance at the meeting was a very rare opportunity for initiating and maintaining close professional relations with our Scandinavian colleagues.

R. J. Myers

OBITUARY

ARTHUR L. BAILEY

1905–1954

Arthur L. Bailey, 49, third vice president and assistant actuary of Lumbermens Mutual Casualty Company and American Motorists Insurance Company, died suddenly August 12, 1954 of a heart attack. Mr. Bailey was a Fellow of the Casualty Actuarial Society, a member of the Educational Committee from 1948 to 1952, and a member of the Council.

Born in Needham, Massachusetts on July 5, 1905, he attended Newtonville, Massachusetts schools and was graduated from the University of Michigan in 1928 with a B.S. degree. During his career in actuarial science he served as statistician for the United Fruit Company and American Mutual Alliance, and was Chief Casualty Actuary with the New York Insurance Department from 1947 until 1951, when he joined the Kemper organization.

He will be remembered by his many friends in the actuarial field for his keen grasp of sound principles of rate making, for his written contributions on the subject of credibility, for the competence and integrity that distinguished all of his work, and for the companionable qualities that endeared him to his associates.

He is survived by his wife, Helen; two sons, Robert and Richard; two daughters, Helen Christine and Margaret Louise; and his parents.

OBITUARY

WILLIAM NORRIS MAGOUN

1876–1954

William Norris Magoun passed away at his home in Arlington, Massachusetts, on December 11, 1954, following an illness of several months.

He relinquished the responsibilities of, and terminated, his professional career by retirement on June 27, 1941, having served until then as General Manager of the Massachusetts Workmen's Compensation Rating and Inspection Bureau from May of 1917, as Manager of the Massachusetts Automobile Rating and Accident Prevention Bureau from its organization in 1925, and as the administrative officer of the Massachusetts Statutory Stock and Non-Stock Pools for Workmen's Compensation Insurance from their inception in 1939.

He was General Manager of the Pennsylvania Compensation Rating Bureau 1916 to early 1917; prior to which he was Workmen's Compensation examiner in the Massachusetts Insurance Department in 1912-1915.

He became a Charter Member and Fellow of the Casualty Actuarial Society. His paper "The Essential Factors in the Computation of the Cost of Workmen's Compensation" read before the National Association of Industrial Accident Boards and Commissions, Chicago, January 12, 1915, is printed in the first volume of the Casualty Actuarial Society *Proceedings*. He participated actively in the affairs of the Society through other contributions to the *Proceedings* and, for a period, was its Current Notes Editor.

In 1917 Norris Magoun served on the "Augmented Standing Committee on Workmen's Compensation Insurance Rates" which was concerned with the principles to be followed in the making of Workmen's Compensation rates at a time when the volume of American statistical data was nil.

He was thus early on the scene following the enactment of the first Workmen's Compensation laws in this country and at a time when ratemaking organizations for Workmen's Compensation insurance were being created and the landmarks few. With his inherent ability he became one of the small band of pioneers in this field.

In a recognition of the successful operation of the Massachusetts [Workmen's Compensation] Rating and Inspection Bureau, and that Norris Magoun had played no small part in this result, the Commissioner of Insurance, after the passage of the Massachusetts Compulsory Automobile Liability Security Act in 1925, decided that a complementary organization, which became the Automobile Bureau, should be established. Here, again, Norris Magoun pioneered. However, his constructive interest and substantial contribution in both of these branches of insurance continued beyond their initial stages throughout the remainder of his active years.

He held Membership in the Veteran Association — First Corps Cadets, the Harvard Faculty Club, the Harvard Musical Association, Society of Colonial Wars and the Sons of the Revolution.

Born in Medford, Massachusetts on March 6, 1876, he was graduated

from Brookline High School in 1894. He is survived by a son, Roger, a resident of Worcester, a brother and a grandson. His wife, Marie, died in 1950.

Norris Magoun, possessed of a rare combination of many talents and abilities, was a man with a strict sense of utmost fairness and justice not only for all those who were associated with him but to all with whom he came in contact. If he had possessed no other attribute, he would have been a notable person for this quality alone.

His personal integrity beyond reproach, his standards in all things the highest, he did much for many in an unassuming way and the memory of him shall remain for many a day.

OBITUARY

JESSE SNYDER PHILLIPS

1871–1954

Jesse S. Phillips passed away quietly on November 6, 1954 at his home in Bronxville, New York after several years of failing health.

He was a member of this Society by virtue of his eminent position in the insurance world, rather than his technical attainments in actuarial, accounting or statistical work. But it must be said that as Superintendent of Insurance of New York (1915-1921), as General Manager and Counsel of the National Bureau of Casualty and Surety Underwriters (1921-1926) and as executive of the Great American Group of Insurance Companies (1926-1950) he was constantly appreciative of the achievements of our members, many of whom served under his leadership and that he faithfully supported every movement to apply scientific principles to our business.

His greatest achievements, however, were in the field of human relationships. He loved people and his affection was so sincere and so genuine that it engendered a similar response on the part of all those with whom he came in contact. A host of friends within and without the insurance business will remember, with a deep sense of personal loss, his many kindnesses, his earthly humor, his keen interest in their personal problems and his good, old-fashioned integrity as an individual. And these memories will persist for a long time to come!

ABSTRACT FROM THE MINUTES OF THE MEETING

May 24 and 25, 1954

The Spring 1954 meeting of the Casualty Actuarial Society was held at the Curtis Hotel, Lenox, Massachusetts, on Monday and Tuesday, May 24 and 25, 1954. The meeting had been preceded by a Social Hour and Buffet Supper on the evening of May 23rd.

The meeting was formally convened at 2:10 P.M. on May 24 with President Seymour Smith presiding and with the following 43 Fellows and 21 Associates present:

FELLOWS

ALLEN, E. S.
BARBER, H. T.
BATHO, E. R.
BERKELEY, E. T.
BEVAN, J. R.
BROWN, F. S.
CARLSON, T. O.
COATES, C. S.
CURRY, H. E.
ELLIOTT, G. B.
FONDILLER, R.
GODDARD, R. P.
GRAHAM, C. M.
GRAVES, C. H.
GREENE, W. W.
HAZAM, W. J.
HEWITT, C. C. JR.
HOPE, F. J.
HUGHEY, M. S.
JACKSON, H. H.
JOHNSON, R. A.
KORMES, M.
KUENKLER, A. S.
KULP, C. A.
LACROIX, H. F. JR.
LINDER, J.
LIVINGSTON, G. R.
MCCONNELL, M. H.
MATTHEWS, A. N.
MAYCRINK, E. C.
MUNTERICH, G. C.
MILLS, J. A.
OBERHAUS, T. M.
PRUITT, D. M.
RODERMUND, M.
SALZMANN, R. E.
SCHLOSS, H. W.
SKELDING, A. Z.
SKILLINGS, E. S.
SMITH, S. E.
VALERIUS, N. M.
WIEDER, J. W. JR.
WOLFRUM, R. J.

ASSOCIATES

BENNETT, N. J.
CONTE, J. P.
DOWLING, W. F.
FOSTER, R. B.
FRANKLIN, N. M.
FULLER, G. V.
FURNIVALL, M. L.
GILDEA, J. F.
HART, W. V. B. JR.
JOHE, R. L.
KALLOP, R. H.
LINO, R.
LISCORD, P. S.
MACKEEN, H. E.
MENZEL, H. W.
MURRIN, T. E.
RESONY, A. V.
SCAMMON, L. W.
SCHWARTZ, M. J.
STOKE, K.
THOMAS, J. W.

There was also present, by invitation, a number of guests prominent in the insurance industry.

After the taking of the Roll, President Smith presented his address "Expanding Requirements for Actuarial Education".

By motion the gathering voted to dispense with the reading of the Minutes of the Society meeting held on November 19 and 20, 1953 at the Hotel Biltmore in New York City.

The Secretary-Treasurer then read the report of the Council relating to the Council meeting held on March 11, 1954. Upon motion, that report was adopted by the Society.

The President then announced that the Council had met on May 23, 1954, but the agenda not having been completed such meeting had been recessed to a convenient time during the present session of the Society. He also announced that the Council was considering, among other items,

(1) A report from the Educational Committee relating to an equitable procedure for granting credits to students who have previously passed those parts of the examinations that will be discontinued under the new syllabus that will become effective with the 1955 examinations.

(2) A report from the Special Committee on Membership, to be sent to all members of the Society, relating to expansion and increased activities of the Society through

(a) Establishment of a Publicity Committee.

(b) Inauguration of a Quarterly Publication to include brief articles and notes of current interest.

(c) An expansion of research activities by the Society to be retained as a standing item on the agenda.

(d) Bringing up to date the booklet "The Casualty Actuarial Profession."

(e) Expansion of the membership of the Society.

The President then turned the meeting over to Vice-President Dudley M. Pruitt who had arranged the panel discussions of the meeting.

With Mr. Kulp acting as moderator there followed a lively panel discussion on the topic "A Look at Rate Regulation Ten Years after the SEUA Decision". The members of the panel, in addition to Professor Kulp, were Messrs. Carlson and Curry, members of the Society and invited guests E. W. Day and M. G. McDonald.

After the recess of the monday afternoon session there followed an informal dinner, Monday evening, which had been preceded by a brief Social Hour. At the informal dinner Mr. Kuenkler acted as Master of Ceremonies and introduced the Guest Speaker, Mr. Arthur D. Cronin, of the firm of Kaler, Karney, Liffler and Company. Mr. Cronin gave a thought provoking address regarding the observations of a practical insurance man on the subject "Where Do We Go From Here?"

At the Tuesday morning session Dudley Pruitt, Chairman of the Research Committee then presented on behalf of the Committee a "Progress Report on Electronics." This report proved most interesting and the President expressed to the Committee the thanks of the Society for a job well done. During the subsequent question and answer period several members expressed a desire to obtain a copy of the report for distribution in their own offices. It was announced that consideration was being given to methods for making the report generally available.

After the presentation of the report of the Research Committee there followed a panel discussion with Mr. W. W. Greene as Moderator on the topic "How to Live with Property Insurance Catastrophes." The panel members were Messrs. D. C. Bowersock, J. A. Diemand, Jr., E. Georlich and A. Kelly. This discussion proved of such interest that it was found necessary to request the Hotel Management to postpone the time of the previously scheduled luncheon so as to permit further exchange of views on this item. Eventually, the exigencies of time necessitated the blowing of the whistle to bring the Spring 1954 session of the Society to a close.

Thereupon, the gathering broke up to reassemble shortly for luncheon.

For the information of the members there follows an interim report on the finances of the Society for the period October 1, 1953 through November 30, 1953.

Respectfully submitted
A. Z. SKELDING
Secretary-Treasurer.

CASUALTY ACTUARIAL SOCIETY

Cash Receipts and Disbursements from October 1, 1953 to November 30, 1953

Income			Disbursements		
On deposit in Marine Midland on October 1, 1953		$4,812.58	Postage, Tel., Exp. etc.		42.55
Members Dues	$ 160.00		Printing & Stationery	$	59.71
Sale of Proceedings	395.70		Secretarial Work		150.00
Examination Fees	29.00		Luncheons & Dinners		2,346.14
Luncheons & Dinners	1,771.00		Storage of Proceedings		10.12
Interest on Bonds	62.50		Library Fund		27.04
Sale of Reprints	7.50	2,425.70	Membership Dues Ins. Society of N. Y.		100.00
			Miscellaneous		50.36
			Total		$2,785.92
			On deposit Nov. 30, 1953 in Marine Midland Trust Co.		$4,452.36
Total		$7,238.28	Total		$7,238.28

Assets			Liabilities	
Cash in Bank	$4,452.36		Michelbacher Fund 11/30/53	$6,052.10
U. S. Savings Bonds	5,000.00		Surplus	3,400.26
			Total Liabilities & Surplus	
Total Assets		$9,452.36		$9,452.36

(s) Richard Fondiller
Former Secretary-Treasurer

This is to certify that we have audited the accounts, examined all the vouchers and investments shown above and find same to be correct.

(s) H. G. Crane
Chairman, Auditing Committee

January 12, 1954

MINUTES OF THE MEETING OF THE CASUALTY ACTUARIAL SOCIETY

NOVEMBER 18 and 19, 1954

HOTEL BILTMORE, NEW YORK, N. Y.

The annual meeting of the Society was held at the Hotel Biltmore, New York City on November 18 and 19, 1954.

The meeting convened at 2:20 P. M., with President Seymour E. Smith presiding. The following 59 Fellows and 30 Associates were in attendance:

FELLOWS

AINLEY
ALLEN
AULT
BARBER
BARKER
BARTER
BERKELEY
BEVAN
CARLETON
CARLSON
COATES
CURRY
ELLIOTT
ELSTON
GINSBURGH
GODDARD
GRAHAM, C. M.
GREENE
GRAVES
HALEY
HARWAYNE
HAUGH
HAZAM
HEWITT
HOPE
JOHE
KORMES
KUENKLER
LIVINGSTON
JOHNSON
KOLE
LESLIE, JR.
LINDER
LONGLEY-COOK
MACKEEN
MARSHALL
MATTHEWS
MCCONNELL
MAYCRINK
MILLS
MURRIN
PERRYMAN
PRUITT
RODERMUND
RUCHLIS
SALZMANN
SATTERTHWAITE
SCHLOSS
SILVERMAN
SIMON
SKELDING
SKILLINGS
SMICK
SMITH
TARBELL
UHTHOFF
VALERIUS
WILLIAMSON
WOLFRUM

ASSOCIATES

ACKER
BAILEY
BITTEL
BLACK
BONDY
BOYAJIAN
CONTE
EIDE
FAIRBANKS
FOSTER
FURNIVALL
GILLAM
GINSBERG
GROSSMAN
HART, JR.
HURLEY
KALLOP
KATES
LINO
LISCORD
MENZEL
OTTESON
PERKINS
POTOFSKY
RESONY
SCHULMAN
SCHWARTZ
STOKE
THOMAS
WRIGHT

In addition, there were also present a number of invited guests. Vice-President Mills, at the request of the President, conducted the meeting and announced the panel discussions which he had arranged.

The first discussion was on the subject "Progress Through Research" with Dudley Pruitt acting as moderator, the members of the panel being Messrs. Curry, Graves, Linder and Longley-Cook.

This interesting discussion was followed by a second panel discussion "A Constructive Look at Social Security — Value vs. Cost." Mr. H. J. Ginsburgh acted as moderator assisted by panel members Robert J. Myers and W. Rulon Williamson.

After a short recess, there followed a brief social hour prior to the informal dinner. At the dinner Mr. C. J. Haugh acted as Master of Ceremonies and introduced the guest speaker, Mr. William N. Woodland, Editor of the "Standard" of Boston, who held the attention of the audience by a most interesting talk relating to the trials and tribulations of both the actuary and the insurance editor.

The meeting reconvened at 10:20 A. M., on Friday, November 19th.

(1) MINUTES OF LAST MEETING

On motion it was voted to dispense with the reading of the Minutes of the May 1954 meeting.

(2) REPORT OF THE SECRETARY-TREASURER

The Secretary-Treasurer reported

(a) May 26 and 27, 1955 have been selected as the dates of the Spring 1955 meeting at the Edgewater Beach Hotel, Chicago, Illinois, the meeting to convene at 10:00 A. M., on May 26th and to reconvene Friday, May 27th, with probable adjournment by lunch time on the 27th.

(b) Report of Research Committee — "Progress Report on Electronics." About 2000 copies of the copyrighted Report have been printed and each member of the Society has been mailed one copy. Additional copies are available to members and subscribers at a price of $2.00 per copy. Also, the President has appointed T. O. Carlson as Chairman of the Research Committee to succeed the retiring Chairman, Dudley M. Pruitt.

(c) Waiver of Dues — Article IV of By-Laws.

The Council unanimously recommends to the membership that the first paragraph of Article IV be amended to read as follows:

"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."

(d) New Associates.

The following six candidates, having successfully completed the Associateship examinations were nominated by the Council to be enrolled as Associates to be admitted at the November 1954 meeting: R. A. Bailey, K. F. Eaton, K. A. Eide, J. Schulman, D. G. Williams and B. Wright. In addition Messrs. N. Ginsberg and P. M. Otteson, having presented papers acceptable to the Committee on Papers for Full Waiver of Examinations for Associateship, and, meeting the other requirements for such waiver, were nominated by the Council to be admitted as Associates.

(e) "The Casualty and Fire Actuarial Profession."

It was announced that copies of the revised pamphlet were available at the meeting and additional copies could be secured from the Secretary's office.

(f) Report of Special Committee on Membership.

This report had been distributed to the membership under date of November 12, 1954. Briefly, it sets forth recommendations for a long range program designed to stimulate interest in the Society and to generally enhance the position of the Society in the insurance world. In this connection the Secretary read the attached recommendations of the Council relating to the establishment of a new publication of the Society, namely, "C.A.S. Notes."

(g) Society Examinations — 1955

The Council had voted that the 1955 examinations be scheduled for May 12 and 13 of that year.

(h) Editor, Librarian, Chairman Examination Committee.

The Council, subject to confirmation by the Society, elected the present incumbents for the coming year, namely,

Emma C. Maycrink—Editor
Gilbert R. Livingston—Librarian
John W. Wieder, Jr.,—Chairman Examination Committee.

(i) Society Dues

The Council had approved the recommendation of the

Secretary-Treasurer for continuance of the present rate of dues for the next fiscal year, namely,

Fellows	$20.00
Associates (1st five yrs.)	$10.00
Associates (after five yrs.)	$20.00
Outside U. S. & Canada	$10.00

Dues waived for members in the service

(j) Financial Report of the Secretary-Treasurer
The Council had adopted the report of the Audit Committee, Howard G. Crane, Chairman, certifying that the Committee had audited the accounts of the Secretary-Treasurer and had found them to be correct. The income and disbursements report from October 1, 1953 through September 30, 1954 is attached.

(k) The Council had voted to accept the resignation of M. Vernon Johns who became an Associate of the Society by examinations in 1952.

Upon motion the Society voted to adopt the Report of the Secretary-Treasurer, with the understanding that separate action would be taken, as required by the Constitution and By-Laws, on

(a) The recommendation of the Council with respect to a revision of the Waiver of Dues rule.

(b) Election of the Editor, Librarian and General Chairman of the Examination Committee.

(3) AMENDMENT TO ARTICLE IV BY-LAWS — DUES

The Society voted to adopt the recommendation of the Council with respect to Waiver of Dues as set forth in item (2c) above.

(4) OBITUARIES

The President announced the deaths during the past year of two Fellows, Arthur L. Bailey, Third Vice-President of the Lumbermens Mutual Casualty Company and Jesse S. Phillips, Director, Great American Indemnity Company. Obituary notices will appear in the Proceedings.

(5) NEW FELLOWS AND ASSOCIATES

The President presented diplomas to the new Fellows:

G. M. Barker H. E. MacKeen T. E. Murrin
R. L. Johe L. J. Simon

The new Associates were presented, by name, to the Society:

R. A. Bailey	P. M. Otteson
K. F. Eaton	J. Schulman
K. A. Eide	D. G. Williams
N. Ginsberg	B. Wright

(6) PRESIDENTIAL ADDRESS

The President presented his Presidential Address, touching upon the difficulties confronting the actuaries — in the past as well as now — and the progress which has been made over the years in solving some of these difficulties.

(7) ELECTION OF OFFICERS

Mr. Perryman, on behalf of the Nominating Committee (Messrs. Leslie, Michelbacher, Perryman) reported the following nominations, all present incumbents:

President .....Seymour E. Smith
Vice-President.....Dudley M. Pruitt
Vice-President.....John A. Mills
Secretary-Treasurer.....Albert Z. Skelding

There being no additional nominations from the floor, the Secretary was instructed to cast one ballot and the foregoing were declared duly re-elected.

It was also announced that the terms of Messrs. Bailey, Carleton and Elliott as members of the Council would expire at the present meeting. There being no nominations from the floor, C. H. Graves, W. Leslie, Jr., and H. W. Schloss were elected to the Council as recommended by the Nominating Committee.

The meeting also re-elected the following as recommended by the Council:

Editor .....Emma C. Maycrink
Librarian .....Gilbert R. Livingston
Examination Committee Chairman..J. W. Wieder, Jr.

(8) WRITTEN DISCUSSION OF PREVIOUS PAPERS

(a) R. P. Goddard (read by Mr. Pruitt) on Roger Johnson's paper "Comparison of Workmen's Compensation Costs" —Volume XL

(b) L. H. Longley-Cook on C. H. Graves' paper "The Uniform Statistical Plan for Fire and Allied Lines."—Volume XL

(9) NEW PAPERS

(a) R. C. Kean — Guest Paper — "Standard Provision for Workmen's Compensation and Employers' Liability Policies."

(b) R. L. Hurley — "A Credibility Framework For Gauging Classification Experience."

(c) P. M. Otteson — "Group Accident and Health Hospital Therapeutic Benefits."

Recess was taken for lunch at the Hotel until 2:10 P.M.

(d) M. Kormes — "Prolonged Illness Insurance."

(e) R. B. Foster — "The Boiler and Machinery Adjustment Rating Plan."

(f) R. M. Marshall — "National Council Procedure for Making Workmen's Compensation Rates."

(10) REPORT FROM R. J. MYERS — NORWEGIAN SOCIETY OF ACTUARIES AND SWEDISH ACTUARIAL SOCIETY.

Mr. R. J. Myers, the representative of the Casualty Actuarial Society to the 50th Anniversary celebration of the Scandinavian Societies, had presented to the Council the attached Report on the deliberations in Oslo on August 23 and 24 and in Stockholm on August 26 and 27, 1954. The Council, having previously voted to print this Report in the *Proceedings*, the Secretary, at the request of the President, read Mr. Myers' Report to the meeting.

(11) Adjournment was taken at 3:10 P. M. on Friday, November 19, 1954.

(12) 1954 EXAMINATIONS

In accordance with past practice there is attached a list of the successful candidates for the 1954 examinations.

1954 EXAMINATIONS — SUCCESSFUL CANDIDATES

The following is a list of those who passed the examinations held by the Society on May 13 and 14, 1954:

ASSOCIATE EXAMINATIONS

PART I:	L. M. Alexander	L. Dropkin	B. Muckenhoupt
	L. A. Bernat	T. L. Dunn	S. Perlstein
	H. W. Black	H. Eimers	A. D. Pinney
	R. L. Bornheutter	A. C. Goddard	H. Rosser
	K. Clark	R. G. Hansen	E. M. Smith
	P. C. Cowan	T. D. Mahon	L. Tarbell, Jr.
		K. J. McDonald	
PART II:	P. C. Cowan	J. A. Lauer	B. Muckenhoupt
	A. C. Goddard	L. F. Mathwick	J. H. Woodworth
	J. J. Jackson		B. Wright
PART III:	H. W. Black	K. F. Eaton	J. H. Muetterties
	H. M. Church	J. E. Faust, Jr.	S. Perlstein
	K. Clark	E. E. Jacks	H. Rosser
	W. D. Coates	A. S. Leight	E. E. Ward
	P. C. Cowan	S. S. Makgill	J. C. Wilson
		B. Muckenhoupt	
PART IV:	R. A. Bailey	C. S. Lewis	H. J. Phillips, Jr.
	J. R. Berquist	B. H. McBirney	J. Schulman
	J. C. Corcoran	D. McNamara	J. P. Stodolka
	K. A. Eide		D. G. Williams

FELLOWSHIP EXAMINATIONS

PART I:	R. A. Bailey	W. V. B. Hart, Jr.	W. J. Perkins
	M. Bondy	G. O. Head	A. V. Resony
	G. Crofts	R. L. Hurley	J. W. Thomas
	W. S. Gillam	R. H. Kallop	B. Wright
		P. B. Kates	
PART II:	M. Bondy	R. L. Johe	P. S. Liscord
	C. M. Daniel	R. H. Kallop	A. V. Resony
PART III:	G. M. Barker	R. L. Hurley	T. E. Murrin
PART IV:	R. B. Foster	P. S. Liscord	H. W. Menzel
	R. Lino	H. E. MacKeen	L. J. Simon

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, 1954:

R. A. Bailey	K. A. Eide	D. G. Williams
K. F. Eaton	J. Schulman	B. Wright

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, 1954:

G. M. Barker	H. E. MacKeen	T. E. Murrin
R. L. Johe		L. J. Simon

A. Z. Skelding,
Secretary-Treasurer

CASUALTY ACTUARIAL SOCIETY

Cash Receipts and Disbursements
from October 1, 1953 to September 30, 1954

Income			Disbursements	
On deposit in Marine Midland on October 1, 1953		$ 4,812.58	Printing & Stationery	$ 4,541.15
Members Dues	$4,631.00		Postage, Tel., Exp., etc.	128.15
Sale of Proceedings	1,237.40		Secretarial Work	600.00
Examination Fees	964.15		Examination Expense	551.74
Luncheons & Dinners	1,997.59		Luncheons & Dinners	2,465.31
Interest on Bonds	125.00		Library Fund	45.04
Sale of Reprints	12.00		Insurance	12.50
Michelbacher Fund	578.42		Storage	106.26
Foreign Exchange	— .10	9,545.46	Miscellaneous	247.43
Total		$14,358.04	Total	$ 8,697.58
			On deposit 9/30/54 in Marine Midland Trust Co.	5,660.46
			Total	$14,358.04

Assets			Liabilities	
Cash in Bank 9/30/54	$5,660.46		Michelbacher Fund 9/30/54	$ 6,630.52
U. S. Savings Bonds	5,000.00		Surplus	4,029.94
		$10,660.46	Total Liabilities & Surplus	$10,660.46

One 12 Yr. U. S. Savings Bond 2½% Series G. No.. M6,757,060G due for $1000 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 Oct. 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 Co.

* * * * *

This is to certify that we have audited the accounts, examined all the vouchers and investments shown above and find same to be correct.

(S) H. G. Crane
Chairman, Auditing Committee

October 25, 1954

EXAMINATION FOR ENROLLMENT AS ASSOCIATE

PART I

1. (a) Given the following data, compute the arithmetic mean, standard deviation, and skewness:

X:	1	2	3	4	5	6	7
f(x):	5	11	23	29	27	9	6

(b) State two formulae for determining standard deviation, one based on the original values of X, and one based upon class interval as a unit of measure, then apply one of these formulae to determine the variance of the first N integers, in terms of N.

2. (a) Prove that the sum of the squares of the deviations of the variates about the mean is less than the sum of the squares of the deviations about any other point.

(b) Compute the coefficient of corellation and its probable error for the following data:

X:	1	3	4	5	7
Y:	−1	2	2	3	4

3. (a) Given the following table of pairs of values, find the formula of the line of regression of Y on X. Demonstrate the fit of the line by computing values of Y and the Y residuals.

X:	2	4	6	8
Y:	3	5	8	10

(b) Given the following pairs of values, test for the type of curve you would fit to each table of values:

Table A		Table B		Table C		Table D	
X	Y	X	Y	X	Y	X	Y
7	0	2.0	5.2	7.0	4.5	4.0	10
15	15	2.6	7.8	7.3	4.8	4.8	12
23	45	3.4	11.7	7.6	5.7	5.7	16
31	89	4.4	17.6	7.9	8.4	6.8	24
39	149	5.7	26.4	8.2	16.5	8.2	40
47	224			8.5	40.8		

4. Given the two distributions of policies by premium size as shown below, test the probability that they are separate samples from the same parent population.

Size of Policy Premium	Sample A No. of Policies	Sample B No. of Policies
$ .01 – 10.00	7	2
10.01 – 20.00	10	5
20.01 – 30.00	25	12
30.01 – 40.00	70	39
40.01 – 50.00	61	77
50.01 – 60.00	30	59
60.01 – 70.00	15	19
70.01 – 80.00	2	7

5. (a) If a sum be accumulated at an effective rate of interest of 5 percent per annum for the first 15 years, 4.5 percent per annum for the next 10 years, and 4 percent per annum for the last 5 years, find the equivalent effective interest (assumed constant) over the whole period of 30 years.

Given: Log 1.050 = .02119
1.045 = .01912
1.040 = .01703

(b) Commute debts of $900 due in 4 years without interest, $1360 due in 5 years with interest at 4½ percent, and $1770 due in 7 years with interest at 5 percent nominal convertible semi-annually, into two equal payments due in 3 years and 4 years, respectively, if interest is at 4 percent convertible quarterly. Use an equation of value 4 years hence, given the following values:

	v^n					$(1+i)^n$			
n	1%	2½%	4%	4½%	n	1%	2½%	4%	4½%
3	.9706	.9286	.8890	.8763	4	1.0406	1.1038	1.1690	1.1925
4	.9610	.9060	.8548	.8386	5	1.0510	1.1314	1.2167	1.2462
6	.9420	.8623	.7903	.7679	7	1.0721	1.1887	1.3159	1.3609
7	.9327	.8412	.7599	.7348	14	1.1495	1.4130	1.7317	1.8519

6. (a) Starting with a sum of $15,000 drawing 4½ percent interest and withdrawing $2000 at the end of each year, how much money would be left at the end of 9 years?

Given: $(1.045)^9 = 1.486095$

(b) An automobile truck costing \$2000 and lasting 5 years, with a second hand value of \$350 at that time, is to be replaced at the end of the 5 year period by means of a sinking fund accumulated at 4 percent from annual payments made at the end of each year. At the beginning of the fourth year the truck is destroyed by accident, with a junk value of \$50. What amount must be added to the sinking fund and junk value to purchase immediately a new \$2000 truck?

Given: $(1.04)^5 = 1.217$

7. A man owes \$7500 on which he pays 5 percent interest. He starts in by paying \$800 a year but after 4 payments finds himself able to pay \$1000 a year, which he does for 6 years.

(a) What payment is required at the end of the eleventh year to pay off the debt?

(b) Set up an amortization schedule for the first five years to determine the amount of principal still due after the first payment of \$1000.

Given: $a_{\overline{4}|} = 3.54595$
$a_{\overline{5}|} = 4.32948$
$a_{\overline{6}|} = 5.07569$
$a_{\overline{10}|} = 7.72173$
$a_{\overline{11}|} = 8.30641$
$v^{10} = .61391$
$v^{11} = .58468$

8. (a) Given a bond of \$5000 with dividends at 6 percent payable annually on outstanding face, to run for 5 years and then to be redeemed by yearly installments of \$1000, the last installment to be paid 10 years after the date of valuation (purchase date). What is the purchase price to yield the investor 5 percent convertible annually?

Given: v^5 at 5% = .784
$a_{\overline{1}|}$ at 5% = .952
$a_{\overline{5}|}$ at 5% = 4.329
$a_{\overline{6}|}$ at 5% = 5.076
$a_{\overline{11}|}$ at 5% = 8.306

(b) A railroad company can buy wooden ties for \$1.25 each, with an average life per tie of 10 years. Determine the Capitalized Cost of 1000 ties, and then determine how much the company could afford to spend per tie on a treating process that would extend the life of the ties to 18 years. Assume money worth 4 percent.

Given: $a_{\overline{8}|} = 6.7327$
$a_{\overline{9}|} = 7.4353$
$a_{\overline{10}|} = 8.1109$
$s_{\overline{8}|} = 9.2142$
$s_{\overline{9}|} = 10.5828$
$s_{\overline{10}|} = 12.0061$

PART II

1. (a) Derive the formula for $\frac{d}{dx}(\log_e x)$ from the general rule for differentiation.

   (b) Find the critical values and points of inflection of the following curve, and draw a rough sketch of the curve:
   $$y = x^3 - 3x^2 + 6$$

2. (a) Find the area cut from $y = 9 - x^2$ by the curve $x - y + 7 = 0$.

   (b) Find the volume of the ring solid (doughnut-shape) obtained by revolving a circle of radius a about an external axis in its plane b units from its center. $b > a$.

3. Evaluate: $$\int (x^2 - a^2)^{3/2}\, dx$$

4. (a) Find the interval of convergence for the following series:
   $$\frac{1}{2x} + \frac{3}{4x^2} + \frac{5}{8x^3} + \frac{7}{16x^4} + \cdots$$

   (b) Expand $\frac{\cos x}{e^x}$ by MacLaurin's series as far as the term containing x^5.

5. (a) Find a general expression for $\Delta^n\, ba^{mx+c}$ where the interval of differencing is h.

   (b) Prove the validity of the expression derived in (a) for any positive integer n.

6. (a) Use LaGrange's interpolation formula to find x to three places when f(x) = 160,

Given:	x:	10	11	13	16
	f(x):	153	157	164	177

   (b) Find: $\sum_{1}^{n} \frac{1}{(3x-2)(3x+1)(3x+4)}$

7. (a) Prove: $\Sigma^n (u_x v_x) = u_x \Sigma^n v_x - n_{(1)}\Delta u_x \Sigma^{n+1} v_{x+1} + (n+1)_{(2)} \Delta^2 u_x \Sigma^{n+2} v_{x+2} - (n+2)_{(3)} \Delta^3 u_x \Sigma^{n+3} v_{x+3} + \ldots$

   (b) By setting n = 1 in the proof of (a) above, prove the ordinary formula for summation by parts.

8. (a) Find f(1), Given: $\sum_{1}^{10} f(x) = 500{,}426$ $\quad \sum_{4}^{10} f(x) = 329{,}240$

   $\sum_{7}^{10} f(x) = 175{,}212$ $\quad f(10) = 40{,}365$

   (b) Use Weddle's rule for obtaining an approximation to the value of an integral to evaluate the following:

$$\int_0^6 \frac{dx}{(1+x)^2}$$

PART III

1. (a) A chess board consists of 64 squares, each of side length a, and a border of width c outside the block of squares. A coin of diameter b is thrown so as to be entirely on the board (not necessarily inside the border). Find the chance that the coin falls entirely within one of the squares. Assume $a > b > c$.

   (b) If a coin is tossed 12 times, what is the probability of getting heads exactly twice as many times in the first 8 throws as in the last 4? (Answer may be left in form of symbols indicating arithmetic processes to be completed.)

2. (a) A bag contains a coin of value M and a number of other coins whose aggregate value is m. A person draws one at a time until he draws the coin M. Find the value of his expectation.

   (b) Eleven members of a football team elect a captain. Each member is as likely as not (i.e. chance = $\frac{1}{2}$) to vote for himself; otherwise he votes at random. What are the odds that a man who received 5 ballots voted for himself?

3. (a) In a sign spelling "Mississippi", two letters have fallen out. The two letters are picked up and replaced in the two vacancies (without regard for proper spelling). Find the chance that the spelling is still correct.

   (b) A prize is to be won by A as soon as he throws 5 with two dice or by B as soon as he throws 10 with three dice. If they throw alternately, A first, compare their respective chances of winning.

4. A series is to be summed to the number of terms given by the throw of two dice. Prove that the probable value will be equal to the sum of the first seven terms, if the series be such that the 8th term equals the 7th, the 9th equals the 6th, the 10th equals the 5th, etc.

5. (a) (i) Define the following symbols used in connection with remarriage tables:

$$l_x^{\dagger};\ m_x^{\dagger};\ d_x;\ d_x^{\dagger};\ r_x^{\dagger};\ q_x;\ q_x^{\dagger}$$

(ii) Assuming an even distribution of remarriages and deaths during the year, use the above basic definitions to derive the formula:

$$q_x^{\dagger} = q_x - \tfrac{1}{2} r_x^{\dagger} q_x$$

(b) A man aged x offers a single premium of: $\frac{\bar{a}_{x-n} - \bar{a}_{x-n:\overline{2n}|}}{{}_nE_{x-n}}$ for a deferred life annuity, first payment at age x+n. Find the annual rent of the annuity.

6. (a) Express in terms of commutation symbols the present value of each of the following:

(i) Life annuity to a man aged 24 beginning at once with a payment of \$10.00 and increasing by \$1.00 a year until a payment of \$25.00 has been reached, after which the annuity payment becomes constant.

(ii) Life annuity to a man now aged x beginning with an initial payment of \$R at once and decreasing by \$r per year until the payments become zero.

(b) A life insurance policy issued at age 20 provides for 20 annual premiums. If the insured dies between ages 20 and 30, the death benefit is \$1,000; if between 30 and 50 the death benefit is \$3,000, if between 50 and 70, the death benefit is \$2,000. If he survives to age 70, the policy pays \$1,000. Express the net annual premium in commutation symbols.

7. (a) Show that the net renewal premium for an n payment, m year endowment policy ($n < 20$), modified on the twenty payment life basis, may be expressed in the form:

$$\beta_1 = \frac{A_{x:\overline{m}|} + {}_{19}P_{x+1} - C_x}{\ddot{a}_{x:\overline{n}|}}$$

(b) Determine ${}_{11}V_{25}$, given: ${}_{10}V_{25} = .09894$; $P_{25} = .01611$

$q_{35} = .00900$ $\quad i = .03$

8. (a) Describe the present values represented by:

(i) ${}_{n}E_{x\,|\,\overline{y}|}$ $\quad$ (ii) $\ddot{a}_{xy\,|\,s}$

(iii) $A_{\overline{xy}}$ $\quad$ (iv) ${}_{n}E_{\overline{xy}\,|\,s}$

(b) Starting with the equation for the Gompertz-Makeham Law of mortality, prove that: If w is the equal age for ages x, y, z, then w+n is the equal age for ages x+n, y+n, z+n.

PART IV

NOTE: Answer any eight of the questions numbered 1 through 12 and any eight of the questions numbered 13 through 24.

1. Compare the method of meeting the problem of underinsurance used in fire insurance with that used in ocean marine.
2. What type of loss that may occur is covered by the "Contingent Liability from Operation of Building Laws" endorsement to the fire policy?
3. There are twelve exclusions in the Personal Property Floater. Give ten of them with a brief statement of the reason for each.
4. Discuss the various kinds of insurable interests to illustrate the varied uses that may be made of fire insurance contracts.
5. What are the three "conditions suspending or restricting insurance" in the Standard Fire Insurance Policy for New York?
6. Summarize the provisions for "Appraisal" contained in the Standard Fire Insurance Policy for New York.
7. Enumerate and discuss four theories which have been advanced to support the basic philosophy of workmen's compensation, i.e., an employer ought to be responsible for injuries to his employees even in cases where he could not be deemed guilty of wrongful conduct.
8. An insured has a Blanket Position Bond with a penalty of $10,000 and no specific excess. After the bond has been in effect for 37 months it is discovered that three employees acting together stole $55,000,

having stolen $15,000 in the first year, $19,000 in the second year, and $21,000 in the third year.

(i) How much can the insured collect?

(ii) If the insured had a Primary Commercial Blanket Bond with the same penalty, how much could he collect on the loss? Why?

(iii) If the insured had found out at the end of the first year that one of the three employees had been taking petty cash, but decided not to fire him, how much could he collect on his Blanket Position Bond when he finally discovered the $55,000 loss? Explain the conditions of the bond which affect this answer.

9. Define each of the seven classes found in the new National Bureau Private Passenger Automobile Classifications Rule.

10. Test the new National Bureau Private Passenger Automobile Classifications Rule against the standards which an ideal classification plan should meet.

11. Name six of the basic exclusions generally contained in the Owners', Landlords' and Tenants' Policy, as respects Bodily Injury.

12. The published manual rates for Workmen's Compensation insurance are applied per $100 of the Insured's payroll, and it would appear therefore that, for risks of the same classification in the same state, the premiums should vary in direct proportion to the payroll, from the smallest to the largest risk. Name and explain briefly the purpose and application of four rating rules or procedures which distort this direct proportion among risks of various sizes.

13. List the arithmetical steps followed in the 1951 New York fire insurance rate revisions.

14. In casualty insurance, elaborate statistical plans are designed to give ratemaking data by classification of risk, by state, and for some lines by further breakdown by city or territory within state. Rating plans then provide for adjustment among risks of the same classification usually on the basis of past experience. How does this compare with the arrangement for fire insurance ratemaking?

15. Enumerate and comment upon those problems which confront a fire insurance rate maker which are not generally met in casualty lines.

16. With respect to the "Analytic" or "Dean" system of Fire rating:
    (a) What feature or features are covered fundamentally by the "basis" rate?
    (b) The "Occupancy Table" consists of three separate columns. What phase of the overall hazard is each column designed to measure?
17. In Workmen's Compensation, classification rates for manufacturing operations vary according to the products made, on the basis that for the most part, manufacture of like products will produce like hazards. Thus two manufacturers located in the same state would have the same manual rate, based upon like manufacturing of the same kind in the state. What are the various factors that make it impractical to conclude that the same two risks should necessarily have the same fire rate?
18. In the post-war economic conditions, the casualty insurance industry found that their traditional ratemaking procedures, based upon the two or three latest completed policy of experience, resulted in rates that were constantly lagging behind current conditions. How does this problem compare with the fire insurance situation, as respects both the present ratemaking procedure and the general nature of fire insurance?
19. In the development of Workmen's Compensation rates, one part of the procedure involves the segregation of losses into three divisions according to type of loss. What are these three divisions, and what is the purpose of this three-way split?
20. There has been considerable discussion of, and in some quarters a demand for, a private passenger merit rating plan designed to charge higher rates for those insureds who have the accidents, and return premium credits to those who are free of accidents during an experienced period. Include in your discussion of the advantages, disadvantages, and problems connected with such a plan, consideration of the justification of such a plan from the standpoint of credibility.
21. If it were found that, industry-wide, a substantial increase in allocated claim expense had occurred, what changes, if any, would be

required in the ratemaking procedure normally followed in the following lines:

Workmen's Compensation
Automobile Liability
Burglary
Manufacturers' and Contractors' Liability

22. If you were asked to prepare a statistical procedure for Group Accident and Health experience which would enable you to determine "pure premiums" on a policy year basis, what units of exposure would you suggest for each of the following types of coverage:

Weekly Indemnity
Employee Hospital Expense
Dependent Hospital Expense
Employee Surgical Expense
Employee Medical Expense

23. It is suggested: Assign a credibility of $1/\sqrt{r}$ to an exposure of $1/r$ of that required for 100% credibility. State the theory upon which this suggestion is based and derive this result from the theory as stated.

24. Name three sources of revenue for the payment of suretyship losses, in addition to premium, that are usually available, and discuss their bearing on surety ratemaking.

EXAMINATION FOR ENROLLMENT AS FELLOW

PART I

1. The ratemaking procedures for casualty insurance provide for a profit factor in the rate structure. Considering the economic theory of risk discuss the propriety of a uniform profit factor for all the lines and sublines of casualty insurance.
2. (a) Under what conditions are "loss prevention" and "assumption of risk" desirable ways of coping with risks?
   (b) To what extent are casualty companies permitted to invest in common stocks under the New York Insurance Law?
3. What conditions should obtain to make feasible self-insurance against the fire hazard?
4. Other things being equal, how is the investment portfolio of an insurance company determined by the type of insurance it writes? Discuss this specifically for a Workmen's Compensation writer as compared with an Automobile Physical Damage writer.
5. (a) Distinguish between cancellation and rescission of an insurance policy.
   (b) What is the difference between a representation and a warranty?
6. It has been said that casualty insurance rates are too stringently regulated under the "all industry" type bills passed by many states. Discuss this in the light of the Federal acts which otherwise would apply to the insurance business.
7. (a) Define the doctrine of subrogation and illustrate its application to Workmen's Compensation insurance.
   (b) Discuss the purposes of the legal requirement of insurable interest in property insurance contracts.
8. The All Industry Bill places the making of rates in the hands of the insurance carriers, but with prior approval or subsequent disapproval by the supervisory official. In your opinion, does the burden of proof that filed rates do or do not satisfy the rating standards of the Bill rest with the insurance carriers or the supervisory official?

PART II

NOTE: Answer any four of the questions numbered 1 through 6.

1. (a) State the purposes and briefly describe the Composite Rating Plan as used for Liability, Burglary and Glass insurance.

   (b) What basic data are necessary to prepare a table of insurance charges in the form of Table M? Describe the calculations.

2. (a) Under the National Council Experience Rating Plan for Workmen's Compensation insurance, describe briefly what part the following items have in the rating:

   1. D-ratio
   2. Expected Loss Rate
   3. Q-point
   4. W-value
   5. B-value

   (b) How is the Standard Premium for Automobile and General Liability insurance determined in the National Defense Projects Rating Plan?

3. You have been given the following information concerning a retrospective rating plan quotation of a competitor to analyze:

   a. No loss limitation
   b. Maximum Premium Factor — 1.159
   c. Minimum Premium Factor — .649
   d. Tax Multiplier — 1.03
   e. Basic Premium Factor — .300
   f. Loss Conversion Factor — 1.10

   You know that the risk is of $50,000 annual standard premium size and the permissible loss ratio for the line of insurance involved is 60%. You are asked to determine the following factors:

   1. The loss ratio underlying the maximum premium factor.
   2. The loss ratio underlying the minimum premium factor.
   3. The insurance charge in the basic premium factor.
   4. The provision for expenses and contingencies in the proposal.

Ratio of Rated Losses to Expected Losses	*RISK EXPECTED LOSSES*					
	$20,000		*$30,000*		*$50,000*	
	Charge	*Saving*	*Charge*	*Saving*	*Charge*	*Saving*
.25	.751	.001	.750	.000	.750	.000
.50	.527	.027	.515	.015	.508	.008
.75	.341	.091	.318	.068	.295	.045
1.00	.216	.216	.180	.180	.143	.143
1.25	.130	.380	.094	.344	.063	.313
1.50	.076	.576	.045	.545	.026	.526
1.75	.045	.795	.022	.772	.011	.761
2.00	.027	1.027	.000	1.000	.000	1.000

4. The presently effective Multiple Location Rating Plan for Fire and Extended Coverage unifies the Multiple Location Service Office Plan and the Independent Plan. What major differences are there between the latter two plans.

5. Discuss the National Automobile Underwriters Association Collision Fleet Rating Plan with respect to:

   a. Eligibility
   b. Coverage
   c. Basic Credits
   d. Experience Rating Provisions

6. Describe the Schedule for Grading Cities and Towns used by the National Board of Fire Underwriters.

7. In the light of the experience of Rhode Island and California what are the desirable features that should be built into a cash sickness system?

8. Proponents of automobile compensation systems have stated that with benefits equal to those for Workmen's Compensation:

   1. The loss cost would not be more than the number of accidents reported to the Registry of Motor Vehicles times the average cost of Workmen's Compensation claims and,
   2. the expense of settling claims would be as low as the expense of settling Workmen's Compensation claims.

   Discuss these statements.

9. (a) Define the meaning of "fully insured" and "currently insured" with regard to the Social Security Act.

(b) State the possible beneficiaries and necessary status of the worker under the Social Security Act for each of the following type benefits:
   1. Retirement Payments
   2. Survivors Payments
   3. Lump Sum Death Payments

10. What recommendations have been made by the President and by the Secretary of Health, Education and Welfare to amend the Social Security Act.

PART III

1. A company which has written $1,000,000 per month for the last 3 years in automobile liability premiums decides to write all policies on a 6 months term basis instead of a yearly basis, commencing January 1st, 1954. Its business is evenly distributed over the year, and it has never written policies for any term other than a year. It pays a 20% commission rate and a 2% tax rate on premiums written. During 1954, this company writes the same risks and incurs the same losses and expenses other than taxes and commissions that it had incurred in 1953, namely, $8,760,000. Assuming no change in rate level for automobile liability insurance during 1952, 1953 and 1954, and taking into account that no change was made in its contingency reserves, will this company increase or decrease its surplus by a greater amount in 1954 than in 1953 from underwriting results? How much and why?

2. Some companies, on some lines of insurance, determine loss reserves on the basis of "projection factors". This method is based on the premise that the indications of the rate of payments in the past on cases occurring during a month on which case payments are now fully completed, when applied to the accumulated losses paid on cases happening during current months, will project these current months payments to an ultimate incurred basis. Discuss the advantages and disadvantages of such a method, particularly as they apply to the use of such a method for (1) workmen's compensation insurance and (2) automobile property damage liability insurance.

3. A fire insurance carrier, not using an installment plan decides to meet the competition of carriers using such a plan by writing its prepaid term business on an annual basis at 83⅓% of the current annual rate. What would be the effect upon its results of adopting such a program?

4. (a) Discuss the requirements of Schedule P with respect to the following items:

   a. Allocated loss expense reserves
   b. Unallocated loss expense reserves
   c. Incurred but not reported loss reserves

   (b) Briefly outline the National Board of Fire Underwriters Statistical Procedure for determining classification earned premium and incurred losses. To what extent does the resulting ratio of incurred losses to earned premium measure the adequacy of tariff rates?

NOTE: Answer either question 5 or question 6, but not both.

5. Describe the features of Part II of the Statistical Plan of the National Board of Fire Underwriters with regard to the reporting of expense data.

6. Outline the compilations of experience which can be produced by the statistical procedure of the Inland Marine Insurance Bureau.

NOTE: Answer either question 7 or question 8, but not both.

7. Outline the essential features of the Workmen's Compensation Statistical Plan published by the National Council on Compensation Insurance, and specifically indicate the advantages of such a system of reporting compared to an annual Schedule Z reporting.

8. (a) What type of experience is the Burglary Statistical Plan designed to develop? Explain briefly how the desired results can be obtained from the information required by the Plan.

   (b) What is the procedure set up within the Automobile Liability Statistical Plan to report statistics on medical payments coverage?

9. Using the maximum likelihood technique, derive the mean of the Poisson distribution.

10. (a) You are analyzing variances of claim frequency data by classsification and policy year to determine the type distribution it represents.

    (1) Name and express algebraically two statistics you would calculate.

    (2) For each give the range of values and names of the distribution it would define.

(b) Under what circumstances may the simplified Bayes' Rule be used instead of the Bayes-Laplace Theorem?

PART IV

The following information is given relative to the operations of Company X. Amounts are given in thousands. The items are 1953 transactions or values as of December 31st, 1953, unless otherwise stated. Assume this is the complete list of operations.

1.	Advances to employees	$ 130
2.	Agents' balances or uncollected premiums	10
3.	Bonds	236,000
4.	Capital paid up	1,810
5.	Capital paid in during year	50
6.	Cash and bank deposits	17,530
7.	Contingency reserve for investment fluctuations	7,280
8.	Dividends paid to stockholders	500
9.	Federal income taxes incurred	8,700
10.	Federal income tax reserve	2,000
11.	Loss expense reserve	13,000
12.	Loss expenses incurred	17,000
13.	Loss reserve	164,000
14.	Loss reserves at December 31, 1952	137,000
15.	Losses (net) paid during year	83,000
16.	Net investment income earned	6,000
17.	Net loss from increase in non-admitted assets	40
18.	Net realized capital gains	140
19.	Net unrealized capital gains	1,400
20.	Premiums written (net)	204,000
21.	Reinsurance recoverable on loss payments	150
22.	Stocks	19,000
23.	Taxes (other than income), licenses and fees incurred during year	6,000
24.	Tax reserve (excluding Federal income tax)	6,000
25.	Underwriting expenses incurred (excluding taxes, licenses and fees)	57,000
26.	Underwriting expense reserve	2,000
27.	Unearned premium	50,600
28.	Unearned premium on reinsurance in unauthorized companies	30
29.	Unearned premium at December 31, 1952	42,600

In answering questions 1 and 2, represent the headings by their respective item numbers in order to save time.

1. (a) List the assets that will appear on the Asset page of the annual statement of this carrier, and give the total assets.

   (b) List the liabilities that will appear on the Liabilities page of the annual statement of this carrier. What is the total surplus of this carrier? What items constitute this surplus?

2. (a) How much did this company gain or lose on underwriting? How much on investments? What was the net income before and after Federal income taxes?

   (b) How much did this company increase its surplus during 1953?

3. Describe the content of Regulation 30 of the New York Insurance Department.

4. (a) Name at least five types of assets which are classified as nonadmitted in the Association-Convention Annual Statement.

   (b) If a company takes annual depreciation on its home office building in what places would this item appear in the annual statement and what effect would it have on reported surplus?

   (c) If in a future year the company sold its home office property for an amount $100,000 in excess of its book value at the date of sale where would this item appear in the annual statement and what effect would it have on surplus?

NOTE: Answer any four of the questions numbered 5 through 10.

5. (a) What voluntary program has been proposed by the insurance industry as an alternative to compulsory automobile liability insurance in New York State?

   (b) What does the industry expect its plan to accomplish?

6. Heightened competition in the automobile insurance field has evidenced itself in new marketing and rating methods. Discuss these new methods.

7. Some members of the public believe that any person required to carry certain insurance coverage should be accepted by any insurance company licensed to write the applicable insurance in the state. Give the arguments pro and con on this issue and describe the insurance carriers' alternative solution to the problem.

8. (a) Outline the 1921 Profit Formula for fire insurance.

(b) What reasons have been advanced for excluding the results of carriers' investment operations from consideration in the makeup of the Formula.

9. (a) What is the purpose of the Nation-wide Marine Definition of the N.A.I.C.?

(b) Describe the membership, function and legal status of the Committee on Interpretation of the Nation-wide Marine Definition.

10. The proponents of the schedule basis and of the indivisible premium basis each cite advantages of their respective approaches to writing multiple peril policies. What are the advantages of each?

INDEX TO VOLUME XLI

INDEX TO VOLUME XLI (Con.)

CASUALTY ACTUARIAL SOCIETY

ORGANIZED 1914

1955 YEAR BOOK

(Addendum to Volume XLI of the *Proceedings*)

Corrected to January 25, 1955 No. 34

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 308 consisting of 164 Fellows and 144 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, 45 East 17th Street, New York 3, N. Y.

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MEMBERSHIP OF THE SOCIETY, NOVEMBER 19, 1954

FELLOWS

Those marked (†) were Charter Members at date of organization, November 7, 1914.
Those marked (*) have been admitted as Fellows upon examination by the Society.

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., 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. 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, Firemen's Fund Insurance Group, 401 California Street, San Francisco 20, Calif.
*Nov. 20, 1942	BART, ROBERT D., Assistant Treasurer and Comptroller, 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, Superintendent Systems and Procedures Dept., American Insurance Group, 15 Washington Street, Newark 2, N. J.
Oct. 22, 1915	BROWN, HERBERT D., (Retired), Glenora-on-Lake Seneca, Dundee, New York.
†	BUCK, GEORGE B., Consulting Actuary, 150 Nassau Street, New York 38, N. Y.

FELLOWS

Admitted	
Apr. 20, 1917	BURHOP, WILLIAM H., President, Employers Mutual Liability Insurance Company, 407 Grant Street, Wausau, Wis.
*Nov. 23, 1928	BURLING, WILLIAM H., Assistant 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., 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., 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., Third 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., Assistant 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 Insurance Department, 8th floor, 200 Bloor Street E., Toronto 5, 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., Associate Actuary, Life Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford, 15, Conn.
*Nov. 15, 1935	EPPINK, WALTER T., Vice-President and Actuary, Merchants Mutual Casualty Co., Merchants Mutual Building, Buffalo 5, N. Y.
†	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, 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 Motorist 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., Vice-President, American Mutual Liability Insurance Company, American Policyholders' Insurance Company, 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.
†	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.

FELLOWS

Admitted	
†	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 110 Fulton St., 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, 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., Actuarial Department, 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.
Feb. 25, 1916	JACKSON, CHARLES W., (Retired), 74 Quimby Avenue, White Plains, N. Y.
*Nov. 19, 1929	JACKSON, HENRY HOLLISTER, 20 South Main Street, Barre, Vt.
*Nov. 19, 1954	JOHE, RICHARD L., Actuarial Department, United States Fidelity and Guaranty Company, Baltimore, Md.
*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.

FELLOWS

Admitted	
*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, 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., Commissioner of Insurance, State of Wisconsin, State Capitol, Madison 2, Wis.
†	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., Assistant Manager, National Council on Compensation Insurance, 45 East 17th Street, New York 3, N. Y.
*Nov. 20, 1924	LINDER, JOSEPH, Consulting Actuary, Wolfe, Corcoran & Linder, 116 John Street, New York 38, N. Y.
*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.
†	MAGOUN, WILLIAM N., (Deceased).
*Nov. 23, 1928	MARSHALL, RALPH M., Assistant Actuary, National Council on Compensation Insurance, 45 East 17th Street, 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.

FELLOWS

Admitted	
*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.
†	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.
*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., 19 Milk St., 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.

FELLOWS

Admitted	
*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.
May 23, 1919	RICHARDSON, FREDERICK, (Retired), Coombe, Bradford Abbas, Sherborne, Dorset, England.
*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., Consulting Actuary, 807 Crystal Springs Road, San Mateo, 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., Assistant 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., 80 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.
*Nov. 19, 1929	SKELDING, ALBERT Z., Assistant Manager, National Council on Compensation Insurance, 45 East 17th St., 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., Associate Actuary, Casualty, Fire and Marine Actuarial Departments, 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, 33 Broad Street, Boston 9, Mass.

FELLOWS

Admitted	
*Nov. 17, 1920	TARBELL, THOMAS F., Vice President and Actuary, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
†	THOMPSON, JOHN S., 79 Douglas Road, Glen Ridge, N. J.
†	TRAIN, JOHN L., President, Utica Mutual Insurance Co., Utica, N. Y.
Nov. 17, 1922	TRAVERSI, ANTONIO T., 9 Balfour Street, Wollstonecraft, 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., 1534 N. Las Palmas Ave., Los Angeles 28, 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 Farmin ton Ave., Hartford 15, Conn.
Nov. 16, 1951	WATSON, LEON A., General Manager, The Fire Insurance Rating Organization of New Jersey, 31 Clinton St., Newark, N. J.
*Nov. 14, 1947	WIEDER, JOHN W., JR., Aetna Casualty and Surety Company, Hartford 15, Conn.
*Nov. 15, 1935	WILLIAMS, HARRY V., Secretary, Hartford Accident and Indemnity Co., 690 Asylum Ave., Hartford 15, Conn.
Nov. 14, 1941	WILLIAMSON, W., RULON, Senior Actuarial Consultant, The Wyatt Company. 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

Those marked (*) have been admitted as Associates upon examination by the Society.

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 of Insurance Emeritus, 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. 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. 19, 1954	BAILEY, ROBERT A., Actuarial Department, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
*Nov. 24, 1933	BARRON, JAMES C., Asst. 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., Assistant Actuary, Department of Banking and Insurance, Division of Insurance, 100 Nashua St., Boston 14, Mass.
*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., California-Western States Life Insurance Company, 2020 I St., 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. 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 Mathematics, University of Manitoba, Winnipeg, Man., Canada.
*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, Lumber Mutual Casualty Co., 260 Fourth Avenue, New York 10, N. Y.
*Nov. 19, 1954	EATON, KARL F., 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 H Unit, Metropolitan Life Insurance Company, 1 Madison Ave., New York 10, N. Y.
*Nov. 16, 1951	FAIRBANKS, ALFRED V., Assistant Actuary, Monarch Life Insurance Company, 365 State Street, Springfield 1, Mass.
*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	FOSTER, ROBERT B., Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
*Nov. 21, 1952	FOWLER, THOMAS W., Actuary, Northwestern National Insurance Company, 526 East Wisconsin Ave., Milwaukee, Wis.
*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. 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. 19, 1954	GINSBERG, NATHAN, Actuary, Pension Planning Company, 260 Madison Avenue, New York 16, N. Y.
*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).
*Nov. 17, 1922	HALL, HARTWELL L., Associate Actuary, 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, Statistical Department, Lumbermen's Mutual Casualty Company, 4750 Sheridan Road, Chicago 40, 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 & Inspection Bureau, 715 N. Van Buren Street, Milwaukee 2, 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. 21, 1952	HURLEY, ROBERT L., Actuary, Liberty Mutual Fire Insurance Company, 175 Berkeley Street, Boston 17, Mass
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, 45 East 17th Street, New York 3, N. Y.
*Nov. 19, 1953	KATES, PHILLIP B., Actuary, Southern Fire and Casualty Company, Knoxville 1, Tenn.
*Nov. 17, 1922	KIRK, CARL L., Deputy U.S. Manager, Zurich General Accident & Liability Insurance Co., 135 South LaSalle Street, Chicago 3, Ill.
*Nov. 15, 1935	KITZROW, E. W., General Manager, Mid-Century Insurance Company, member of Farmers Group, 4680 Wilshire Boulevard, Los Angeles 54, Cal.
*Nov. 21, 1952	LINO, RICHARD, Actuarial Department, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y.
*Nov. 21, 1952	LISCORD, PAUL S., Casualty Actuarial Department, The Travelers Insurance Co., 700 Main Street, Hartford 15, Conn.
*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, Associate 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.

ASSOCIATES

Admitted	
*Nov. 17, 1950	MAYERSON, ALLEN L., Principal Actuary, New York State Insurance Department, 61 Broadway, New York 6, N. Y.
*Nov. 17, 1922	McIVER, R. A., Actuary, Washington National Insurance Co., 1630 Chicago Avenue, Evanston, Ill.
*Nov. 17, 1950	MENZEL, HENRY W., Actuarial Department, National Bureau of Casualty Underwriters, 60 John Street, New York 38, N. Y
*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.
*Nov. 18, 1937	MINOR, EDUARD H., Manager Accident and Health Actuarial Division, 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, 1937	MYERS, ROBERT J., Chief Actuary, Social Security Administration, Washington 25, D.C.
*Nov. 15, 1935	NELSON, S. TYLER, Executive Vice President, Exchange Insurance Association, 175 West Jackson Blvd., Chicago, 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 and Actuary, 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 Lodges Lane, Cynwood, Pa.
*Nov. 21, 1952	PENNYCOOK, RODERICK B., Underwriting Manager, Manitoba Hospital Service Association, Winnipeg, Man., Canada.
*Nov. 19, 1953	PERKINS, WILLIAM J., 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.

ASSOCIATES

Admitted	
*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.
*Nov. 15, 1918	RAYWID, JOSEPH, Consultant, Woodward and Fondiller, Consulting Actuaries, 200 West 57th Street, New York 19, N. Y.
*Nov. 21, 1952	RESONY, ALLIE V., Actuarial Department, Hartford Accident and Indemnity Co., 690 Asylum Ave., Hartford 15, Conn.
Nov. 19, 1932	RICHARDSON, HARRY F., General Manager, National Council on Compensation Insurance, 45 East 17th Street, New York 3, N.Y.
*Nov. 19, 1953	RICHMOND, OWEN D., Supervisor, Tax Section, Business Men's Assurance Company of America, 215 Pershing Road, Kansas City 41, 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., Ron Stever and Company, 411 West 5th Street, Los Angeles 13, 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, Actuarial Department, New York Compensation Insurance Rating Board, 100 East 42nd Street, 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., 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., Associate Manager, New York Compensation Insurance Rating Board, Pershing Square Bldg., 100 East 42nd Street, New York 17, N. Y.
*Nov. 19, 1926	SOMERVILLE, WILLIAM F., (Retired).
*Nov. 18, 1925	SOMMER, ARMAND, Vice President, Continental Casualty Co., and United States Life Insurance Co., 310 So. Michigan Avenue, Chicago 4, Ill.

ASSOCIATES

Admitted	
*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., Manager, Budget Director, Utica Mutual Insurance Co., Box 530, Utica, N. Y.
*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., 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., Philadephia 2, Pa.
*Nov. 19, 1954	WILLIAMS, D. G., Staff Actuary, Texas Employers' Insurance Association, Dallas 1, Tex.
*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, 350 Broadway, New York, 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	*Howard 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

Secretary-Treasurer

1914-1917....*C. E. Scattergood
1918-1953.....R. Fondiller
1954.....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

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
1951-1954. Gilbert R. Livingston
Chairman—Examination Comm.
1949-1952.....Roger A. Johnson
1952-1954..John 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	Jul. 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
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
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
Nov. 22, 1934	Walter H. Thompson	May 25, 1935

FELLOWS WHO HAVE DIED—*Continued*

Admitted		Died
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 19, 1954

	Fellows	Associates	Total
Membership, November 19, 1953.....	161	143	304
Additions:			
By Election.....	...	2	2
By Reinstatement.....	...	...	...
By Examination.....	5	6	11
	166	151	317
Deductions:			
By Death.....	2	...	2
By Withdrawal.....	...	2	2
By Transfer from Associate to Fellow..	...	5	5
Membership, November 19, 1954.....	164	144	308

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)*
Associateship, 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.

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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.
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CASUALTY ACTUARIAL SOCIETY

ORGANIZED 1914

RECOMMENDATIONS FOR STUDY

EDUCATIONAL COMMITTEE
(1954)

Ernest T. Berkeley, *Chairman*

John W. Carleton
Clarence A. Kulp
Lawrence H. Longley-Cook
John W. Wieder, Jr.

Tenth Edition, 1954

LIST OF PROCEEDINGS

The following schedule comprises a complete set of the *Proceedings* issued to date.

Number	Volume	Pages	Number	Volume	Pages
1	I	76	39	XIX	214
2	I	130	40	XIX	202
3	I	109			
			41	XX	254
4	II	186	42	XX	162
5	II	148			
6	II	196	43	XXI	240
			44	XXI	202
7	III	128			
8	III	200	45	XXII	211
			46	XXII	200
9	IV	248			
10	IV	218	47	XXIII	134
			48	XXIII	196
11	V	196			
12	V	198	49	XXIV	232
			50	XXIV	267
13	VI	168			
14	VI	268	51	XXV	290
			52	XXV	192
15	VII	216			
16	VII	263	53	XXVI	307
			54	XXVI	168
17	VIII	176			
18	VIII	185	55	XXVII	235
			56	XXVII	264
19	IX	176			
20	IX	221	57	XXVIII	278
			58	XXVIII	373
21	X	98			
22	X	161	59	XXIX	208
			60	XXX	127
23	XI	190			
24	XI	181	61	XXXI	88
			62	XXXII	190
25	XII	204			
26	XII	216	63	XXXIII	116
27	XIII	146	64	XXXIV	132
28	XIII	218			
			65	XXXV	105
29	XIV	220			
30	XIV	274	66	XXXVI	152
31	XV	136	67	XXXVII	34
32	XV	168	68	XXXVII	108
33	XVI	282	69	XXXVIII	84
34	XVI	167	70	XXXVIII	184
35	XVII	160	71	XXXIX	12
36	XVII	191	72	XXXIX	114
37	XVIII	252	73	XL	33
38	XVIII	279	74	XL	61

Communications should be addressed to:

Albert Z. Skelding,
Secretary-Treasurer
Casualty Actuarial Society
107 William St., Room 1230
New York, 38, N. Y.

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	(b)	Advanced Problems in Insurance Statistics.
IV	(a)	Advanced Problems in Rate-making.
	(b)	Current Insurance Problems.

RECOMMENDATIONS FOR STUDY

The examinations for admission to the two grades of membership in the Society are designed to establish the qualifications of candidates. The following Recommendations For Study are provided as a guide for the candidates in their preparation for the examinations. It should be realized that although the examination questions will be based upon the textual material cited, they will not necessarily be drawn directly therefrom. The examinations will test not only the candidate's knowledge of the subject matter, but also his ability to apply that knowledge.

In their study of the mathematical sections of the Associateship Examination, candidates are advised to work out as many examples as possible, in order to acquire facility in the application of the mathematical principles and methods to specific problems.

In preparing for the non-mathematical parts of the Associateship and all of the Fellowship Examinations, the candidate should be familiar with pertinent papers published in the Proceedings of the Casualty Actuarial Society subsequent to November 1953, in addition to the references cited. The candidate should also read at least one insurance journal for the year preceding his examination in order to be familiar with current developments.

In setting examination questions for Associateship Part IV, Sections (a) and (b), Fellowship Part II, Sections (a) and (b), Fellowship Part III, Section (b) and Fellowship Part IV, Sections (a) and (b), recognition will be given to the fact that some candidates may be trained essentially in casualty insurance while others are trained essentially in property insurance. Generally this recognition will take the form of providing multiple questions giving the candidate a limited choice.

The references to papers in the *Proceedings* of the Casualty Actuarial Society (denoted by P.C.A.S.) in the *Transactions of the Actuarial Society of America* (denoted by T.A.S.A.) and in the *Transactions of the Society of Actuaries* (denoted by T.S.A.) are considered to include all discussions of these papers in these publications, though the page references cited refer to the papers only.

Description of texts cited will be found in the Index at the end of these Recommendations.

Candidates can review the examinations given in previous years by referring to the reprints contained in the Proceedings of the Society. Copies of examinations for recent years may be obtained from the Secretary-Treasurer.

ASSOCIATESHIP: GENERAL

The candidate should have adequate preparation in business arithmetic and in algebra as a prerequisite to study for Part I, Sections (a) and (b) and Part II, Section (a) of these examinations. The preparation in algebra should include the equivalent of chapters 1–5, 8–14, 16 and 24 of "Higher Algebra" by Hall and Knight (published by Macmillan) with particular emphasis on permutations and combinations and the binominal theorem. It is also considered desirable for the candidate to have an elementary knowledge of differential and integral calculus. Such a background will add greatly to the candidate's understanding and appreciation of the mathematical parts of the examinations and also the technical papers contained in the *Proceedings* of the Society.

ASSOCIATESHIP: PART I

SECTION (a). STATISTICS.

Hoel, P. G. Introduction to Mathematical Statistics.

Richardson, C. H. An Introduction to Statistical Analysis. 1944.

SECTION (b). PROBABILITY.

Freeman, Harry. Mathematics for Actuarial Students. Part II, Chap. 10.

Hall, H. S., and Knight, S. R. Higher Algebra. Chap. 32.

Whitworth, W. A. Choice and Chance. 1934. (Included as a source of additional examples).

ASSOCIATESHIP: PART II

SECTION (a). ELEMENTARY LIFE INSURANCE MATHEMATICS.

Larson, R. E., and Gaumnitz, E. A. Life Insurance Mathematics. Chaps. 1-6.

New York (State) Workmen's Compensation Board. Workmen's Compensation Tables (3% interest) 1948. (Special bulletin no. 222).

Schloss, H. W. Valuation of Death Benefits Provided by the Workmen's Compensation Law of New York. P.C.A.S. XXXV, p. 40.

The candidate should have a working knowledge of the tables set forth in Special Bulletin No. 222, published by the New York Workmen's Compensation Board. The candidate will not be required to develop or reproduce the formulae contained in the Appendix to Special Bulletin No. 222 nor in the paper by Schloss.

SECTION (b). GENERAL PRINCIPLES OF INSURANCE; INSURANCE ECONOMICS AND INVESTMENTS.

Badger, R. E., and Guthmann, H. G. Investment Principles and Practices. 1951.

Boehmler, E. W. and others. Financial Institutions.

Kulp, C. A. Casualty Insurance. 1942. Chaps. 1 and 2.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chap. 1.

Mowbray, A. H. Insurance. 1946. Chaps. 1-4.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chaps. 1 and 2.

Willet, A. H. The Economic Theory of Risk and Insurance.

ASSOCIATESHIP: PART III

SECTION (a). INSURANCE LAW; SUPERVISION, REGULATION AND TAXATION OF INSURANCE.

Carlson, T. O. Rate Regulation and the Casualty Actuary. P.C.A.S. XXXVIII, p. 9. (Contains analysis of casualty rate regulatory laws).

Conyngton, T., and Bergh, L. O. Business Law. 1949.

Donovan, J. B. The New Era of Casualty Rate Regulation. P.C.A.S. XXXIV, p. 50.

Donovan, J. B. Regulation of Insurance Under the McCarran Act. (In: Law and Contemporary Problems. Regulation of insurance. 1950).

Hobbs, C. W. Workmen's Compensation Insurance. 1939. Chaps. 5 and 15.

Insurance Accounting and Statistical Association. Insurance Accounting—Fire and Casualty. Chaps. 7 and 14.

Kulp, C. A. Casualty Insurance. 1942. Chap. 20.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chap. 4.

Mowbray, A. H. Insurance. 1946. Chaps. 27 and 28.

National Association of Insurance Commissioners. Proceedings. (The last four years should be reviewed for all discussions and committee reports relating to the topics covered in this section).

National Board of Fire Underwriters. Committee on Law. Compilation of rate regulatory laws. Vol. 1, Fire. (States of California, Connecticut, New York, and North Carolina only).

New York (State) Insurance Dept. Examination of Insurance Companies. Vol. II, Part 2, Chaps. 2 and 3; Part 3, Chaps. 4 and 5.

New York (State) Laws, statutes, etc. New York Insurance Law. Articles I-V, VII, VIII, IX a, b, c, X; XI a, b, c, XII, XV; XVI and XVII.

New York (State) Laws, statutes, etc. New York Tax Law. Section 187.

Sawyer, E. W. Insurance as Interstate Commerce.

Vance, W. R. Handbook of the Law of Insurance. 1951. Chaps. 1-9.

SECTION (b). SOCIAL INSURANCE.

(1) *General.*

Farley, Jarvis, and Billings, Roger. An Approach to a Philosophy of Social Insurance. P.C.A.S. XXIX, p. 29.

Gagliardo, Domenico. American Social Insurance. Chap. 1.

International Labour Office. Approaches to Social Security. (Studies and reports. Series M. no. 18).

Meriam, L. Relief and Social security. Chaps. 22-24, 26-29, 37.

U. S. Laws, statutes, etc. Compilation of the Social Security Laws.

Williamson, W. R. Death 'n' Taxes. (Reprint from the Health and Accident Underwriters Conference. *Proceedings*, forty-ninth annual meeting, 1950).

——Social Budgeting. P.C.A.S. XXIV, p. 17.

——Some Backgrounds to American Social Security. P.C.A.S. XXX, p. 5.

(2) *Compulsory Automobile Insurance.*

Association of Casualty and Surety Companies. Chart analysis of the automobile liability security laws of the United States and Canada.

Committee to Study Compensation for Automobile Accidents. Report to the Columbia University Council For Research in the Social Sciences. Chap. 2.

Insurance Industry Committee on Motor Vehicle Accidents. Report relating to the State of New York . . . November, 1951.

Kline, G. H. and Pearson, C. O. The Problem of the Uninsured Motorist.

Kulp, C. A. Casualty Insurance. 1942. Chap. 9.

(3) *Cash Disability and Medical Care Insurance.*

Gagliardo, Domenico. American Social Insurance. Chaps. 17-22.

New York (State) Dept. of Labor. Studies in Disability Insurance. (Special bulletin no. 224)

Research Council for Economic Security. Disability Insurance, 1952 (Publication no. 97)

Schwartz, M. J. New York Statutory Disability Benefits Law, Coverage, Rates, and Rating plans. P.C.A.S. XXXVII, p. 57.

(4) *Old Age Assistance and Insurance.*

Gagliardo, Domenico. American Social Insurance. Chaps. 2-5.

(5) *Unemployment Insurance.*

Gagliardo, Domenico. American Social Insurance. Chaps. 9-12.

New York (State) Dept. of Labor. Economic brief in support of the New York Unemployment Insurance Law.

U. S. Dept. of Labor. Comparison of state Unemployment Insurance Laws.

ASSOCIATESHIP: PART IV

SECTION (a). POLICY FORMS AND UNDERWRITING PRACTICE.

The candidate should be familiar with policy provisions, manuals and the bases of exposure used in the respective lines of insurance. Since the manual and policy provisions change from time to time, it is essential to supplement the cited texts and papers by study of the contracts and manuals currently in use. The principal current manuals, with the names of the organizations publishing them, are cited herein. Copies of current insurance contracts must be obtained from a carrier.

Certain of the references encompass some material beyond the scope of this section, such as the determination of manual or class rates and individual risk rating plans. The examination for this section will not reflect such extraneous material.

(1) General.

Kulp, C. A. Casualty Insurance. 1942. Chaps. 3 and 4.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chaps. 5, 6, 13, 14.

Mowbray, A. H. Insurance. 1946. Chap. 5.

(2) Fire Insurance.

Middle Department Association of Fire Underwriters. Rule book.

Mowbray, A. H. Insurance. 1946. Chap. 6.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chaps. 17-22.

(3) Ocean Marine Insurance.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 26.

Winter, W. D. Marine insurance; its Principles and Practices. 1952. Chaps. 5-15.

(4) Inland Marine Insurance.

Inland Marine Insurance Bureau. Forms-rules-rates.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 27.

Rodda, W. H. Inland Marine and Transportation Insurance. 1949. Chaps. 1-19.

(5) Accident and Health Insurance.

Faulkner, E. J. Accident and Health Insurance. Except Chap. 7.

McCahan, David. Accident and Sickness Insurance. Except Chaps. 11-14.

(6) Automobile Insurance.

Kulp, C. A. Casualty Insurance. 1942. Chap. 8.

National Automobile Underwriters Asscociation. Rules, rates, and premiums... fire and transportation, theft, comprehensive, collision and miscellaneous perils . . . New York.

National Bureau of Casualty Underwriters. Automobile casualty manual. Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 29.

(*7*) *Aviation Insurance.*

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 30.

(*8*) *Boiler and Machinery Insurance.*

Kulp, C. A. Casualty Insurance. 1947. Chap. 13.

National Bureau of Casualty Underwriters. Manual of Boiler and Machinery Insurance.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 25.

(*9*) *Burglary, Theft and Robbery Insurance.*

Kulp, C. A. Casualty Insurance. 1942. Chap. 11.

National Bureau of Casualty Underwriters. Manual of burglary, theft and robbery insurance.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 31.

(*10*) *Fidelity and Surety.*

Crist, G. W. Corporate Suretyship. 1950. Except Chaps. 3, 4, 7, 8.

Mackall, L. W. The Principles of Surety Underwriting. 1951.

Surety Association of America. Tables of basic rates for blanket position bonds...

(*11*) *General Liability Insurance.*

Ainley, J. W. Problems in Relation to Contractual Liability Insurance. P.C.A.S. XXV, p. 151.

Kulp, C. A. Casualty Insurance. 1942. Chap. 10.

National Bureau of Casualty and Surety Underwriters. Manual of liability insurance.

Sawyer, E. W. Comprehensive Liability Insurance.

(*12*) *Glass Insurance.*

Kulp, C. A. Casualty Insurance. 1942. Chap. 12.

National Bureau of Casualty Underwriters. Manual of glass insurance.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 25.

(*13*) *Workmen's Compensation Insurance.*

Hobbs, C. W. Workmen's Compensation Insurance. 1939. Chaps. 1-4, 6-10, 12, 13.

Kulp, C. A. Casualty Insurance. 1942. Chaps. 5-7.

National Council on Compensation Insurance. Basic manual of rules, classifications and rates for workmen's compensation and employers' liability.

SECTION (b). GENERAL PRINCIPLES OF RATE-MAKING; CREDIBILITY.

Craig, J. D. The Actuarial Basis for Premiums and Reserves in Personal Accident and Health Insurance. P.C.A.S. XVII, p. 51.

Crist, G. W. Corporate Suretyship. 1950. Chap. 8.

Dorweiler, Paul. Notes on Exposures and Premium bases. P.C.A.S. XVI, p. 319.

Farley, Jarvis. A 1940 view of Non-cancellable Disability Insurance. P.C.A.S. XXVII, p. 43-53, 69-74.

Faulkner, E. J. Accident and Health Insurance. Chap. 7.

Hobbs, C. W. Workmen's Compensation Insurance. 1939. Chaps. 16-18.

Kulp, C. A. Casualty Insurance. 1942. Chap. 18.

Kulp, C. A. The rate making process in Property and Casualty insurance Goals, Techniques, and Limits. (In Law and Contemporary Problems. Regulation of insurance. 1950).

McCahan, David. Accident and Sickness Insurance. Chaps. 11 and 12.

Magee, J. H. General Insurance. 1953. Chap. 12.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chap. 7.

Mowbray, A. H. Insurance. 1946. Chap. 20.

Perryman, F. S. Some Notes on Credibility. P.C.A.S. XIX, p. 65.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chap. 23.

Reference in the above reading to individual risk rating plans and the determination of deductible and excess coverage rates should be ignored.

FELLOWSHIP: PART I

SECTION (a). DETERMINATION OF PREMIUM, LOSS AND EXPENSE RESERVES.

Black, N. C. Method of Setting up Reserve to Cover Incurred but not Reported Loss Liability. P.C.A.S. XIV, p. 9.

Conrod, S. F. Valuation of Non-cancellable Accident and Health Insurance policies. P.C.A.S. XXXII, p. 27.

Craig, J. D. The Actuarial Basis for Premiums and Reserves in Personal Accident and Health Insurance. P.C.A.S. XVII, p. 51.

Informal discussion: Premiums and Loss Reserves for Casualty and Bonding Insurance. P.C.A.S. XXV, p. 366.

Informal discussion: Reserves against the recurrence of an unfavorable loss ratio in the bonding lines. P.C.A.S. XXIII, p. 269.

Insurance Accounting and Statistical Association. Insurance Accounting—fire and Casualty. Chaps. 9-11.

Matthews, A. N. A system of Preparing Reserves on Workmen's Compensation Claims. P.C.A.S. XIV, p. 244.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chap. 9.

Mowbray, A. H. Insurance. 1946. Chap. 24.

New York (State) Workmen's Compensation Board. Workmen's Compensation Tables (3% interest) 1948. (Special bulletin no. 222)

Report of Committee on Compensation and Liability and Loss Expense Reserves. P.C.A.S. XXXV, p. 56, 64.

Report of Committee on Mortality for Disabled Lives. P.C.A.S. XXXII, p. 123.

Roeber, W. F., and Marshall, R. M. An American Remarriage Table. P.C.A.S. XIX, p. 279.

Tarbell, T. F. Incurred but not Reported Claim Reserves. P.C.A.S. XX, p. 275.

Valerius, N. M. On Indeterminate Reserve Tables for Compensation. P.C.A.S. XX, p. 82.

The candidate should have knowledge of the provisions of Sections 72, 74, 219, 326 and 352 of the New York Insurance Law (recodification of 1939 and subsequent amendments) which pertain to unearned premium, loss and loss expense reserves of casualty and surety, and fire companies. The current convention form of annual statement blank for fire and casualty companies sets forth in Schedule "P" the statutory loss reserve requirements for the liability and workmen's compensation lines. This schedule should be studied carefully.

SECTION (b). INSURANCE EXPENSE ANALYSIS AND ACCOUNTING.

The candidate should have an adequate knowledge of the following:

1. General accounting. As a prerequisite to a study of insurance accounting in detail, the candidate should be familiar with the fundamental accounting principles, terms and forms as set forth in standard college texts on the subject. Suggestion for reading:

Tunick, S.B. and Saxe, E. Fundamental Accounting.

2. The purposes, details and sources of the accounts set forth in the current convention form of annual statement blank (with accompanying schedules).
3. National Bureau of Casualty Underwriters. Insurance Expense Exhibit.
4. New York (State) Insurance Dept. Regulation No. 30: uniform classifications of expenses of fire and marine and casualty and

surety insurers, effective January 1, 1949. (The candidate should also be familiar with all amendments to the regulation and official interpretations promulgated by the Uniform Accounting Sub-Committee of the National Association of Insurance Commissioners as found in their proceedings.)

Suggested readings for these topics are as follows:

Insurance Accounting and Statistical Association. Insurance Accounting—Fire and Casualty.

——— ——— Proceedings, 1953. p. 338-363, 398-404, 412-416.

McConnell, M. H. The Expense Study by Size of Risk. P.C.A.S. XXXIX, p. 19.

National Association of Insurance Commissioners. Proceedings, 1953. Report of industry uniform accounting subcommittee appointed to study preferred methods of allocation of specific activities under uniform accounting. Vol. I, p. 236.

Pruitt, D. M. Uniform Accounting—A Study of Regulation. P.C.A.S. XXXVI, p. 22.

Tarbell, T. F. The Combined Fire and Casualty Annual Statement Blank. P.C.A.S. XXXVII, p. 74 and XXXVIII, p. 113.

FELLOWSHIP: PART II

SECTION (a). INDIVIDUAL RISK RATING.

The candidate should study the following rating plans effective in the State of New York and the forms used in the application thereof:

National Bureau of Casualty Underwriters. Automobile liability experience rating plan.

——— ——— Boiler and machinery insurance premium adjustment rating plan.

——— ——— Burglary and glass—individual risk rating plan.

——— ——— Composite rating plan. (Automobile, general liability, burglary, glass)

——— ——— General liability experience rating plan.

——— ——— Retrospective rating plan D—rating supplements for liability lines. Surety Association of America. Fidelity experience rating plan.

The candidate should also study the following rating plans in the workmen's compensation field and the forms used in the application thereof:

National Council on Compensation Insurance. Workmen's compensation experience rating plan.

——— ——— Workmen's compensation retrospective rating plans. (A, B, C, D)

——— ——— National Defense Projects Rating Plan.

In addition the candidate should study the following property insurance rating plans:

Inland Marine Insurance Bureau. Forms-rules-rates (individual risk rating)

National Automobile Underwriters Association. Fleet rating formulae for automobile, fire, theft and collision.

National Board of Fire Underwriters. Standard schedule for grading cities of the United States with references to their fire defenses and physical conditions.

Moore, F. C. Standard universal schedule for rating mercantile risks.

Multiple Location Service Office. Recommended rules and forms for multiple location reporting.

Western Actuarial Bureau. Analytic system for the measurement of relative fire hazard.

The candidate is advised to read the references in the first four books cited below to obtain the general principles underlying individual risk rating, prior to studying the respective plans and the technical articles cited from the *Proceedings*. It should be noted that the general subject of individual risk rating includes the determination of rates for coverages other than full coverage, such as deductible, excess and aggregate stop loss.

Hobbs, C. W. Workmen's Compensation Insurance. 1939. Chaps. 17 and 18.

Kulp, C. A. Casualty Insurance. 1942. Chap. 19.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chap. 8.

Riegel, Robert, and Miller, J. S. Insurance Principles and Practices. 1947. Chaps. 23 and 29.

Bailey, A. L. Workmen's Compensation D-Ratio Revision. P.C.A.S. XXXV, p. 26.

Cahill, J. M. Deductible and Excess coverages, Liability and Property Damage lines other than automobile. P.C.A.S. XXIII, p. 18.

——— ——— Excess Coverage (per accident basis) for Self-insurers: Workmen's Compensation—New York. P.C.A.S. XXVII, p. 77.

Carlson, T. O. An Actuarial Analysis of Retrospective Rating. P.C.A.S. XXVIII, p. 283.

Dorweiler, Paul. Observations on Making Rates for Excess Compensation Insurance. P.C.A.S. XIII, p. 154.

——— ——— On Graduating Excess Pure Premium Ratios. P.C.A.S. XXVIII, p. 132.

——— ——— A Survey of Risk Credibility in Experience Rating. P.C.A.S. XXI, p. 1.

Johnson, R. A. The Multi-split Experience Rating Plan in New York. P.C.A.S. XXVIII, p. 15.

Leslie, W. L., Jr. The National Defense Projects Rating Plan. P.C.A.S. XXXVIII, p. 174.

Perryman, F. S. Experience Rating Plan Credibilities. P.C.A.S. XXIV, p. 60.

——— ——— Possible Values for Retrospective Rating Plan. P.C.A.S. XXXI, p. 5.

Peters, Stefan. Ex-medical Coverage—Workmen's Compensation. P.C.A.S. XXVII, p. 112.

Smith, S. E. Interstate and Overall Rating Plans. P.C.A.S. XXXIV, p. 6.

Uhthoff, D. R. Excess Loss Ratios via Loss Distributions. P.C.A.S. XXXVII, p. 82.

Valerius, N. M. Risk Distributions Underlying Insurance Charges in the Retrospective Rating Plan. P.C.A.S. XXIX, p. 96.

Reference should also be made to the reports cited in Section (a) of Part IV on the examination of rate making organizations by the New York Insurance Department for such information as is contained therein on individual risk rating plans.

SECTION (b). ADVANCED PROBLEMS IN UNDERWRITING AND ADMINISTRATION.

It is strongly recommended that the candidate seek to acquire technical proficiency in the subjects covered under this section by direct discussion, whenever possible, with executives in the various departments of the insurance business. In addition, the candidate should review scientific and professional journals and the proceedings of supervisory bodies or associations.

Illustrative of these materials are the following:

International Association of Industrial Accident Boards and Commissions. Proceedings of the annual meeting.

National Association of Insurance Commissioners. Proceedings.

New York (State) Insurance Department. Annual report of the Superintendent of Insurance. Vol. II, Fire and marine insurance companies; Vol. III, Casualty, surety and miscellaneous insurance companies.

New York (State) Insurance Dept. Preliminary report of Superintendent of Insurance.

The candidate should keep in touch with current developments by reading regularly the New York Journal of Commerce and also at least two general insurance periodicals. Best's Insurance News (Fire and Casualty) for the most recent years should be reviewed for articles relating to underwriting, investments and administration.

The candidate should review all papers in the Proceedings of the Casualty Actuarial Society for recent years which are not cited under the preceding sections and also such material recommended under

Associateship: Part IV, Section (a), as refers to underwriting practice. The following references are indicated for particular attention:

Hobbs, C. W. Workmen's Compensation Insurance. 1939. Chap. 11.

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chaps. 2, 3, 12, 14-19, 21.

Mowbray, A. H. Insurance. 1942. Chaps. 16-19, 21-23, 25, 26.

Blackall, J. C. Stocks and Bonds as Insurance Company Investments. (In: National Association of Insurance Commissioners. Proceedings, 1936. p. 91.)

Blanchard, R. H. Survey of Accident and Health Insurance. (U. S. Social Security Board. Bureau memorandum no. 62).

Cahill, J. M. Multiple Line Underwriting. P.C.A.S. XXXVI, p. 1.

Carlson, T. O. Rate Regulation and the Casualty Actuary. P.C.A.S. XXXVIII, p. 9.

Clarke, John W. Seasonal Fluctuation in Loss Ratios for Automobile coverage. P.C.A.S. XXXVI, p. 63.

Dorweiler, Paul. Policy Limits in Casualty Insurance. P.C.A.S. XX, p. 1.

Informal discussion: Investments of Casualty Insurance Companies. P.C.A.S. XXIV, p. 141.

Insurance Industry Committee on Motor Vehicle Accidents. Report relating to the State of New York.

Johnson, R. A. Comparison of Workmen's Compensation costs. P.C.A.S. XL, p. 10.

Kline, G. H. and Pearson, C. O. The Problem of the Uninsured Motorist.

Report of the Committee on Bases of Exposure for Workmen's Compensation Insurance. P.C.A.S. XXI, p. 200.

Scammon, L. W. Automobile Statistics by "Age of Driver". P.C.A.S. XXXVII, p. 43.

Tarbell, T. F. The Effect of Changes in Values on Casualty Insurance. P.C.A.S. XIX, p. 1.

Thompson, Kenneth. Reinsurance. 1951.

Vanderfeen, C. G. Voluntary Plans for Granting Automobile Bodily Injury and Property Damage Liability Insurance to Risks Unable to Secure It. for Themselves. P.C.A.S. XXVIII, p. 471.

FELLOWSHIP: PART III

SECTION (a). MACHINE METHODS.

Barber, H. T. Mechanized Unit Reporting. P.C.A.S. XXXIII, p. 5.

Insurance Accounting and Statistical Association. Proceedings, 1953. p. 270-276, 329-332.

——— ——— Proceedings, first electronic conference; electronics and its future in the insurance industry. 1953.

——— ——— Panel discussion on electronic machinery. Proceedings, 1953. p. 438.

International Business Machines Corp. Electric punched card accounting machines—principles of operation.

Masterson, N. E. Statistical Methods for Casualty Companies by use of the Eighty Column Hollerith System. P.C.A.S. XVI, p. 288.

Pruitt, C. M. Premium Collections on Punch Cards. P.C.A.S. XXVIII, p. 503.

Report of Committee on New Recording Means and Computing Devices. T.S.A. IV, p. 170.

SECTION (b). ADVANCED PROBLEMS IN INSURANCE STATISTICS.

This section includes reading which covers (1) the planning and use of internal statistical material, and the compilation and presentation of insurance statistics for administrative and rate-making purposes, and (2) sources and uses of external statistics, particularly as they may be required in insurance administration and rate-making.

(1) Internal Statistics.

In addition to the references cited, the candidate should study the various statistical plans used in casualty and property insurance. The plans most widely used, and the organizations publishing them, are listed below:

Bureau of Personal Accident and Health Underwriters. Personal accident statistical plan . . . adopted January 1, 1922 . . . revised January 1, 1931.

——— ——— Personal health statistical plan . . . adopted January 1, 1921 . . . revised January 1, 1931.

Crist, G. W. Corporate Suretyship. 1950. Chap. 7.

Graves, C. H. Fire and Allied Lines Insurance Statistical Plan. P.C.A.S. XL, p. 40.

Hobbs, C. W. Workmen's Compensation Insurance. 1939. Chap. 16.

Inland Marine Insurance Bureau. Forms-rules-rates. (Statistical procedure)

Michelbacher, G. F. Casualty Insurance Principles. 1942. Chaps. 10 and 11.

Multiple Peril Insurance Rating Organization. Statistical plan.

National Association of Independent Insurers. Automobile statistical plan; all coverages.

——— ——— Statistical plans; casualty lines other than automobile.

National Automobile Underwriters Association. Automobile statistical plan for fire, theft, comprehensive, collision and allied coverages.

National Board of Fire Underwriters. Standard classification of occupancy hazards.

——— ——— Actuarial Bureau. Statistical plan for earned premiums and incurred losses.

National Bureau of Casualty Underwriters. Automobile bodily injury and property damage liability statistical plan.

——— ——— Boiler and machinery insurance statistical plan.
——— ——— Burglary insurance statistical plan.
——— ——— Glass statistical plan.
——— ——— Liability statistical plan.
National Council on Compensation Insurance. National Council workmen's compensation statistical plan. Contains Unit statistical plan and Schedule Z for workmen's compensation.
New York (State) Insurance Dept. Classification of fire occupancy hazards; evolution of the uniform statistical plan for classified fire experiences.
Surety Association of America. Standard fidelity, surety and forgery classification code.

The candidate should be familiar with the sources of published insurance statistics, so as to know where to obtain such information when the need arises. The following annual publications constitute a representative list of such sources:

Best, Alfred M., Co. Best's insurance reports (fire and casualty)
——— ——— Best's reproductions of principal schedules from casualty and surety statements.
——— ——— Best's fire and casualty aggregates and averages.
The National Underwriter. Argus casualty and surety chart.
——— ——— Argus fire chart.
The Spectator. The Spectator insurance year book; fire, marine, casualty and surety.
——— ——— Insurance by states.
——— ——— The Spectator handy chart of casualty, surety and miscellaneous insurance companies.
Weekly Underwriter. The insurance almanac.

(*2*) *External Statistics.*

The candidate should endeavor to become acquainted with as many sources of external statistics as possible so as to know where to obtain the necessary information in connection with the solution of problems arising in the casualty and property insurance business. The following is a representative but limited list of such sources:

U. S. Board of Governors of the Federal Reserve System. Federal reserve bulletin. Washington, U. S. Govt. Print. Off. Issued Monthly
Schmeckebier, Laurence. The statistical work of the national government.
U. S. Bureau of Foreign and Domestic Commerce . . . Distribution cost accounting. for wholesaling. (Domestic commerce series, no. 106)
U. S. Bureau of Labor Statistics. Methods of procuring and computing statistical information of the Bureau of Labor Statistics. (Bureau of Labor Statistics bulletin no. 326)

U. S. Bureau of Budget. Office of Statistical Standards. Statistical services of the United States government.

U. S. Bureau of the Census. Statistical abstract of the United States. Washington, Dept. of Commerce, Bureau of the Census. Issued annually.

U. S. Dept. of Commerce. Survey of current business. Washington, U. S. Govt. Print. Off. Issued monthly.

FELLOWSHIP: PART IV

SECTION (a). ADVANCED PROBLEMS IN RATE-MAKING.

Allen, E. S. Notes of the Effect of Wage Changes on Workmen's Compensation Premiums and Losses. P.C.A.S. XXXIX, p. 59.

Atkiss, H. C. Fire Insurance Rate-making. p. 1-23.

Backman, Jules. Surety Rate-making.

Elliott, G. B. The Making of Workmen's Compensation Rates as Illustrated by the 1951 Pennsylvania Rate Revision. P.C.A.S. XXXVIII, p. 141.

Flynn, B. D. Interest Earnings as a Factor in Casualty Insurance Rate-making. P.C.A.S. XIV, p. 285.

Hunter, Arthur and Thompson, Allen B. Hospital Service Insurance. T.A.S.A. XLIV, p. 5.

Informal discussion: Individual Accident and Sickness. T.S.A. V, p. 170.

Johnson, R. A., Jr. New York Compensation Rate-making. P.C.A.S. XXXV, p. 6.

Longley-Cook, L. H. Problems of Fire Insurance Rate-making. P.C.A.S. XXXVIII, p. 94.

McConnell, M. H. A Casualty Man Looks at Fire Insurance Rate-making. P.C.A.S. XXXVIII, p. 103.

Morrill, T. C. Fire Insurance Terms and Discounts.

National Association of Insurance Commissioners. Committee on Fire and Marine Insurance. Second report of the special sub-committee of the Fire and Marine Committee regarding underwriting profit or loss and the Commissioners 1921 standard profit formula, October 9, 1947 (McCullough report). Proceedings, 1948. p. 72.

National Board of Fire Underwriters. Committee on Laws. Statement in reply to report by Mr. Roy McCullough regarding underwriting profit or loss and commissioners' 1921 standard profit formula, June 3, 1948. 126p.

Thaler, A. M. Group Major Medical Expense Insurance, T.S.A. III, p. 429.

Important material on the determination of manual rates is contained in the reports on the examination of the following rate-making organizations by the New York Insurance Department which appear at intervals of three to five years:

Compensation Insurance Rating Board (New York)

Mutual Casualty Insurance Rating Bureau

National Bureau of Casualty Underwriters
Surety Association of America
Inland Marine Insurance Bureau
National Automobile Underwriters Association
New York Fire Insurance Rating Organization.

Copies of the above reports are in the library of the Society.

In addition, reference should be made to the four latest years of the Proceedings of the National Association of Insurance Commissioners.

FELLOWSHIP: PART IV

SECTION (b). CURRENT INSURANCE PROBLEMS.

The examination covering this section will contain a list of several subjects of current interest and importance in the industry, and the candidate will be asked to select one and write a short essay on it. There will be a choice between casualty and property subjects.

The candidate should keep in touch with current insurance problems by reading regularly the New York Journal of Commerce and also at least two general insurance periodicals, such as Best's Insurance News (Fire and Casualty Edition) and the Insurance Law Journal. He should likewise review the latest issues of scientific and professional journals and the most recent proceedings of supervisory bodies or associations, which are listed in part in Part II, Section (b).

This program of reading should be supplemented as much as possible by discussions with executives in the various departments of the insurance business.

INDEX TO READINGS

Atkiss, H. C. Fire Insurance Rate-making.—Part 1. New York City risks. Albany, New York State Insurance Department, 1950. 318p.

Backman, Jules. Surety Rate-making. New York, Surety Association of America, 1948. 492p.

Badger, R. E., and Guthmann, H. G. Investment Principles and Practices. 4th ed. New York, Prentice-Hall, Inc., 1951. 858p.

Blanchard, Ralph H. Survey of Accident and Health insurance. Bulletins 1-6. Washington, Federal Security Agency, Social Security Board, Bureau of Research and Statistics, 1945. 2v.

Boehmler, E. W. and others. Financial Institutions. Chicago, R. D. Irwin, Inc., 1951. 650p.

Committee to Study Compensation for Automobile Accidents. Report to the Columbia University Council for Research in the Social Sciences. Philadelphia, Press of International Publishing Company, 1932. 300p.

Conyngton, T., and Bergh, L. O. Business Law. 4th ed. New York, Ronald Press, 1949. 866p.

Crist, G. W. Corporate Suretyship. 2d ed. New York, McGraw-Hill, 1950. 441p.

Faulkner, E. J. Accident and Health insurance. New York, McGraw-Hill, 1940. 366p.

Freeman, Henry. Mathematics for Actuarial Students. Cambridge, Eng., Published for Institute of Actuaries at the University Press, 1939. 339p. (Part II, Finite difference, probability and elementary statistics)

Gagliardo Domenico. American Social Insurance. New York, Harper., 1949. 671p.

Hall, H. S., and Knight, S. R. Higher Algebra. 4th ed. London, Macmillan, 1918. 556p.

Hobbs, C. W. Workmen's Compensation Insurance, including employers' liability. 2d ed. New York, McGraw-Hill, 1939. 707p.

Hoel, Paul G. Introduction to Mathematical Statistics. New York, 1947. 258p.

Insurance Accounting and Statistical Association. Insurance Accounting—Fire and Casualty. Philadelphia, The Spectator, 1954. 351p.

International Labour Office. Approaches to Social Security. Montreal, The Office, 1942. 100p. (Studies and reports, series M—Social insurance no. 18)

Kline, G. H. and Pearson, C. O. The Problem of the Uninsured Motorist; a report to Superintendent of Insurance Bohlinger. Albany, New York State Insurance Dept., 1951. 174p.

Kulp, C. A. Casualty Insurance. New York, Ronald Press, 1942. 680p.

Larson, R. E. and Gaumnitz, E. A. Life Insurance Mathematics. New York, Wiley, 1951. 184p.

Law and Contemporay Problems. Regulation of Insurance. Durham, N. C., School of Law, Duke University, 1950. p.471-629.

Mackall, L. W. The Principles of Surety Underwriting. 4th ed. Philadelphia. The Spectator, 1951. 280p.

Magee, John H. General Insurance. 4th ed. Homewood, Ill., Richard D. Irwin, 1953. 924p.

McCahan, David. Accident and Sickness insurance. Philadelphia University of Pennsylvania Press, 1954.

Meriam, L. Relief and Social security. Washington, Brookings Institute, 1946. 912p.

Michelbacher, G. F. Casualty Insurance Principles. 2d ed. New York McGraw-Hill, 1942. 705p.

Moore, F. C. Standard Universal Schedule for Rating Mercantile risks. New York, Universal Schedule Committee, 1902, 141p.

Morrill, T. C. Fire Insurance Terms and Discounts; a report to Robert Dineen, State of New York Insurance Department, 1950, submitted to Fire and Marine Insurance Committee, National Association of Insurance Commissioners. Albany, New York State Insurance Dept., 1950.

Mowbray, A. H. Insurance; Its Theory and Practice in the United States. 3d ed. New York, McGraw-Hill, 1946. 694p.

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