

REVISION OF RATES APPLICABLE TO A CLASS OF PROPERTY FIRE INSURANCE

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THE OBJECTIVE AND DEFINITION OF TERMS USED

Many volumes have been written covering the general subject of property insurance, with emphasis on underwriting, claims settlement, and contractual relationships, but little has been written on the processes involved in rating fire insurance and the subsequent revision of these rates. For the most part only a relatively few informed people connected with insurance departments, rating bureaus, and statistical associations have been in a position to discuss the validity of the methods used in fire insurance rate making.

During the past few years, due to this lack of information, fire insurance rates have been the subject of controversy. The controversy has centered largely around the question of adequacy or inadequacy of the rates as affected by deviations from the prescribed bureau plans.

Objective.—It is to be hoped that an analytical study of the processes involved in a revision of the fire insurance rates for a given class of property will afford enough information from which those who are somewhat informed can draw reasonable conclusions as to the propriety of the principles involved, to the end that those having actuarial inclinations may be challenged to make a deeper investigation into the field of fire rating than is being attempted in this particular study. It is to be noted that the procedure outlined in this study is that which is followed by the bureaus operating in certain midwestern states such as Ohio, Indiana, Michigan, and Kentucky and may differ to some degree from the methods used in the Eastern part of the country. No attempt has been made to cover any differences which may exist as between these different areas.

Since the main problem of ratemaking is the adequacy of the rates, this naturally leads to a discussion of the statistical basis and to questions of discrimination between various classes of risks.

Effective January, 1947, a revised Fire Statistical Plan was adopted. This Plan is generally known as the *Standard Classification of Occupancy Hazards* and has been approved by the National Association of Insurance Commissioners. The Plan contains 115 occupancy classes, which in turn are collected into five major groupings of risks: residential, mercantile, non-manufacturing, manufacturing, and sprinklered.

For purposes of this study the three largest occupancy classes contained in Group I (Residential) of the Plan have been chosen. These classes are as follows:

Class No. 009—Household contents of Dwellings, when contents are written on separate policy.

Class No. 019—Dwelling—Buildings and Contents, when both written on same policy.

Class No. 029—Dwellings—Buildings only when written on separate policy.

These three classes apply entirely to class rated risks, whereas most of the other classes in the Plan are for specifically rated risks.

Fire loss experience is reported in accordance with this class which in turn forms the basis of adjustment by classes. Thus the classified data for the adjustment of the fire loss cost of insurance rates are provided. These fire loss experience data may be used in determining a statewide rate level as well as for classes of risks.

While such expressions as earned premiums, incurred losses, and expense ratio are generally familiar, there are certain expressions peculiar to fire insurance which should be mentioned.

Catastrophe Allowance.—A loading in the rate to compensate for the effects which a conflagration might have upon the normal or expected loss experience.

Protection Classification.—One of a series of categories established by the National Board of Fire Underwriters to identify certain types of risks by kinds of construction in combination with certain town gradings for statistical identification.

Occupancy Class.—One of a series of categories established by the National Board of Fire Underwriters to identify certain types of risks by kinds of occupancy for statistical identification.

The method followed in this study is one that is currently used by some of the midwestern fire rating bureaus in making class rate adjustments and for the most part reflects the effects of the loss experience on the rates.

RATING METHODS

Fire Insurance Rates are separated into two main categories: Class Rates and Specific Rates.

Class Rates.—Class rates apply to risks that are of substantially the same general character, and where minor differences in exposure can be ignored without any material increase in risk occurring. Such risks are classified as to construction, occupancy, and fire protection and include dwellings, small apartments, and sometimes churches, clubs, schools, farms, small mercantiles, and certain special risks.

Dwellings are universally class rated and may make up from 50% to 80% of the number of insurable risks in a town or city. They are, however, mostly small risks and therefore may not produce more than 10% to 25% of the premium volume.

Specific Rates.—A specific rate applies to an individual risk that is not subject to class rates; it is the rate for a particular building, or the rate for the contents of a certain tenant. The main difference in determining specific rates, as opposed to class rates, is the procedure involved. The determination of each specific rate requires an inspection for hazards that may create conditions favorable to fire damage. The deficiencies and hazards are evaluated in accordance with sets of standards, with allowances for protection devices, and a rate for a

specific building and rates for each occupant of this building is formulated.

Statistical Accumulation.—The National Board of Fire Underwriters collects fire insurance premium and loss statistics on a state by state basis from all stock companies and files consolidated reports of these statistics with state insurance departments and rating bureaus for their use in connection with making rate revisions.

In addition to the National Board there are two other statistical organizations which accumulate and report fire insurance statistics to the insurance departments, namely; the Mutual Insurance Advisory Association and the National Association of Independent Insurers. These statistics are not used for rating purposes.

Throughout the country there are several regional advisory organizations which co-ordinate the functions of the rating bureaus in their respective jurisdictions. These organizations afford advice in connection with the development of new coverages, changes in coverages, and changes in rate levels.

Fire rates are made in most states by rating bureaus which have been established by the stock companies. State laws require that these bureaus furnish their services to any other companies desiring them. A few states have bureaus established by statute and all companies operating in such states are required to belong to them.

Rate Make-up.—Fire insurance rates are expressed in terms of the amount of dollars or cents charged for \$100 valuation of property insurance for a period of one year. These rates should result in sufficient aggregate premiums to provide for (1) losses, (2) expenses of conducting business, (3) an allowance for catastrophe, and (4) a reasonable profit. Adjustment expense is included in the operating expenses and not as a part of losses.

While fire insurance rates are promulgated on a statewide basis and follow the same basic pattern as to development, certain differences exist between states as to the proportionment of the rate for losses, expenses, profit, and catastrophe as well as to the application of credits applicable to specifically rated risks. The following formula most nearly reflects the pattern which is in use in the State of New York and the midwestern states mentioned above:

Loss Payment	.475
Underwriting Expense	.465
Conflagration Allowance	.010
Profit (Underwriting)	.050

Underwriting profit as referred to in this formula shall be determined with the use of direct earned premiums and incurred loss and incurred expense figures without regard to reinsurance.

This formula for the most part reflects the expense and loss experience of the stock companies reporting to the National Board, and the profit factor (5% profit plus 1% catastrophe) follows the 1921 Profit Formula of the National Board as modified in the 1949 Subcommittee Report of the N.A.I.C. In connection with adjusting rates, it is assumed that no adjustment shall be made if the indicated profit is

within a tolerance zone of two percentage points above or below such 6% factor.

ACCUMULATION OF EXPERIENCE

In order to assure the accumulation of experience statistics, the Standard Classification requires that the companies furnish annually to the various statistical agencies premium and loss reports of written premiums by occupancy-construction classification and further division by term of policy. These data for premiums written are classified according to term of policy, to be converted to premiums earned for each class of risk and construction group through the application of specially computed fractions or factors.

Annual Call.—This detailed report of loss experience is called the Annual Calendar Year Report and is furnished to the companies' statistical agents. In this report, written premium and paid loss detail is shown by occupancy class and construction-protection class. Such a report would show the following information for one of the residential classes:

<i>Occupancy Class</i>	<i>Construction- Protection</i>	<i>Written Premium</i>	<i>Paid Losses</i>
029	1	\$554,250	\$114,385
029	2	408,100	72,427
029	3	67,039	14,587
029	4	57,165	19,148

This is direct experience. (Gross of reinsurance.) To attempt to use loss experience accumulated on a net basis would present a rather unreal picture in instances where changes have occurred in the reinsurance program during the period covered due to the fact that reinsurance cannot be regulated and further, since the rates are intended to cover the full effects of the losses on the class of business to which they are applicable, it is only proper that direct experience be used.

Pro-rata Earned Premium.—To obtain the pro-rata earned premium to be used for each class of business involved, requires that each transaction be identified as to the policy term and spread by year written and then factored on the basis of five year premium being earned—1/10, 1/5, 1/5, 1/5, 1/5, and 1/10 each year. Three year business—1/6, 1/3, 1/3, and 1/6 each year. One year business—1/2 and 1/2 each year. This array applied in a given year would appear as follows:

Class	Construction- Protection	Year of Writing	Term	Written Premium	Factor	1955 Earned Premium
029	1	1950	5	\$139,643	.1000	\$13,964
029	1	1951	5	147,312	.2000	29,462
029	1	1952	5	121,137	.2000	24,227
029	1	1952	3	182,149	.1667	30,358
029	1	1953	5	139,800	.2000	27,960
029	1	1953	3	210,175	.3333	70,058
029	1	1954	5	138,849	.2000	27,770
029	1	1954	3	210,177	.3333	70,059
029	1	1954	1	63,110	.5000	31,555
029	1	1955	5	188,556	.1000	18,856
029	1	1955	3	275,518	.1667	45,919
029	1	1955	1	90,176	.5000	45,088

1955 Earned Premium \$435,276

Incurring Losses.—As stated previously, incurred losses are to be used to measure the loss severity. Under the National Board Plan incurred losses are available at present for four years, but most bureaus have used the usual formula, net losses paid for period covered, plus outstanding losses at end of period, minus outstanding losses at beginning of period. Earned premium and incurred losses for a five year period must be set up for each occupancy class subject to adjustment and separated by construction and protection group.

Class	Construction- Protection	Earned Premium	Incurred Losses
029	1	\$1,706,717	\$425,989
029	2	1,351,309	329,181
029	3	202,033	53,819
029	4	193,501	51,503

Adjustment of Earned Premiums.—Before loss ratios are calculated, earned premium must be adjusted to current rate levels. This requires that an accurate record be maintained of all rate changes made during the period under study.

The following example will illustrate what is involved in making these adjustments:

A rate study is being undertaken based on the loss experience of the five year period, 1951-1955. For Class 029-frame protected dwellings (construction-protection group 1)—a 3% rate increase was effective January 1, 1952 and a 4% rate increase was effective October 1, 1955. All premium written before October 1, 1955 must be adjusted. The premium written in 1951 would have to be adjusted for both rate increases. This results in a 7% increase in written premium for 1951, and a 4% increase for 1952, 1953, and 1954, and a 3% increase for 1955.

The following table shows the appropriate adjustments to be made:

Year	Class	Construction- Protection	Written Premium	Percent of Adjustment	Adjusted Written Premium
1951	029	1	\$275,720	7	\$295,020
1952	029	1	319,138	4	331,904
1953	029	1	421,087	4	437,930
1954	029	1	412,136	4	428,621
1955	029	1	554,250	3	570,878
Five Year Total			\$1,982,331		\$2,064,353

The relationship between the actual and the adjusted written premium for the five years combined provides a factor to adjust the five year earned premium to current rate levels. The following formula would apply:

$$\frac{(\text{Adjusted Written Premium})}{(\text{Actual Written Premium})} \times \frac{\text{Actual Earned Premium}}{\text{Premium}} = \frac{\text{Earned Premium}}{\text{Adjusted to Current Rate Levels}}$$

Loss Ratio.—Finally then, loss ratios can be computed by dividing incurred losses by the adjusted earned premiums. These loss ratios are ready to be inserted into the rate formula:

$$\frac{\text{Incurred Losses}}{\text{Adjusted Earned Premium}} = \text{Loss Ratio}$$

Expenses.—Although the fire rate adjustment is not based on expenses, expenses nevertheless play a part in determining the allowable loss ratio .475 as reflected in the formula referred to previously in this study. Some states use a 50% allowable loss ratio and some others a different one. This formula reflects for the most part the industry stock company loss and expense experience as reflected in the Loss and Expense Ratios as compiled from insurance expense exhibits as filed with the New York Insurance Department.

Some explanation of the treatment of expenses would seem in order at this time.

Because of the intrinsic part reinsurance plays in the fire insurance operation, net expenses are more indicative of operating costs. Whereas reinsurance recoveries for losses are unpredictable, expenses involved in reinsurance transactions are explicit enough to justify their inclusion.

Countrywide expenses for the most part are used for fire rating purposes. Some few states use taxes and commissions on a state basis and some states use state expenses which probably do not vary greatly from countrywide expenses.

Although fire rates are based primarily on historical data, it is nonetheless important that the expense ratio be indicative of future

expenses. It follows, then, that the most recent year's expenses would probably be more suitable than expenses over the last two, three, or more years period. Serious consideration should also be given to future changes which would affect expenses. It would be misleading and perhaps even dangerous to attempt to say explicitly what technique or period of time should be used to obtain the premium and expense data involved in calculating an expense ratio.

Rating bureaus, faced with the impossible situation of not being able to consider plans and anticipated expenses of their member companies, are forced to rely on expense data over the immediate past five years. This information is available from the New York Insurance Department.

The logic and technique involved after the basic information is made available becomes more confining. For example, it is generally agreed that it is not practical to develop a statutory expense ratio where all expenses are related to earned premium. This exaggerated illustration will show why:

*A company beginning its property fire operation in 1955 writes \$200,000 premium during its first year. However, only \$50,000 premium is earned during the year. If a 25% commission is paid, the commission expense alone equals the earned premium.

It is obvious from this illustration that relating commission expense to earned premium is misleading. While it is true that the distortion has been magnified, nevertheless this same type distortion is a problem to many fast-growing insurance companies. To establish an expense ratio suitable for the rate formula, therefore, it is necessary to consider each classification of expense individually and decide whether it should be related to written or earned premium.

Loss adjustment expenses incurred should be related to earned premium because losses are incurred during the term in which the premium is being earned.

As has been shown in the above illustration, (*), commission and brokerage expenses incurred should be related to written premium.

Other acquisition, field supervision, and collection expenses incurred and general expenses incurred both contain elements that are more appropriately related to written premium. On the other hand, the rest of the expenses in this category are more appropriately related to earned premium. A more conservative approach for the expanding company would be to relate these expenses to earned premium.

Taxes, licenses, and fees incurred are paid on the basis of written premium for the most part; thus these expenses are related to written premium.

Here is an example of how an expense ratio computed on this basis would appear:

Net Written Premium	\$27,481,443	
Net Earned Premium	23,648,225	
*Loss Adjustment Expenses Incurred	1,921,776	8.1%
**Commission and Brokerage Expenses Incurred	(493,644)	(1.8%)
*Other Acquisition, Field Supervision, and Collection Expenses Incurred	4,755,206	20.1%
*General Expenses Incurred	5,260,898	22.2%
**Taxes, Licenses, and Fees Incurred	932,828	3.4%
Expense Ratio		52.0%
*Ratio to Net Earned Premium		
**Ratio to Net Written Premium		

In order to illustrate what has been covered so far in this portion of the study, a series of tables showing actual experience for the residential Class 029 has been developed. To be more in line with present day rating bureau practices, expenses for the five year period, 1951-1955, are shown. No attempt has been made to consider anticipated developments bearing on the expense picture.

TABLE I

Direct Written Premium and Paid Losses
for Occupancy Class 029
Construction and Protection Groups 1-4
Years 1951-1955 and Combined

Class	Const.- Prot.	<u>1951</u>		<u>1952</u>		<u>1953</u>	
		Written Premium	Paid Losses	Written Premium	Paid Losses	Written Premium	Paid Losses
029	1	\$3,295,152	\$664,180	\$3,723,547	\$1,027,224	\$4,832,931	\$1,011,049
	2	3,241,324	601,261	3,573,779	799,536	4,658,253	698,780
	3	346,866	34,613	411,300	56,238	560,765	166,542
	4	423,328	47,395	488,182	39,180	655,107	123,354
	Total	\$7,306,670	\$1,347,449	\$8,196,808	\$1,922,178	\$10,707,056	\$1,999,725
Class	Const.- Prot.	<u>1954</u>		<u>1955</u>		<u>Combined Years</u>	
		Written Premium	Paid Losses	Written Premium	Paid Losses	Written Premium	Paid Losses
029	1	\$4,691,506	\$1,052,453	\$6,246,690	\$1,281,378	\$22,789,826	\$5,036,284
	2	4,376,318	1,486,595	5,247,732	881,730	21,097,046	4,467,902
	3	534,420	160,637	730,134	155,131	2,583,485	573,161
	4	595,931	183,219	721,776	259,603	2,884,324	652,751
	Total	\$10,198,175	\$2,882,904	\$12,946,332	\$2,577,842	\$49,355,041	\$10,730,098

TABLE I reflects written premium and paid losses as contained in annual reports to a statistical agent, covering a five year period, 1951 through 1955, for occupancy Class 029 (dwellings, and includes a portion of Class 019 covering dwellings and contents)

TABLE II

Earned Premium and Incurred Loss Statistics
Years 1951-1955 Used to Arrive at Factor

	<u>Written Premium</u>	<u>Earned Premium</u>	<u>Paid Losses</u>	<u>Incurred Losses</u>
1951	\$17,232,421	\$14,471,410	\$4,902,979	\$4,899,828
1952	19,076,963	16,261,932	7,221,197	6,618,526
1953	23,761,125	19,245,504	6,464,635	6,376,314
1954	23,309,997	21,520,416	7,748,783	7,962,982
1955	27,334,299	23,822,248	7,615,891	8,182,120
Total	\$110,714,805	95,321,510	33,953,485	34,039,770
Factor		.8609644392		1.00254127

This table (II) indicates the relationship between written and earned premium on a statewide basis for the five year period, 1951-1955. The relationship between paid and incurred losses for this period is also shown, since the beginning pending (12-31-50) is not available in the necessary detail.

The earned premium factor is arrived at by dividing the five year earned premium by the five year written premium. The incurred loss factor is arrived at by dividing the five year incurred losses by the five year paid losses.

TABLE III

STATEWIDE DIRECT EARNED PREMIUM AND INCURRED
LOSSES FOR OCCUPANCY CLASS 029
CONSTRUCTION AND PROTECTION GROUPS 1-4
COMBINED YEARS 1951-1955

<i>Class</i>	<i>Construction- Protection</i>	<i>Earned Premiums</i>	<i>Losses Incurred</i>
029	1	\$19,621,230	\$5,049,083
	2	18,164,116	4,479,256
	3	2,224,289	574,618
	4	2,483,300	654,410
	Total	\$42,492,935	\$10,757,367

This table (III) shows the earned premiums and incurred losses for Class 029, for which rates are being adjusted. The experience reflected in this table is the product of the earned premium and incurred loss factors shown in TABLE II times the written premium and paid losses shown in TABLE I.

This completes the conversion of the written premium and paid loss experience to an earned premium and incurred loss basis.

TABLE IV

RATE CHANGES FOR CLASS 029
1951-1955

1. Frame protected rates increased average of 3% effective January 1, 1952.
2. Brick protected rates decreased average of 5% effective July 1, 1953.
3. Frame unprotected rates increased average of 4% effective January 1, 1954.
4. Brick unprotected rates decreased average of 3% effective July 1, 1954.
5. Frame protected rates increased 4% effective October 1, 1955.

This table (IV) reflects the percentage effects of hypothetical rate adjustments over the past five years. It is necessary to adjust the earned premiums to reflect current rate levels before calculating loss ratios.

TABLE V

Adjustment of Actual Written Premium to Current Rate Levels

<u>Class</u>	<u>Const.- Prot.</u>	<u>Year</u>	<u>Act. W.P.</u>	<u>Factor</u>	<u>Adj. W.P.</u>	<u>Ratio of Adj. to Act.</u>	
029	1	1951	\$3,295,152	1.070	\$3,525,813	1.0416	
		1952	3,723,547	1.040	3,872,489		
		1953	4,832,931	1.040	5,026,248		
		1954	4,691,506	1.040	4,879,166		
		1955	6,246,690	1.030	6,434,091		
		Total	\$22,789,826		\$23,737,807		
	2	1951	\$3,241,324	1.040	\$3,370,977		1.0218
		1952	3,573,779	1.040	3,716,730		
		1953	4,658,253	1.040	4,844,583		
		1954	4,376,318	1.000	4,376,318		
		1955	5,247,732	1.000	5,247,732		
		Total	\$21,097,406		\$21,556,340		
	3	1951	\$346,866	.950	\$329,523		.9799
		1952	411,300	.950	390,735		
		1953	560,765	.975	546,746		
		1954	534,420	1.000	534,420		
1955		730,134	1.000	730,134			
	Total	\$2,583,485		\$2,531,558			
4	1951	\$423,328	.970	\$410,628	.9806		
	1952	488,182	.970	473,537			
	1953	655,107	.970	635,454			
	1954	595,931	.985	586,992			
	1955	721,776	1.000	721,776			
	Total	\$2,884,324		\$2,828,387			

TABLE V shows the manner of adjusting written premium to current rate levels and shows the relationship of actual written (TABLE I) to adjusted premium.

Adjusted Written Premium = Ratio of Adjusted to Actual

TABLE VI

Earned Premium Adjusted to Current Rate Levels

Incurred Losses and Loss Ratio
1951-1955

<u>Class</u>	<u>Const.- Prot.</u>	<u>Actual Earned Premium</u>	<u>Factor</u>	<u>Adjusted Earned Premium</u>	<u>Losses Incurred</u>	<u>Loss Ratio</u>
029	1	\$19,621,230	1.0416	\$20,437,473	\$5,049,083	24.7
	2	18,164,116	1.0218	18,560,094	4,479,256	24.1
	3	2,224,289	.9799	2,179,581	574,618	26.4
	4	2,483,300	.9806	2,435,124	654,410	26.9
	Total	\$42,492,935		\$43,612,272	\$10,757,367	24.7

This table (VI) shows the process by which the adjusted earned premium is obtained, that of multiplying the earned premium from TABLE III by the factors shown in TABLE V.

DETERMINATION OF NEED FOR REVISION

In the previous portion of this study, it was shown how the loss and expense ratios are established. It was necessary to determine the loss ratio for each statistical subdivision, i.e., each construction-protection group within the occupancy Class 029. Only one expense ratio was used.

These ratios, then, along with the conflagration allowance and profit percentage provide all that is needed for establishing the percent of change needed to bring the rate in line with the actual experience.

Determination of Amount of Change.—The percent of the premium dollar intended for conflagration allowance and profit are, of course, predetermined by industry practice or by individual companies, and a rate change would not affect these percentages. Similarly, the expense ratio will be only partially affected by a rate change since commissions and taxes are paid as a percentage of premium. Therefore, by adjusting the rate we are aiming at changing only the loss ratio.

According to the formula which is set forth in this paper, the allowable loss ratio is .475. It is obvious that any substantial deviation from this ratio would necessitate a rate change but when the actual loss ratio differs only slightly from the permissible it is necessary to apply some arbitrary rule to "draw the line." A common practice is to make a rate adjustment only if the actual loss ratio differs from the permissible by two or more percentage points. Therefore, with a 47.5% permissible loss ratio, a rate adjustment would not be made unless the actual ratio is (1) 45.5% or less or (2) 49.5% or more.

TABLE VII
DETERMINATION OF NEED FOR RATE CHANGE

<i>Class</i>	<i>Const.- Prot.</i>	<i>Permissible Loss Ratio</i>	<i>Actual Loss Ratio</i>	<i>Rate Change</i>
029	1	45.5%-49.5%	24.7%	Rate Decrease Indicated
029	2	45.5%-49.5%	24.1%	Rate Decrease Indicated
029	3	45.5%-49.5%	26.4%	Rate Decrease Indicated
029	4	45.5%-49.5%	26.9%	Rate Decrease Indicated

TABLE VII shows the actual loss ratios for Class 029 and indicates whether or not a rate change should be made.

CALCULATING AMOUNT OF CHANGE

To calculate the amount of adjustment to be made, it is only a matter of comparing the permissible loss ratio for each class and protection group combination to the actual loss ratio. This can be done by dividing the actual loss ratio by the permissible and apply-

ing the resulting factor to each rate involved in the particular classification. If, for example, the experience indicates a 5% increase for Class 029, construction-protection code 1 (Dwellings—Buildings only—frame protected,) it would be necessary to apply the 5% increase to the rates for the following Class 029 combinations :

<i>Class of Bldg.</i>	<i>Town Class</i>	<i>No. of Fam.</i>	<i>Occ. Class</i>	<i>Const.-Prot.</i>	<i>Rate</i>
Frame approved roof	1 to 4	1 to 2	029	1	.12
Frame approved roof	1 to 4	3 to 4	029	1	.14
Frame approved roof	5 and 6	1 to 2	029	1	.13
Frame approved roof	5 and 6	3 to 4	029	1	.15
Frame approved roof	7 and 8	1 to 2	029	1	.15
Frame approved roof	7 and 8	3 to 4	029	1	.17
Frame unapproved roof	1 to 4	1 to 2	029	1	.16
Frame unapproved roof	1 to 4	3 to 4	029	1	.18
Frame unapproved roof	5 and 6	1 to 2	029	1	.17
Frame unapproved roof	5 and 6	3 to 4	029	1	.19
Frame unapproved roof	7 and 8	1 to 2	029	1	.19
Frame unapproved roof	7 and 8	3 to 4	029	1	.21

Due to the fact that the rates consist of two digits only, the 5% increase may not actually change some of the rates. Moreover, the basic rating structure already in existence would normally not be disturbed. That is, the relationship between the rates for the various construction, protection, and number of family combinations is maintained.

TABLES VIII, IX, X and XI which follow, show the adjustments made in the rates for each construction-protection group combination. From these tables, it can be determined if there is a 2% plus or minus variance from the allowable loss ratio of 47.5% which would necessitate an adjustment.

The proposed rate for each group needing adjusting is developed by dividing the actual loss ratio by the permissible loss ratio of 47.5% and multiplying the result by the current rate.

TABLE XII reflects an array of the proposed rate structures for all the Class 029 groups of business. The purpose of this table is to determine if the construction-protection relationship has been maintained throughout. For instance, had the loss ratio for frame buildings been considerably lower than brick buildings, a lower rate for frame buildings might have resulted which would be inconsistent with the policy of maintaining the basic rate structure.

TABLE VIII

Class 029 Brick Protected Approved and Unapproved Roof
 Business Divided by Town Class and Number of Families
 Showing Current Rates and Proposed Rates

<u>Class</u>	<u>Actual Loss Ratio</u>	<u>Permissible Loss Ratio</u>	<u>Factor (Actual Loss Ratio ÷ 47.5%)</u>	<u>Type of Roof</u>	<u>Town Class</u>	<u>No. of Families</u>	<u>Current Rate</u>	<u>Factor X Current Rate</u>	<u>Proposed Rate</u>
029	26.4%	45.5%-49.5%	.56	Approved	1 to 4	1 and 2	.08	.045	.05
	"	"	"	"	1 to 4	3 and 4	.10	.056	.06
	"	"	"	"	5 and 6	1 and 2	.09	.050	.05
	"	"	"	"	5 and 6	3 and 4	.11	.062	.06
	"	"	"	"	7 and 8	1 and 2	.11	.062	.06
	"	"	"	"	7 and 8	3 and 4	.13	.073	.07
	"	"	"	Unapproved	1 to 4	1 and 2	.12	.067	.07
	"	"	"	"	1 to 4	3 and 4	.14	.078	.08
	"	"	"	"	5 and 6	1 and 2	.13	.073	.07
	"	"	"	"	5 and 6	3 and 4	.15	.084	.08
	"	"	"	"	7 and 8	1 and 2	.15	.084	.08
	"	"	"	"	7 and 8	3 and 4	.17	.095	.10

This table (IX) indicates the process whereby the proposed rate is developed.

47.5% = Permissible Loss Ratio

(Actual Loss Ratio ÷ Permissible Loss Ratio) X Current Rate = Proposed Rate.

TABLE IX

Class 029 Frame Protected Approved and Unapproved Roof
 Business Divided by Town Class and Number of Families
 Showing Current Rates and Proposed Rates

<u>Class</u>	<u>Actual Loss Ratio</u>	<u>Permissible Loss Ratio</u>	<u>Factor (Actual Loss Ratio+47.5%)</u>	<u>Type of Roof</u>	<u>Town Class</u>	<u>No. of Families</u>	<u>Current Rate</u>	<u>Factor X Current Rate</u>	<u>Proposed Rate</u>
029	24.7%	45.5%-49.5%	.52	Approved	1 to 4	1 and 2	.12	.062	.06
	"	"	"	"	1 to 4	3 and 4	.14	.073	.07
	"	"	"	"	5 and 6	1 and 2	.13	.068	.07
	"	"	"	"	5 and 6	3 and 4	.15	.078	.08
	"	"	"	"	7 and 8	1 and 2	.15	.078	.08
	"	"	"	"	7 and 8	3 and 4	.17	.088	.09
	"	"	"	Unapproved	1 to 4	1 and 2	.16	.083	.08
	"	"	"	"	1 to 4	3 and 4	.18	.094	.09
	"	"	"	"	5 and 6	1 and 2	.17	.088	.09
	"	"	"	"	5 and 6	3 and 4	.19	.099	.10
	"	"	"	"	7 and 8	1 and 2	.19	.099	.10
	"	"	"	"	7 and 8	3 and 4	.21	.109	.11

TABLE X

Class 029 Brick Unprotected Approved and Unapproved Roof
Business Divided By Town Class and Number of Families
Showing Current Rates and Proposed Rates

<u>Class</u>	<u>Actual Loss Ratio</u>	<u>Permissible Loss Ratio</u>	<u>Factor (Actual Loss Ratio÷47.5%)</u>	<u>Type of Roof</u>	<u>Town Class</u>	<u>No. of Families</u>	<u>Current Rate</u>	<u>Factor X Current Rate</u>	<u>Proposed Rate</u>
029	26.9%	45.5%-49.5%	.57	Approved	9	1 and 2	.22	.125	.13
	"	"	"	"	9	3 and 4	.24	.137	.14
	"	"	"	"	10	1 and 2	.24	.137	.14
	"	"	"	"	10	3 and 4	.26	.148	.15
	"	"	"	Unapproved	9	1 and 2	.28	.160	.16
	"	"	"	"	9	3 and 4	.30	.171	.17
	"	"	"	"	10	1 and 2	.30	.171	.17
	"	"	"	"	10	3 and 4	.32	.182	.18

TABLE XI

Class 029 Frame Unprotected Approved and Unapproved Roof
Business Divided By Town Class and Number of Families
Showing Current Rates and Proposed Rates

<u>Class</u>	<u>Actual Loss Ratio</u>	<u>Permissible Loss Ratio</u>	<u>Factor (Actual Loss Ratio÷47.5%)</u>	<u>Type of Roof</u>	<u>Town Class</u>	<u>No. of Families</u>	<u>Current Rate</u>	<u>Factor X Current Rate</u>	<u>Proposed Rate</u>
029	24.1%	45.5%-49.5%	.51	Approved	9	1 and 2	.28	.143	.14
	"	"	"	"	9	3 and 4	.30	.153	.15
	"	"	"	"	10	1 and 2	.30	.153	.15
	"	"	"	"	10	3 and 4	.32	.163	.16
	"	"	"	Unapproved	9	1 and 2	.34	.173	.17
	"	"	"	"	9	3 and 4	.36	.184	.18
	"	"	"	"	10	1 and 2	.36	.184	.18
	"	"	"	"	10	3 and 4	.38	.194	.19

TABLE XII

Verification of Proposed Rates

<u>BUILDING</u>					
	<u>Type of Roof</u>	<u>Town Class</u>	<u>No. of Families</u>	<u>Proposed Brick Rates</u>	<u>Proposed Frame Rates</u>
Protected	Approved	1 to 4	1 and 2	.05	.06
	"	1 to 4	3 and 4	.06	.07
	"	5 and 6	1 and 2	.05	.07
	"	5 and 6	3 and 4	.06	.08
	"	7 and 8	1 and 2	.06	.08
	"	7 and 8	3 and 4	.07	.09
	Unapproved	1 to 4	1 and 2	.07	.08
	"	1 to 4	3 and 4	.08	.09
	"	5 and 6	1 and 2	.07	.09
	"	5 and 6	3 and 4	.08	.10
	"	7 and 8	1 and 2	.08	.10
	"	7 and 8	3 and 4	.10	.11
Unprotected	Approved	9	1 and 2	.13	.14
	"	9	3 and 4	.14	.15
	"	10	1 and 2	.14	.15
	"	10	3 and 4	.15	.16
	Unapproved	9	1 and 2	.16	.17
	"	9	3 and 4	.17	.18
	"	10	1 and 2	.17	.18
	"	10	3 and 4	.18	.19

EFFECTS OF RATE REVISIONS

The statistics which have been developed in this study indicate the need for a substantial reduction in rates for nearly all the class combinations involved, and were it not for the consideration which must be given to certain factors relating to other classes, adjustments could be made as indicated.

Consideration must be given to the fact that there may be certain classes of risks which do not have adequate rates and which because of certain credibility limitations cannot be adjusted on the basis of their own experience, to bring them in line. In order to guard against causing an unreasonable imbalance to occur, it is many times necessary to scale down what would otherwise be a sizeable reduction for a given class.

A fire rate maker takes a good deal of liberty in applying judgment in connection with adjusting class rates, keeping in mind that it is his primary aim to maintain the basic rate levels, and that his adjusting is largely that of testing these levels so the approved relationship existing in the basic levels will be maintained.

To determine the degree of adjustment which should be made, it is necessary to ascertain the percent of change required to produce a permissible loss ratio for the combined classes being considered for adjustment. This can be determined by combining the premiums and losses for the various classes involved and arriving at a loss ratio for the total.

As long as the total experience of the business being rated produces the permissible results, it is possible to establish individual rates with some degree of flexibility. Consequently the proposed rates should be checked to determine if the application of them to the business written will produce, in total, the desired results.

SUMMARY AND CONCLUSIONS

From the foregoing discourse, certain facts stand out, which should be mentioned in summarization and from which certain conclusions can be drawn.

Basis for Rates.—It is evident that fire rates do not stem from a purely statistical basis, but rather from arithmetical calculations based upon organized quantitative data compiled by either the companies or the National Board of Fire Underwriters covering the volume of premiums written and losses paid to the end that a permissible loss ratio can be established, which in turn becomes the yardstick for determining the need for adjustment.

By following this principle and including the N.A.I.C. profit factor of 6%, a rather universal formula has been developed with which to determine the adequacy of fire rates.

It is apparent that the groundwork is being laid which will permit a closer approach to statistical rating, but it should be kept in mind that fire insurance rate making is not likely to become an exact science.

Classified experience statistics, no matter how applied, can only tell a story of what has occurred during the period covered by such experience, giving no clues as to what the future holds. However, to paraphrase the National Board statement of principles, by proper application of judgment which gives adequate consideration to economic trends, social conditions, new processes, and inventions, such data can be of great value in predicting what may occur in the immediate future from a loss experience standpoint.

Rate Adequacy.—It is trite, but nevertheless true to state that the fire rate must produce enough premiums for companies to pay their losses and expenses of operations. The pattern followed in this study indicates that adjustments made in keeping with this pattern will afford a rate level adequate to meet the above requirements, keeping in mind of course that this applies on the basis of average if it is the rating bureau which is making the adjustment and not a single company.

Rate Fairness.—Rate regulations in most states prohibit the use of rates which are “unfairly” discriminatory between risks of essentially the same hazard. This restraint, in essence, affords the basis for the fire rate makers’ adherence to the principle of maintaining the uniform relationship between classes of risks as indicated in the processes involved in this study.

Whatever else may be said for or against the fire rating system and the propriety of the base rate make-up, the system for the most part affords a fair degree of consistency as applied to maintaining the basic relationship between classes.

Credibility.—No consideration has been given to the credibility factor in this study, the reason being that no acceptable measure of credibility for fire risks exists. Some rating bureaus take credibility into consideration, but this practice is not universal.

As the “Standard Classification” gains wider usage and sufficient bodies of statistical data are accumulated, credibility factors can possibly be developed which would be satisfactory.

Expenses.—As has been indicated, fire rating does not take into consideration expense costs by class of risk, which can be taken to indicate a degree of unfairness, at least in principle, and it will take a lot of work and study to establish a plan that will properly apportion such costs to the separate risks involved.

It is to be hoped that present efforts being made in this direction will bear fruit, and ultimately eliminate cause for complaint in this one area.