THE MAKING OF WORKMEN'S COMPENSATION RATES, AS ILLUSTRATED BY THE 1951 PENNSYLVANIA RATE REVISION

BY

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The Pennsylvania system of making workmen's compensation rates differs in many important respects from the systems used in other states. No attempt will be made to enumerate these differences, nor to comment upon them in other than a general way. Rather, this paper will simply describe how rates are made in Pennsylvania, using the July 1, 1951 rate revision as an example. Since no description of the Pennsylvania system has appeared in the *Proceedings* of the Society since 1919,[1] this paper should be of interest to the members of the Society.

Pennsylvania workmen's compensation rates are based solely on Pennsylvania experience, and since the Manual contains but 195 classifications (including 8 voluntary classes) it is possible to review the relativity for every classification at each rate revision. The experience used for Manual rate-making purposes is that of the five most recent policy years and is exclusive of the experience of minimum premium risks, as well as that of the larger risks (those with a credibility of 75 per cent or more for experience rating). For the July 1, 1951 rate revision, the experience period covered the five policy years 1944 to 1948, inclusive, and the procedure followed in this revision is described in the following pages.

MODIFICATION OF EXPERIENCE

A. PAYROLL MODIFIERS

The first step, after tabulation of the raw experience, was the selection of modifiers applicable to payrolls. These modifiers were based on weekly compensation wages as shown on the reports of Temporary accidents—of which there are some 35,000 to 40,000 each year. The average weekly wage was calculated for each policy year for each of the three major industry divisions—Manufacturing and Utilities, Contracting and Quarrying, and All Other. The average wages for each policy year were plotted on a graph and the trend line projected to the midpoint of the period during which the rates were to be effective (see Appendix, Graph I). Payroll multipliers were then calculated from the ratios of the projected wages to the wages for each policy year, as shown in the following table:

[1] "The Revision of Pennsylvania Compensation Insurance Rates, 1918,"—E. H. Downey and G. C. Kelly (Vol. V, p. 243).

TABLE A
AVERAGE WEEKLY WAGES AND PAYROLL MULTIPLIERS

	Manufacture		*Contracting*		*Other*	
Policy Year (1)	*Average Weekly Comp. Wages* (2)	*Payroll Multiplier* (3)	*Average Weekly Comp. Wages* (4)	*Payroll Multiplier* (5)	*Average Weekly Comp. Wages* (6)	*Payroll Multiplier* (7)
1944	$43.10	1.51	$49.20	1.52	$33.69	1.54
1945	44.17	1.47	48.70	1.54	35.22	1.48
1946	44.38	1.46	49.94	1.50	37.05	1.40
1947	49.37	1.32	55.15	1.36	40.26	1.29
1948	53.69	1.21	61.14	1.23	42.93	1.21
1949	56.33	1.15	64.30	1.17	45.43	1.14
1950	57.96	1.12	67.25	1.12	48.74	1.07
1951–52*	65.00	1.00	75.00	1.00	52.00	1.00

* 7-1-51 to 7-1-52.

B. LOSS MODIFIERS

Following the calculation of payroll modifiers, the next step was the determination of loss modifiers to be applied to compensable cases, other than Death and Permanent Total.

1. *Temporary Disability.* Modifiers for cases of Temporary disability were based on the average weekly compensation for each policy year and for each industry division. These averages were plotted on a graph and a projection made to the mid-point of the rate revision year (see Appendix, Graph I). Compensation multipliers applicable to cases of Temporary disability were then calculated in the same way as payroll multipliers. The Temporary Compensation multipliers serve a dual purpose—they modify the weekly compensation as reported to take account of wage changes, and also provide for changes in benefit levels. The Compensation and Occupational Disease Acts were amended as of July 1, 1945, increasing the weekly maximum from $18 to $20, and again as of July 1, 1949, increasing the maximum from $20 to $25. These benefit changes account for the divisions shown for policy years 1944, 1945, 1948 and 1949 in the following table:

TABLE B
AVERAGE WEEKLY COMPENSATION AND TEMPORARY COMPENSATION MULTIPLIERS

Policy Year (1)	*Manufacture* Ave. Weekly Comp. (2)	*Manufacture* Comp. Multiplier (3)	*Contracting* Ave. Weekly Comp. (4)	*Contracting* Comp. Multiplier (5)	*Other* Ave. Weekly Comp. (6)	*Other* Comp. Multiplier (7)
1944	$17.47	1.42	$17.89	1.40	$16.23	1.43
Before 7–1–45	17.37	1.42	17.73	1.41	16.11	1.44
After 7–1–45	19.00	1.30	19.64	1.27	17.77	1.31
1945	18.64	1.33	19.24	1.30	17.50	1.33
Before 7–1–45	17.51	1.41	17.80	1.40	16.33	1.42
After 7–1–45	19.14	1.29	19.58	1.28	17.83	1.30
1946	19.35	1.28	19.65	1.27	18.12	1.28
1947	19.56	1.27	19.75	1.27	18.47	1.26
1948	19.90	1.24	20.15	1.24	18.92	1.23
Before 7–1–49	19.67	1.26	19.81	1.26	18.67	1.25
After 7–1–49	23.96	1.03	24.74	1.01	22.57	1.03
1949	22.80	1.09	23.56	1.06	21.76	1.07
Before 7–1–49	19.81	1.25	19.87	1.26	18.79	1.24
After 7–1–49	24.24	1.02	24.75	1.01	22.79	1.02
1950	24.50	1.01	24.76	1.01	23.00	1.01
1951–52*	24.75	1.00	25.00	1.00	23.25	1.00

* 7-1-51 to 7-1-52.

2. *Major and Minor Permanent.* Cases of Major Permanent and Minor Permanent disability were individually revalued as though they had occurred under the benefit level in effect at the time of the rate revision. Weekly compensation in each case was based upon the weekly wage as reported at the time of injury, so that a further modification was necessary to take account of the increase in wages since the date of injury. For this purpose, the average weekly compensation rate as reported was recalculated on the basis of current benefit levels, for each policy year and industry division. The corresponding multipliers to be applied to the compensation portion of Major and Minor Permanent disability cases were then determined, as shown in the following table:

TABLE C
AVERAGE WEEKLY COMPENSATION TRANSLATED TO 7-1-49 BENEFIT LEVEL AND COMPENSATION MULTIPLIERS APPLICABLE TO MAJOR AND MINOR PERMANENT CASES

	Manufacture		*Contracting*		*Other*	
Policy Year (1)	*Ave. Weekly Comp.* (2)	*Comp. Multiplier* (3)	*Ave. Weekly Comp.* (4)	*Comp. Multiplier* (5)	*Ave. Weekly Comp.* (6)	*Comp. Multiplier* (7)
1944	$22.37	1.11	$23.58	1.06	$19.74	1.18
Before 7–1–45	22.38	1.11	23.55	1.06	19.68	1.18
After 7–1–45	22.29	1.11	23.83	1.05	20.48	1.14
1945	22.69	1.09	23.64	1.06	20.36	1.14
Before 7–1–45	22.82	1.08	23.69	1.06	20.19	1.15
After 7–1–45	22.63	1.09	23.62	1.06	20.41	1.14
1946	23.04	1.07	23.78	1.05	20.89	1.11
1947	23.66	1.05	24.12	1.04	21.59	1.08
1948	23.99	1.03	24.41	1.02	22.05	1.05
Before 7–1–49	23.99	1.03	24.39	1.03	22.01	1.06
After 7–1–49	23.96	1.03	24.74	1.01	22.57	1.03
1949	24.28	1.02	24.68	1.01	22.64	1.03
Before 7–1–49	24.36	1.02	24.46	1.02	22.19	1.05
After 7–1–49	24.24	1.02	24.75	1.01	22.79	1.02
1950	24.50	1.01	24.76	1.01	23.00	1.01
1951–52*	24.75	1.00	25.00	1.00	23.25	1.00

* 7-1-51 to 7-1-52.

3. *Death and Permanent Total.* Cases of Death and Permanent Total disability were individually revalued as though they had occurred under current benefit levels and average values were determined for each of seventeen industry groups. These averages were further modified to take account of wage changes which occurred subsequent to the date of injury. Multipliers applicable to the compensation portion of these cases to account for wage changes were calculated in the following manner; The total revalued cost (including funeral and medical) of the 1,889 Deaths and 334 Permanent Totals occurring in the five years 1944–1948 was $13,174,292, of which $1,021,328 (or 7.75 per cent) was medical cost and hence not subject to compensation multipliers. The appropriate multipliers applicable to the whole cost of Death and Permanent Total cases were therefore calculated by applying the ratio of (1.000 − .0775) or .9225 to the increments of Table C above.

The resulting factors, when weighted by the number of cases in the whole experience (excluding dust disease cases) were as follows:

TABLE D
COMPENSATION MULTIPLIERS—DEATH AND PERMANENT TOTAL

Policy Year	*Manufacture*			*Contracting*			*Other*		
	No. of Cases	*Factor*	*Product*	*No. of Cases*	*Factor*	*Product*	*No. of Cases*	*Factor*	*Product*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
All	723	1.07	771	533	1.05	557	837	1.10	923
1944	172	1.10	189	98	1.06	104	161	1.17	188
1945	150	1.08	162	93	1.06	99	157	1.13	177
1946	140	1.06	148	116	1.05	122	182	1.10	200
1947	142	1.05	149	110	1.04	114	186	1.07	199
1948	119	1.03	123	116	1.02	118	151	1.05	159

The average values of Death and Permanent Total cases as calculated by the method just described, as well as the average values selected for classification and experience rating purposes, are shown in the following table:

TABLE E
AVERAGE VALUE OF DEATH AND PERMANENT TOTAL
BY INDUSTRY GROUPS

Industry Groups	*No. of Death and P.T.*	*Total Death and P.T. Comp. & Med. (Revalued)*	*Average Value*	*Ave. with Comp. Multipliers (Table D)*	*Selected Average 7-1-51*
(1)	(2)	(3)	(4)	(5)	(6)
(1) All	2,223	$13,174,292	5,926	6,390	6,432
All ex. Stevedoring & Shipwright	2,174	12,481,229	5,741	6,183	6,194
(2) Manufacture and Utilities	723	4,367,894	6,041	6,464	6,446
(3) Metal Mfg., Boat Bldg. and Aircraft Mfg.	294	1,921,441	6,536	6,994	7,000
(4) Foods	122	744,767	6,105	6,532	6,500
(5) Textiles	57	277,344	4,866	5,207	5,200
(6) Other Manufacture	205	1,120,304	5,465	5,848	5,800
(7) Utilities	45	304,038	6,756	7,229	7,200
(8) Contracting and Quarrying	533	3,154.716	5,919	6,215	6,244
(9) Mining and Quarrying	100	577,877	5,779	6,068	6,000
(10) Excavation	126	711,282	5,645	5,927	6,300
(11) Building Construction	141	843,405	5,982	6,281	6,300
(12) Building Finishing	166	1,022,152	6,158	6,466	6,300
(13) Other Industries	967	5,651,682	5,845	6,430	6,526
(14) Other Industries ex. (18)	918	4,958,619	5,402	5,942	5,967
(15) Trucking and Storage	242	1,465,643	6,056	6,662	6,700
(16) Mercantile	96	518,543	5,401	5,941	6,000
(17) Office and Professional	89	447,030	5,023	5,525	5,500
(18) Stevedoring & Shipwright	49	693,063	14,144	15,558	17,000
(19) Municipal	225	1,224,410	5,442	5,986	6,000
(20) Amusements and Hotels	105	494,107	4,706	5,177	5,200
(21) Agriculture	116	577,374	4,977	5,475	5,500
(22) All Other	45	231,512	5,145	5,660	5,700

4. *Medical Cost.* Medical multipliers were determined by the following method: The average cost per case as reported for each of the six types of injury (Death, Permanent Total, Major Permanent, Minor Permanent, Temporary and Non-Compensable) was calculated for each of the five policy years and for each of the three industry divisions. Weighted averages for each policy year were then secured, using the ratio of the number of cases of each kind of medical cost to the total number of cases occurring in the five policy years, 1944–1948, as weights. An example, based on the data for Manufacture and Utilities will serve to illustrate the method employed. The average costs per case by type of injury were first determined and are shown in the following table:

TABLE F

AVERAGE MEDICAL COST AS REPORTED—MANUFACTURE AND UTILITIES

POLICY YEARS 1944—1948

Type of Injury (1)	All		1944		1945		1946		1947		1948	
	No. of Cases (2)	Average (3)	No. of Cases (4)	Average (5)	No. of Cases (6)	Average (7)	No. of Cases (8)	Average (9)	No. of Cases (10)	Average (11)	No. of Cases (12)	Average (13)
All	606,536	$19.33	120,293	$ 17.09	110,552	$17.63	125,355	$19.01	129,183	$20.88	121,153	$21.81
Death	424	372.60	84	362.82	81	327.95	86	412.72	92	418.20	81	333.01
Perm. Total	74	1,010.93	27	1,012.19	19	724.89	13	956.69	10	952.30	5	2,349.40
Major Perm.	2,114	531.72	417	407.88	389	425.24	421	526.31	432	701.05	455	580.50
Minor Perm.	3,991	122.42	794	100.82	820	107.40	813	123.05	821	130.08	743	152.96
Temporary	72,498	55.95	15,427	46.76	14,520	47.93	15,352	54.28	14,541	63.40	12,658	69.84
Non-Comp.	527,435	10.81	103,544	9.51	94,723	9.97	108,670	10.70	113,287	11.42	107,211	12.29

The weights to be applied to these average costs were then determined from the ratio of the number of cases for each type of injury in the five years to the total number of cases (606,536). The calculation follows:

TABLE G
RATIO OF NUMBER OF CASES OF EACH KIND OF MEDICAL COST TO TOTAL
MANUFACTURE AND UTILITIES
POLICY YEARS 1944–1948

Type of Injury	*No. of Cases*	*Ratio to Total*
(1)	(2)	(3)
All	606,536	1.0000
Death	424	.0007
Permanent Total	74	.0001
Major Permanent	2,114	.0035
Minor Permanent	3,991	.0066
Temporary	72,498	.1195
Non-Compensable	527,435	.8696

The application of the weights shown in column (3) above to the average costs shown in Table F produced the following weighted average costs per case:

1944 — $16.31
1945 — 16.90
1946 — 18.83
1947 — 21.21
1948 — 22.54

Similar calculations were made for the other two industry divisions and the averages as determined for the three industry divisions were plotted on a graph and projected to the midpoint of the rate revision period (see Appendix, Graph II). Medical multipliers were calculated from these averages, keyed to the projected 1951–52 average. To test the reasonableness of these multipliers it was decided to attempt to secure some indication of the trend in medical costs since the end of the experience period. For this purpose the following tabulation was made of the average medical costs on Temporary accidents:

TABLE H
TEMPORARY MEDICAL—AVERAGE COST PER CASE

Policy Year	All		Manufacture		Contracting		Other	
	No. of Cases	Ave. Cost Per Case	No. of Cases	Ave. Cost Per Case	No. of Cases	Ave. Cost Per Case	No. of Cases	Ave. Cost Per Case
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1944	27,609	$50.49	15,427	$46.76	2,953	$59.75	9,229	$53.76
1945	28,961	52.56	14,520	47.93	3,978	59.46	10,463	56.36
1946	32,261	59.25	15,352	54.28	5,202	66.75	11,707	62.43
1947	31,581	67.96	14,541	63.40	5,696	74.02	11,344	70.77
1948	28,664	74.38	12,658	69.84	5,547	80.47	10,459	76.64
1949	27,505	77.69	12,671	75.01	4,847	80.98	9,987	79.49
Bef. 7-1-49	7,878	79.23	4,123	76.26	1,186	88.27	2,569	79.83
Aft. 7-1-49	19,627	77.07	8,548	74.41	3,661	78.62	7,418	79.38
1950	10,621	67.40	5,045	64.55	1,837	69.38	3,739	70.29

It was noted that a definite leveling-off of medical costs was indicated in 1949 and 1950. It was recognized, however, that for 1950 the cases reported were those of comparatively short duration, and it seemed certain that the fully developed costs would be somewhat higher than those shown above. Nevertheless, it was felt that the 1949 figures justified the conclusion that medical costs were not increasing as rapidly since 1948 as they were prior to that time. Accordingly, the averages of the above table were plotted for the years 1944 through 1949 and extended to an assumed 1951–52 average of $80.00 for Manufacture, $85.00 for Contracting and $85.00 for Other Industries (see Appendix, Graph III). The ratios of these selected averages to the averages for 1948 were found to be 1.145 for Manufacture, 1.056 for Contracting and 1.109 for Other Industries. When rounded to 1.15, 1.05 and 1.10, respectively, and applied to the weighted averages for all types of medical cost for 1948, the following weighted averages for 1951–52 were produced:

Industry	Weighted Average	Selected Average
Manufacture	$25.92	$26.00
Contracting	33.84	34.00
Other	34.10	34.00

Medical multipliers were then calculated, keyed to the above selected averages for 1951–52. The multipliers, after rounding, were as follows:

TABLE J
MEDICAL MULTIPLIERS

Policy Year (*1*)	*Manufacture* (*2*)	*Contracting* (*3*)	*Other* (*4*)
1944	1.60	1.40	1.55
1945	1.55	1.35	1.45
1946	1.40	1.25	1.30
1947	1.25	1.10	1.20
1948	1.15	1.05	1.10
1949	1.10	1.04	1.07
1950	1.05	1.02	1.04
1951–52	1.00	1.00	1.00

These multipliers were applied to the medical cost of Minor, Temporary and Non-Compensable cases—83% of all medical. The medical cost for cases of Death, Permanent Total and Major Permanent disability was used as reported, without modification.

EXPENSE LOADING AND RATE FORMULAE

Prior to July 1, 1951, there was no provision in Pennsylvania rates for profit and contingencies. Following extensive consideration of the subject, the Classification and Rating Committee adopted, and the Insurance Commissioner approved, a loading of 2.5 per cent for profit and contingencies for inclusion in the expense provisions underlying the July 1, 1951 rates. The provision for losses was accordingly reduced from .615 to .590, and the following expense loading formula adopted:

PREMIUM		100.00
POLICY FEE—$8		
Taxes (.025 × 3)	.08	
Acquisition (.175 × 3)	.53	
Home Office & Audit	2.39	3.00
MANUAL RATES		
Losses	59.0	57.23
Claims Expense	8.2	7.95
Inspection & Bureau	2.9	2.81
Taxes	2.5	2.43
Acquisition	17.5	16.98
Home Office & Audit	7.4	7.18
Profit & Contingencies	2.5	2.43
	100.0	

It will be noted that the policy fee, or expense constant, is included in the above formula as equivalent to three per cent of total premium. This percentage was developed from the Size of Risk studies for policy years 1946 and 1947. For these two years combined, the average premium (excluding minimum premiums) was found to be $269. The $8 policy fee was 2.97 per cent of this average and hence was used at three per cent in the formula. It should be noted that in Pennsylvania, the policy fee applies to all risks and not just to risks below a certain premium size, as is the case in most other states.

The rate formulae used for the July 1, 1951 rates were as follows:

(a) MANUFACTURING AND UTILITIES:

$$\frac{\text{Pure Premium} \times 1.12}{.590} + \$.01 = 1.90 \text{ p.p.} + \$.01$$

(b) CONTRACTING AND QUARRYING:

$$\frac{\text{Pure Premium} \times 1.12}{.590} + \$.01 = 1.90 \text{ p.p.} + \$.01$$

(c) OTHER INDUSTRIES:

$$\frac{\text{Pure Premium} \times 1.09}{.590} + \$.01 = 1.85 \text{ p.p.} + \$.01$$

In the above formulae .590 is the expected loss ratio, $.01 is the loading for catastrophes, and the factors 1.12 and 1.09 are the Large Risk Factors. The Large Risk Factor is a combined off-balance factor and loss constant and is designed to equalize the loss ratios of risks of over and under $500 annual premium. The effect of the Large Risk Factor gradually decreases as the size of the risk increases. For Manual rated risks, the full effect of the factor is obtained. For experience rated risks, the effect of the factor diminishes as the credibility increases; that is, a risk with 50 per cent credibility receives a 50 per cent weighting of the factor, while in a self-rated risk the effect of the Large Risk Factor disappears entirely.

For a number of years a single factor of 1.12 was used for all industries and produced an almost exact balance in loss ratios. For example, for policy year 1947 the loss ratio for risks with annual premiums of less than $500 (exclusive of minimum premium risks) was 49.6 per cent, whereas the loss ratio for risks with annual premiums of $500 or more (exclusive of self-rated risks) was 49.4 per cent.

In spite of the fact that the Large Risk Factor appeared to be producing the desired results on an all-industry basis, it seemed advisable to determine whether or not the loss ratios were being equalized for each of the three industry divisions. Accordingly, the Size of Risk experience for policy years 1946 and 1947 was reviewed, and appreciable differences were noted when the results for the three industry divisions were compared. For the two years combined, the loss ratios were found to be as follows:

Size Groups (*Annual Premium*)	*Loss Ratio Based on Standard Premium* (*including Policy Fee*)
All Industries	
Under $500 (ex. Minimum Premium)	49.0
$500 and over (ex. Self-Rated)	48.9
Manufacture and Utilities	
Under $500 (ex. Minimum Premium)	56.5
$500 and over (ex. Self-Rated)	53.5
Contracting and Quarrying	
Under $500 (ex. Minimum Premium)	47.8
$500 and over (ex. Self-Rated)	42.5
Other Industries	
Under $500 (ex. Minimum Premium)	46.2
$500 and over (ex. Self-Rated)	48.1

In view of the differences in loss ratios for the three industry groups, it was decided that a calculation should be made to determine the effect of the Large Risk Factor as well as the Policy Fee, using the Size of Risk studies for policy years 1946 and 1947 for that purpose. The average premium (excluding Policy Fee) for each of fourteen size groups was determined and the experience rating credibility corresponding to each such premium was calculated. The amount of premium resulting from the Large Risk Factor was then developed from the formula:

$$L = P\left(1 - \frac{1}{F}\right)\left(1 - \frac{C}{100}\right)$$

Where L = Amount of premium from Large Risk Factor
P = Standard Premium ex. Policy Fee
F = Large Risk Factor = 1.12
C = Credibility

Loss ratios were then calculated, based on:

(1) Standard Premium, including Policy Fee.
(2) Standard Premium, excluding Policy Fee.
(3) Premium ex. Large Risk Factor.
(4) Premium ex. Large Risk Factor and ex. Policy Fee.

The results were summarized and are shown in Exhibit I of the Appendix. The ratios of the loss ratios of the smaller risks to those of the larger risks were then calculated for each of the four premium bases, as shown in the following table:

TABLE K

RATIO OF LOSS RATIOS OF RISKS WITH PREMIUM UNDER $500 (EX. MINIMUM PREMIUM) TO THOSE OF RISKS WITH PREMIUM OVER $500 (EX. SELF-RATED)

POLICY YEARS 1946 AND 1947

Industry Division (1)	*Standard Premium* (2)	*Premium Ex. Policy Fee* (3)	*Premium Ex. Large Risk Factor* (4)	*Premium Ex. L. R. F. & Policy Fee* (5)
All	1.001	1.103	1.036	1.155
Manufacture & Utilities	1.073	1.146	1.118	1.203
Contracting & Quarrying	1.125	1.192	1.171	1.248
Other Industries	.962	1.094	.985	1.136

After reviewing these calculations, it was felt that, while there was some indication of the need for a larger factor for Contracting, it would be unwise to increase the factor at the present time, in view of the favorable loss ratios in this industry division. Accordingly, it was decided to continue the 1.12 Large Risk Factor for the Manufacturing and Contracting divisions, but to reduce the factor to 1.09 for the Other Industries division.

MINIMUM PREMIUM FORMULA

Prior to July 1, 1950, the minimum premium formula was: 1.333 × Losses Per Risk + Policy Fee. This formula was originally adopted in 1940 and was based on an expected loss ratio of 50 per cent, with the policy fee taken at 33⅓ per cent. The latter percentage was based on the average minimum premium of $24 for all industries, as shown in the latest Size of Risk study available at that time. The formula was developed as follows:

Losses	.500
Policy Fee	.333
Expenses	.167
	1.000

$$\frac{\text{Expenses (ex. Policy Fee)}}{\text{Losses}} = \frac{.167}{.500} = .333$$

Minimum Premium Loss Multiplier = 1.333

This formula was revised in the spring of 1950 for use in the July 1, 1950 rate revision and was repeated in the 1951 rate revision. An analysis of the Size of Risk Experience for 1947 policy year indicated that the average minimum premium for all industries had decreased from $24.00 to $19.05, with the following averages for the three industry divisions:

Manufacture and Utilities	$17.75
Contracting and Quarrying	29.16
Other Industries	16.74

The indicated loss multipliers, based on the above averages and an expected loss ratio of 50 per cent, were calculated as follows:

Industry (1)	*Per Cent Policy Fee to Average Premium* (2)	*Balance for Expenses* [1.000–.500–(2)] (3)	*Ratio* (3)÷.500 (4)	*Indicated Loss Multiplier* (5)
Manufacture & Utilities	.451	.049	.098	1.098
Contracting & Quarrying	.274	.226	.452	1.452
Other Industries	.478	.022	.044	1.044

The indicated loss multipliers were rounded to 1.10, 1.40 and 1.05, respectively, and the following minimum premium formulae were adopted:

Manufacture: 1.10 Losses Per Risk + $8.00 : Maximum payroll $1,200
Contracting: 1.40 Losses Per Risk + $8.00 : Maximum payroll $1,200
Other Industries: 1.05 Losses Per Risk + $8.00 : Maximum payroll $1,200

The $1,200 payroll limitation is included in the formula so as to prevent minimum premiums in the lower rated classes from increasing, as the average payroll per risk increases. For classifications in which the average payroll exceeds $1,200, the ratio of $1,200 to such average payroll is calculated and applied as a reducing factor to the loss cost per risk.

CHARACTERISTICS OF CLASSIFICATION EXPERIENCE

Following the selection of payroll and loss multipliers, as well as the rate and minimum premium formulae, pure premiums and indicated rates are calculated for each Manual classification. However, before describing this part of the rate-making process, it seems advisable to explain briefly one rather unique step in the procedure.

In the past, a number of different methods had been used to attempt to stabilize rate levels for classifications having a comparatively small volume of experience. None of these methods had produced completely satisfactory results, so that about five years ago studies were undertaken looking toward a more dependable method. These studies culminated in the procedure which was first used in the 1947 rate revision. To attempt to give a complete exposition of this study would extend the scope of this paper beyond reasonable limits; a brief description of the methods used and the conclusions reached should be sufficient to explain how the procedure operates.

The study involved a review of the occurrence of accidents of various types for classifications having an average of 100 or more Temporary accidents per annum, and covered the fourteen policy years, 1930 to 1943, inclusive. (In subsequent rate revisions a full fifteen year period was used.) This period included periods of industrial activity and major depression, as well as the early part of World War II. There were considerable changes in wage rates and both upward and downward changes in benefit levels because of legislative

amendments. It was felt that relationships which were reasonably constant during this period could be accepted as characteristic of classification experience. Because of the variation in employment and the fluctuation in wage rates, it was felt that payrolls could not be used as a dependable index of exposure. Following a series of tests, the conclusion was reached that the number of Temporary accidents was the most dependable index which could be found. Accordingly, a tabulation was made of the five-year moving averages of the number of Death and Permanent Total, Major Permanent and Minor Permanent cases per 1,000 Temporary cases. A table of credibilities was developed from this material, based on the average number of Temporary cases per year, as shown in Exhibit II in the Appendix.

In the development of Manual rates, classifications having 150 or more Temporary accidents in the five-year experience period are assigned the credibility from the table corresponding to the average number of Temporary accidents per annum in the five years. (Rates for classifications with less than 150 Temporaries are based on the five-year experience, without further modification.) The complement of this credibility is assigned to the 15-year experience. The respective credibilities are then applied to the number of Death and Permanent Total, Major Permanent and Minor Permanent cases related to the number of Temporary cases in the five-year experience period, and a weighted average number for each type of serious case is calculated. These weighted averages are then compared with the number of serious cases in the experience period, and the losses adjusted accordingly. An example based on Classification 225, Rubber Goods and Tire Manufacturing, will serve to illustrate the method used:

In the five-year experience period there were 7 Deaths, no Permanent Totals, 20 Major Permanents, 54 Minor Permanents and 680 Temporaries. The average number of Temporaries per year (136) gives the five-year experience a credibility of .677, with a corresponding credibility of .323 assignable to the 15-year experience. The number of Deaths and Permanent Totals, Major Permanents and Minor Permanents occurring in the 15 years, related to the 680 Temporaries, was 5, 17 and 47, respectively. Weighted averages were then calculated, as follows:

	Death & P.T.	*Major Permanent*	*Minor Permanent*
(1) Number of cases—5 years	7	20	54
(2) Credibility—5 years	.677	.677	.677
(3) (1) × (2)	4.74	13.54	36.56
(4) Number of cases—15 years (Per 680 Temporaries)	5	17	47
(5) Credibility—15 years	.323	.323	.323
(6) (4) × (5)	1.62	5.49	15.18
(7) (3) + (6)	6.36	19.03	51.74
(8) Number of cases—5 years	7	20	54
(9) (7) − (8)	−1	−1	−2

It will be seen from the above calculation that it was necessary to adjust the losses of the five-year period by subtracting from them the value of one Death and Permanent Total, one Major Permanent and two Minor Permanents. The average values for each of these types of injury in this classification

were $5,800, $3,532 and $1,154 respectively. A total of $11,640 was therefore subtracted from the five-year losses of $350,254, producing adjusted losses of $338,614. The pure premium corresponding to the adjusted losses was $.480 and the resulting rate indication $.947 (including $.025 for Silicosis). The pure premium corresponding to the unadjusted five-year losses was $.497 and the resulting rate indication $.979—a difference of $.032 in final rate.

For the larger classes with high credibility, the procedure makes very little difference in the final rate result. For example, Classification 811, Truckmen, with 6,643 Temporary accidents in the five-year period, had a credibility of .875 for the five-year experience. The rate indication based on the losses of the five years alone was $1.277, as against $1.281 for the combined experience.

Before leaving this subject, it might be of interest to the members of the Society to set forth some of the conclusions reached in the course of this study. They are as follows:

1. The stability and accuracy of classification rates can be enhanced—so far as losses enter into the rate calculation—by using the experience of the most recent five years with the appropriate credibility against the experience of the fifteen years multiplied by one minus the credibility.
2. No Pennsylvania industry class is big enough to be rated on less than five years of experience when five years are available. Tests made of the credibility of experience for the six largest Pennsylvania classifications indicated a marked decrease in credibility when three years or two years of experience were used.
3. Recent experience, if it indicates a departure from the averages of a previous period, so far as losses are concerned, may be misleading, entirely aside from the fact that some losses are undetermined in character for two, three, or more years after the accident.
4. Trends in accident rate and consequently in pure premium in as short a period as five years should not be followed implicitly or projected, because of the cyclic nature of accident rates.

CALCULATION OF CLASSIFICATION RATES

The experience for each classification is tabulated on a reported basis, by policy year and by type of injury. As indicated earlier, the experience used for the making of Manual rates excludes that of the larger risks (those with an experience rating credibility of 75 per cent or more), as well as that for minimum premium risks. It excludes, as well, cases of dust disease and lead poisoning, the pure premiums for which are calculated separately and added to the traumatic pure premiums before calculation of the final Manual rate. Other occupational disease losses are included in the body of the experience, so that no general loading for occupational disease is necessary.

Rate sheets are prepared for each classification, showing the experience of the five years, both as reported and as translated by application of the various payroll and loss modifiers. The pure premium based on the five-year experience alone, as well as the adjusted pure premium after weighting for the 15-year experience, together with the corresponding rate indications, are shown at the bottom of each sheet. Indicated rates for dust disease or lead poisoning are set out separately for the classifications having such losses. Information pertinent to the calculation of the Minimum Premium is also shown.

The rate sheet for Classification 461, Machine Shops, has been reproduced as Exhibit III in the Appendix to illustrate the manner in which the classification experience is prepared for the Classification and Rating Committee. The detail of the translation of the experience for this classification is shown as Exhibit IV.

When the rate sheets for all classifications have been completed, they are distributed to the Classification and Rating Committee, usually about a week in advance of the rate selection meeting. The rate indications for each classification are reviewed, and the indicated rates are generally adopted, subject to the provision that no rate shall be increased or decreased by more than 25 per cent. Rates of fifty cents or less are rounded to the nearest cent, while those in excess of fifty cents are rounded to the nearest nickel.

After adoption of rates for each classification, a "Test of Selected Rates" is prepared and submitted to the Committee for review. This Test shows a comparison of the rates of the current Manual with those just adopted. The percentage change is shown for each classification and is summarized by industry group and industry division. The average over-all change indicated by the 1951 Test of Rates was a reduction of 4.4 per cent, with the following average changes by industry division:

Manufacture and Utilities —2.5 per cent
Contracting and Quarrying—6.8 per cent
All Other Industries —5.2 per cent

The summary sheet of the 1951 Test is shown in the Appendix as Exhibit V.

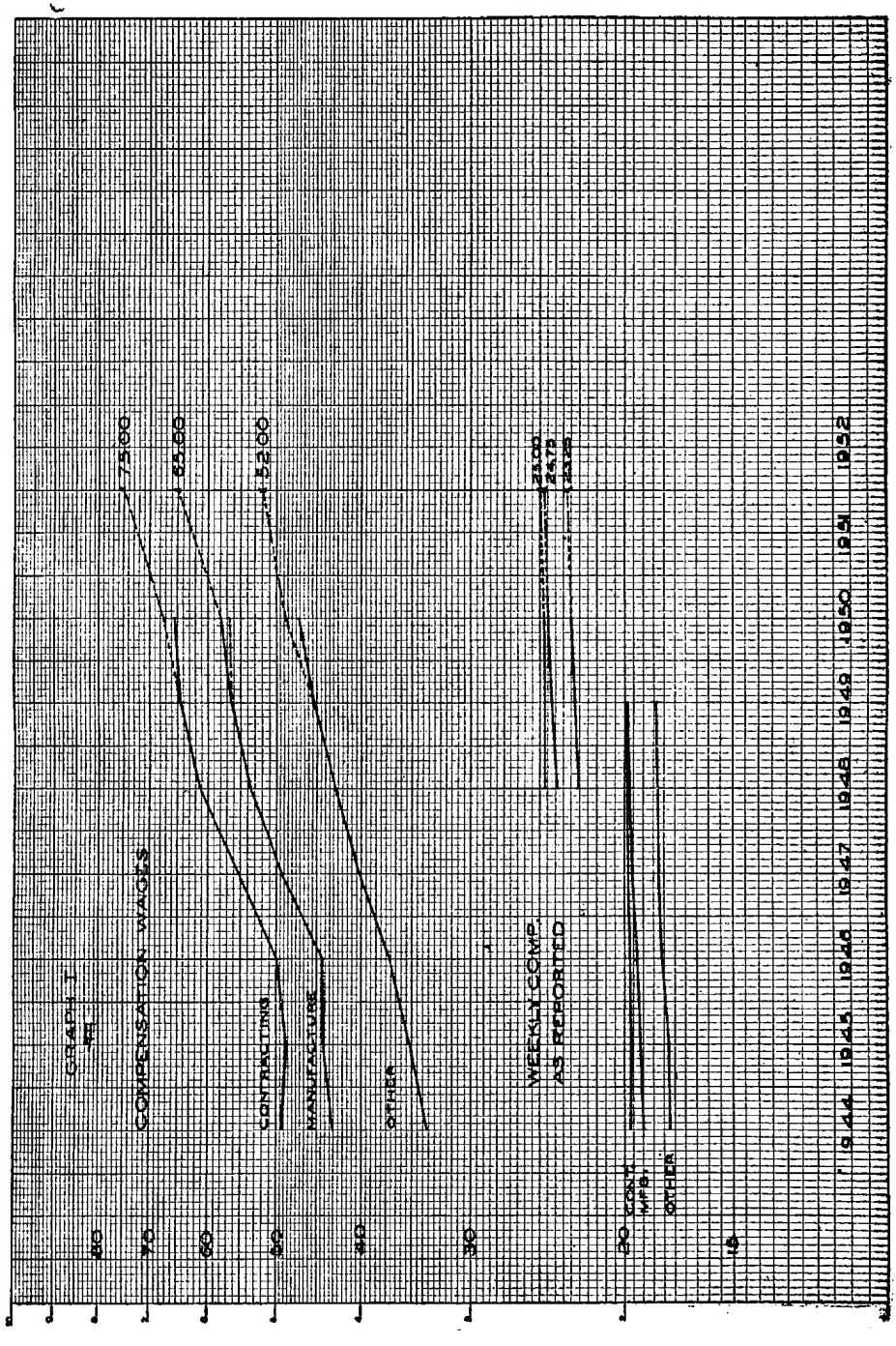
Following adoption of the rates of the Test, filing is made with the Insurance Commissioner. Unless some very unusual circumstance is involved, the Commissioner ordinarily approves the rates as proposed to him. One reason for our ability to secure prompt approval of rate filings is that, in accordance with the Constitution of the Bureau, the Insurance Commissioner or his representative acts as chairman of all committees of the Bureau. He is therefore fully informed on all matters presented to him, and is in a position to act promptly on all Bureau proposals.

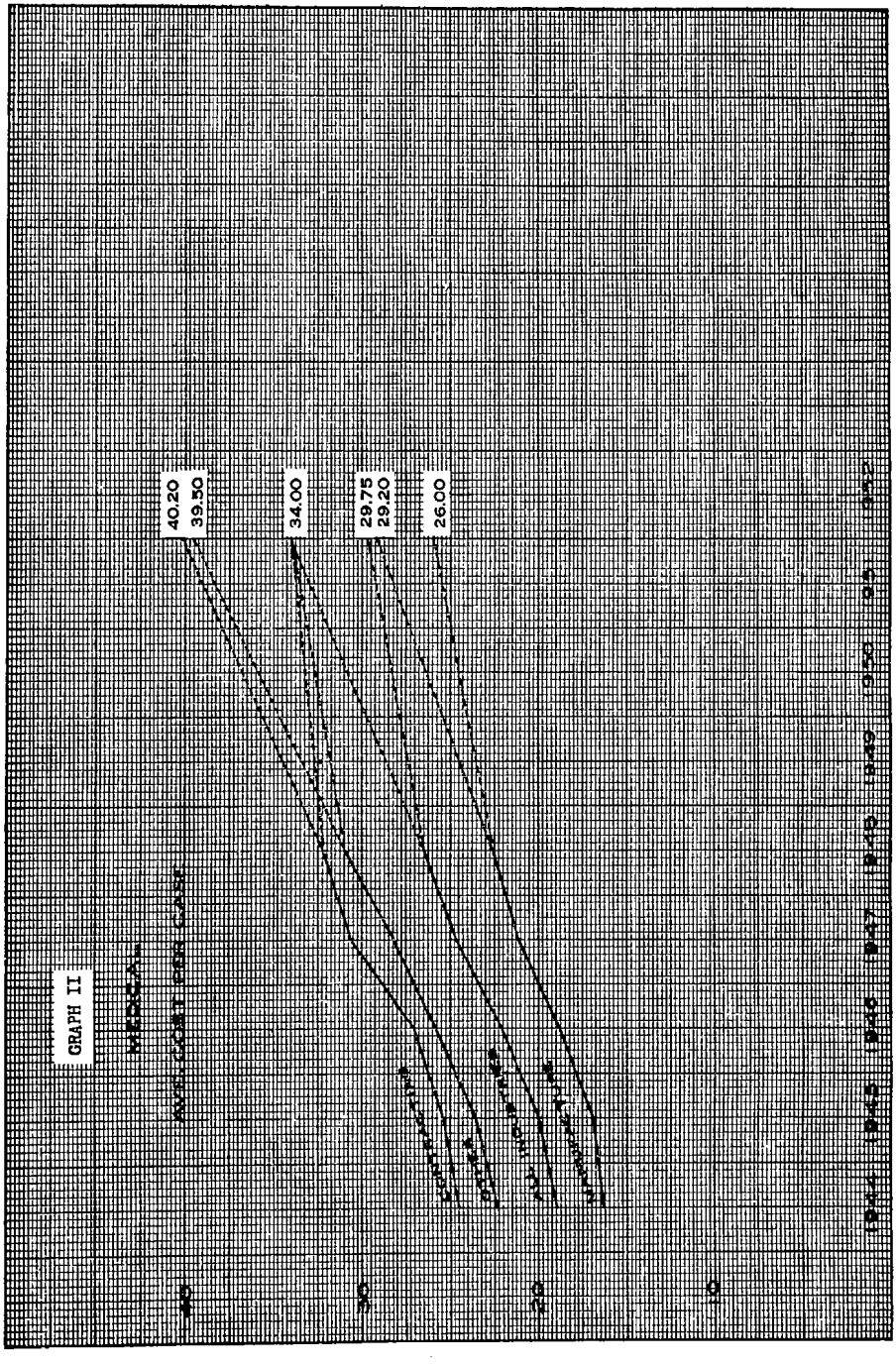
In conclusion, it might be well to mention one improvement which will be made in the rate-making procedure in connection with the 1952 rate revision. As previously mentioned, the experience used for the July 1, 1951 rate revision was that of policy years 1944–1948, inclusive. The last policy of 1948 policy year expired in December of 1949—eighteen months prior to the effective date of the 1951 rates. In order to reduce this lag in experience, the Bureau staff proposed to the Actuarial Committee that for the July 1, 1952 rate revision, the experience be compiled on a "Manual Year" basis. That is, the experience period is to be the five "Manual Years" beginning with policies of July 1, 1945, instead of the five policy years beginning with policies of January 1, 1945. This will reduce the lag in experience by six months and will mean that the latest policy of the experience period will expire exactly twelve months prior to the effective date of the 1952 rates. It is felt that this change will effect a considerable improvement in the rate-making structure.

Several statistical tables are shown in the Appendix as a matter of interest. Your attention is called particularly to Exhibit VI, which shows the rate changes that have occurred in Pennsylvania since July 1, 1939. It will be noted

that in spite of benefit increases in 1945 and 1949, the July 1, 1951 rates were, on the average, 53.3 per cent lower than those in effect in 1939.

APPENDIX


GRAPH 1
RE
COMPENSATION WAGES
75.00
85.00
52.00
CONTRACTING
MANUFACTURE
OTHER
WEEKLY COMP.
AS REPORTED
25.00
25.75
14.38
COAST
MFG.
OTHER
80
70
60
50
40
30
20
10
1944
1945
1946
1947
1948
1949
1950
'51
1952


GRAPH II
MEDICAL
PAID CLAIM COST CASE
40.20
39.50
34.00
29.75
29.20
26.00
1944
1945
1946
1947
1948
1949
1950
1951
1952

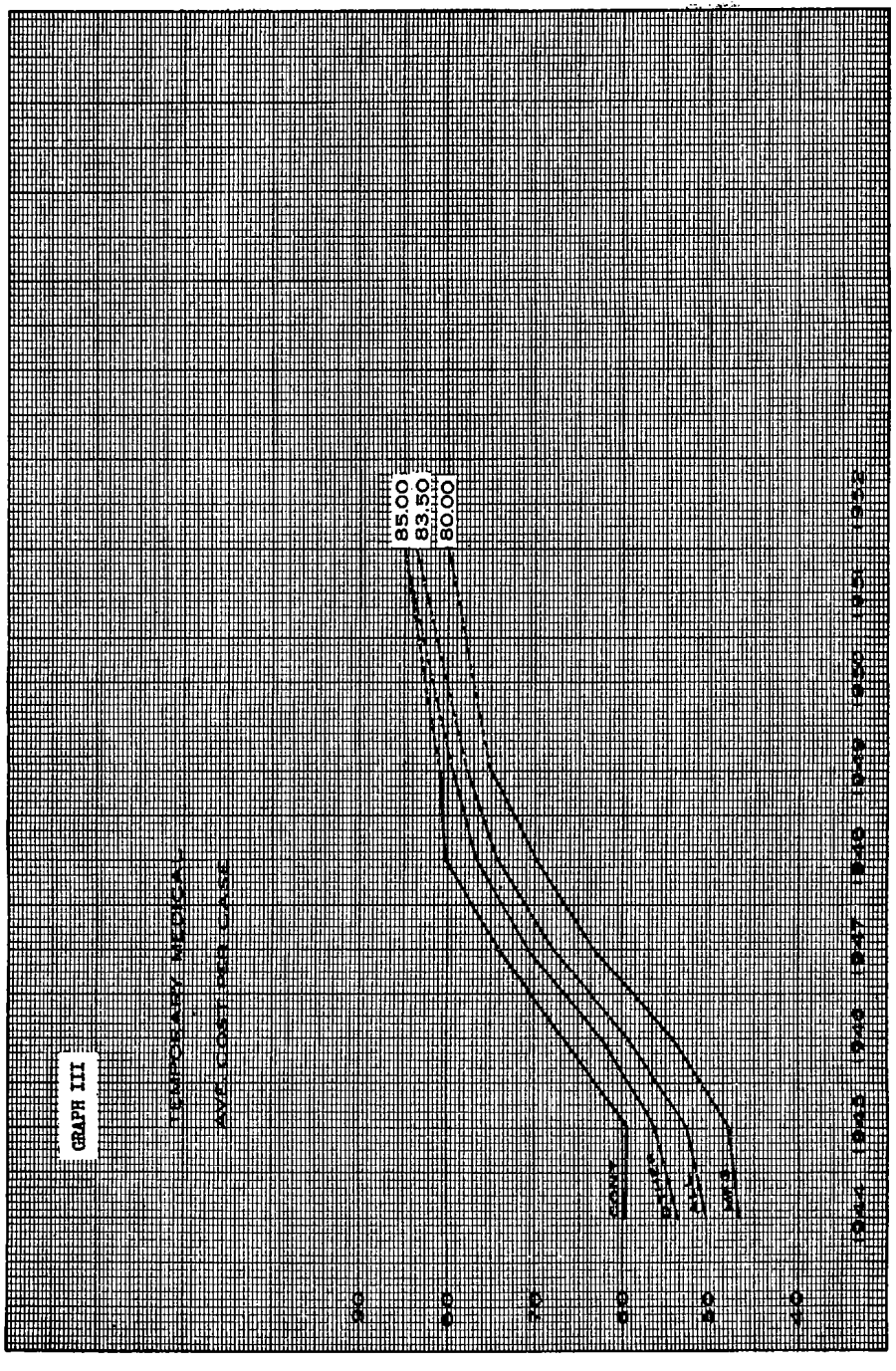

GRAPH III
HOSPITAL & MEDICAL
AVG. COST PER CASE
85.00
83.50
80.00
1946
1947
1948
1949
1950
1951
1952

EXHIBIT I

CALCULATION SHOWING EFFECT OF LARGE RISK FACTOR AND POLICY FEE
POLICY YEARS 1946 AND 1947

Size Groups Annual Premium (1)	*Standard Premium* (2)	*Premium Ex. Policy Fee* (3)	*Correction for Large Risk Factor (1.12)* (4)	*Premium Ex.L.R.F.* (2)—(4) (5)	*Premium Ex.L.R.F. & Policy Fee* (3)—(4) (6)	*Ratio* (5)÷(6) (7)	*Incurred Losses* (8)	*Loss Ratio Based on* Col. (2) (9)	Col. (3) (10)	Col. (5) (11)	Col. (6) (12)
ALL INDUSTRIES											
All	$64,317,074	$61,882,514	$4,109,324	$60,207,750	$57,773,190	1.071	$32,340,923	50.28	52.26	53.72	55.98
Under 500 (Ex.M.P.)	17,742,307	16,025,895	1,687,318	16,054,989	14,338,077	1.118	8,689,562	48.98	54.22	54.12	60.60
500 & over (Ex.S.R.)	38,304,366	38,149,966	2,422,006	35,882,360	35,727,960	1.068	18,748,895	48.95	49.15	52.25	52.48
Minimum premium	1,360,541	799,037	—	1,360,541	799,037	1.000	483,895	35.57	60.56	35.57	60.56
Self-rated	6,909,860	6,908,116	—	6,909,860	6,908,116	1.000	4,418,571	63.95	63.96	63.95	63.96
MANUFACTURE											
All	$27,771,593	$27,390,953	$1,516,073	$26,255,520	$25,874,880	1.059	$15,305,399	55.11	55.88	58.29	59.15
Under 500 (Ex.M.P.)	4,120,214	3,844,270	402,474	3,717,740	3,441,796	1.117	2,328,015	56.50	60.56	62.62	67.64
500 & over (Ex.S.R.)	18,748,475	18,684,467	1,113,599	17,634,876	17,570,868	1.063	9,876,844	52.68	52.86	56.01	56.21
Minimum premium	89,820	50,436	—	89,820	50,436	1.000	37,094	41.30	73.55	41.30	73.55
Self-rated	4,813,084	4,811,780	—	4,813,084	4,811,780	1.000	3,063,446	63.65	63.67	63.65	63.67
CONTRACTING											
All	$14,053,067	$13,678,083	$ 985,932	$13,067,135	$12,692,151	1.078	$ 6,242,478	44.42	45.64	47.77	49.18
Under 500 (Ex.M.P.)	4,007,599	3,770,567	396,045	3,611,554	3,374,522	1.117	1,916,118	47.81	50.82	53.06	56.78
500 & over (Ex.S.R.)	9,422,046	9,383,270	589,887	8,832,159	8,793,383	1.067	4,002,152	42.48	42.65	45.31	45.51
Minimum premium	367,865	268,349	—	367,365	268,349	1.000	159,533	43.43	59.45	43.43	59.45
Self-rated	256,057	255,897	—	256,057	255,897	1.000	164,675	64.31	64.35	64.31	64.35
OTHER INDUSTRIES											
All	$22,492,414	$20,813,478	$1,607,319	$20,885,095	$19,206,159	1.084	$10,793,046	47.99	51.86	51.68	56.20
Under 500 (Ex.M.P.)	9,614,494	8,410,558	888,799	8,725,695	7,521,759	1.118	4,445,429	46.24	52.86	50.95	59.10
500 & over (Ex.S.R.)	10,133,845	10,082,229	718,520	9,415,325	9,363,709	1.077	4,869,899	48.06	48.30	51.72	52.01
Minimum premium	903,356	480,252	—	903,356	480,252	1.000	287,268	31.80	59.82	31.80	59.82
Self-rated	1,840,719	1,840,439	—	1,840,719	1,840,439	1.000	1,190,450	64.67	64.68	64.67	64.68

EXHIBIT II

CREDIBILITY OF FIVE YEARS OF CLASSIFICATION EXPERIENCE

Ave. No. of Temp. Cases Per Annum (1)	*Credibility* (2)	*Ave. No. of Temp. Cases Per Annum* (1)	*Credibility* (2)	*Ave. No. of Temp. Cases Per Annum* (1)	*Credibility* (2)
30	.302	210	.762	390	.833
40	.379	220	.770	400	.835
50	.445	230	.777	450	.841
60	.499	240	.784	500	.846
70	.542	250	.790	550	.850
80	.573	260	.795	600	.853
90	.596	270	.800	650	.855
100	.615	280	.804	700	.857
110	.633	290	.807	750	.859
120	.650	300	.811	800	.861
130	.667	310	.814	850	.863
140	.683	320	.817	900	.864
150	.698	330	.820	950	.864
160	.711	340	.822	1,000	.865
170	.723	350	.825	2,000	.896
180	.734	360	.827	3,000	.927
190	.744	370	.829	4,000	.958
200	.753	380	.831	5,000	.986

EXHIBIT III

EXPERIENCE EXCLUDING LARGE RISKS AND MINIMUM PREMIUMS

CLASSIFICATION Machine Shops CODE NO. 461

	POLICY YEAR	PAYROLL (IN THOUSANDS)	ALL LOSSES	DEATH No.	DEATH AMOUNT	PERM. TOTAL No.	PERM. TOTAL AMOUNT	MAJOR PERM. No.	MAJOR PERM. AMOUNT	MINOR PERM. No.	MINOR PERM. AMOUNT	TEMP. COMP. No.	TEMP. COMP. AMOUNT	MEDICAL AMOUNT	PURE PREM.
AS REPORTED	1944	118 553	504 265	7	31 859	4	34 833	38	83 951	84	44 972	1532	85 819	222 831	.43
	1945	91 156	366 475	3	15 074	-	-	21	43 189	84	49 508	1132	75 515	183 189	.40
	1946	87 838	361 810	3	15 012	-	-	22	60 983	74	44 458	992	60 579	180 778	.41
	1947	101 112	409 468	3	12 013	3	32 519	26	57 398	65	46 886	962	60 014	200 638	.40
	1948	103 490	404 139	8	33 953	-	-	25	65 274	74	45 538	802	53 152	206 222	.39
	TOTAL	502 149	2 046 157	24	107 911	7	67 352	132	310 795	381	231 362	5420	335 079	993 658	.41
TRANSLATED	1944	179 015	733 176	11	77 000			38	114 863	84	63 631	1532	121 152	356 530	.41
	1945	133 999	525 553	3	21 000			21	55 187	84	65 211	1132	100 212	283 943	.39
	1946	128 243	484 259	3	21 000			22	75 397	74	57 232	992	77 581	253 089	.38
	1947	133 468	497 756	6	42 000			26	68 764	65	59 976	962	76 218	250 798	.37
	1948	125 223	494 080	8	56 000			25	77 544	74	56 857	802	66 524	237 155	.39
	TOTAL	699 948	2 734 824	31	217 000			132	391 755	381	302 907	5420	441 647	1 381 515	.39
	PURE PREMIUM		.391		.031		-		.056		.043		.063	.197	
	MIN. PREM. TRANSLATED COST PER RISK		980-$1042		5.43		-		-		1.29		1.23	2.91	

15 Yr. Ave. per 5420 Temp. 34 - 152 - 382 Credibility .132 Combined 31 - 135 - 381 p.p. .392 Rate .755 Ind. .753

MULTIPLE ACCIDENTS

44 - 1 - 2 Ma. D. & P.T. -
Ma. + 3 8 904
Mi. -
Total 2 743 728

YEAR	1947	1948	1949	1950	1951	MINIMUM PREM.	
IND. RATES	.85	.80	.85	.75	.75	14	
MANUAL RATES	.80	.80	.85	.75		1950 15	1951

EXHIBIT IV
TRANSLATION OF EXPERIENCE AND RATE CALCULATION
CLASSIFICATION 461, MACHINE SHOPS

A. MODIFIERS USED FOR TRANSLATION OF EXPERIENCE

Policy Year (1)	*Payroll* (2)	*Medical—Minor, Temp. Non-Comp.* (3)	*Policy Year* (4)	*Revalued Major & Minor Compensation* (5)	*Temporary Compensation* (6)
1944	1.51	1.60	1944—Bef. 7–1–45	1.11	1.42
1945	1.47	1.55	1944—Aft. 7–1–45	1.11	1.30
1946	1.46	1.40	1945—Bef. 7–1–45	1.08	1.41
1947	1.32	1.25	1945—Aft. 7–1–45	1.09	1.29
1948	1.21	1.15	1946	1.07	1.28
			1947	1.05	1.27
			1948—Bef. 7–1–49	1.03	1.26
			1948—Aft. 7–1–49	1.03	1.03

Average Value Death and P. T. $7,000.
Major Medical—as Reported.
Rate Formula: 1.90 p.p. + .01.
Minimum Premium Formula: 1.10 × Losses per Risk + $8: Maximum Payroll $1,200.

EXHIBIT IV (cont'd)
EXPERIENCE EXCLUDING LARGE RISKS AND MINIMUM PREMIUM RISKS
CLASSIFICATION 461, MACHINE SHOPS
B. EXPERIENCE AS REPORTED

Policy Year	Payroll (In Thousands)	All Losses	Death		Perm. Total		Major Permanent		Minor Permanent		Temporary		Medical—Minor, Temp. Non-Comp.	Pure Prem.
			No.	Amount	No.	Amount	No.	Comp.	Med.	No.	Comp.	No.	Comp.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1944	$118,553	$ 504,265	7	$31,859	4	$34,833	38	$71,245	$12,706	84	$44,972	1,532	$85,819	$222,881	$.43
1945	91,156	366,475	3	15,074	–	—	21	35,828	7,361	84	49,508	1,132	75,515	183,189	.40
1946	87,838	361,810	3	15,012	–	—	22	51,699	9,284	74	44,458	992	60,579	180,778	.41
1947	101,112	409,468	3	12,013	3	32,519	26	44,891	12,507	65	46,886	962	60,014	200,638	.40
1948	103,490	404,139	8	33,953	–	—	25	52,109	13,165	74	45,538	802	53,152	206,222	.39
Total	$502,149	$2,046,157	24	$107,911	7	$67,352	132	255,772	55,023	381	231,362	5,420	335,079	993,658	.41
1944—Before 7-1-45							34	67,589	12,163	74	39,668	1,437	79,890		
1944—After 7-1-45							4	3,656	543	10	5,304	95	5,929		
1945—Before 7-1-45							6	13,397	3,818	23	10,578	404	23,313		
1945—After 7-1-45							15	22,431	4,043	61	38,930	728	52,202		
1948—Before 7-1-49							22	47,365	10,314	70	42,089	776	51,208		
1948—After 7-1-49							3	4,744	2,851	4	3,449	26	1,944		
REVALUED MAJOR AND MINOR COMPENSATION															
1944—Before 7-1-45							34	87,831	—	74	51,470				
1944—After 7-1-45							4	4,202	—	10	5,855				
1945—Before 7-1-45							6	17,647	—	23	14,014				
1945—After 7-1-45							15	26,392	—	61	45,941				
1946							22	61,788	—	74	53,488				
1947							26	53,578	—	65	57,120				
1948—Before 7-1-49							22	57,760	—	70	51,752				
1948—After 7-1-49							3	4,744	—	4	3,449				

EXHIBIT IV (cont'd)

EXPERIENCE EXCLUDING LARGE RISKS AND MINIMUM PREMIUM RISKS
CLASSIFICATION 461, MACHINE SHOPS

C. EXPERIENCE AS TRANSLATED

Policy Year (1)	*Payroll (In Thousands)* (2)	*All Losses* (3)	*Death and Perm. Total* No. (4)	Amount (5)	*Major Perm.* No. (6)	Amount (7)	*Minor Perm.* No. (8)	Comp. (9)	*Temporary* No. (10)	Comp. (11)	*Medical— Minor, Temp., Non-Comp.* (12)	*Pure Premium* (13)
1944	$179,015	$733,176	11	$77,000	38	$114,863	84	$63,631	1,532	$121,152	$356,530	$.41
1945	133,999	525,553	3	21,000	21	55,187	84	65,211	1,132	100,212	283,943	.39
1946	128,243	484,259	3	21,000	22	75,397	74	57,232	992	77,541	253,089	.38
1947	133,468	497,756	6	42,000	26	68,764	65	59,976	962	76,218	250,798	.37
1948	125,223	494,080	8	56,000	25	77,544	74	56,857	802	66,524	237,155	.39
Total	699,948	2,734,824	31	217,000	132	391,755	381	302,907	5,420	441,647	1,381,515	.39
Pure Premium		.391		.031		.056		.043		.063	.197	

15 Yr. Ave. per 5,420 Temporaries

Death and P. T.	34
Major Perm.	152
Minor Perm.	382
Credibility	.132

5 Year Experience

Death and P. T.	31
Major Perm.	132
Minor Perm.	381
Credibility	.868

Weighted Averages

Death and P. T.	31
Major Perm.	135
Minor Perm.	381

Translated Losses—5 Years	$2,734,824
Add: 3 Major Perm.	8,904
Adjusted Losses	2,743,728

Five Years Pure Premium = $.391
Adjusted Pure Premium = .392

Rate = 1.90 x .391 + .01 = $.753
Rate = 1.90 x .392 + .01 = .755

Minimum Premium Calculation

(1)	Average Payroll Per Risk	$1,042.00
(2)	Average Loss Cost Per Risk	5.43
(3)	1.10 x (2) + $8 =	13.97
(4)	Indicated Minimum Premium	14.00

EXHIBIT V

TEST OF 1951 SELECTED RATES

Industry Classifications (1)	*Modified Payrolls Schedule Z 1944, 1945, 1946, 1947 and 1948 Ex. Large & M.P. Risks (000 omitted)* (2)	*Premiums at 1950 Manual Rates* (3)	*Premiums at 1951 Selected Rates* (4)	*Ratio Premiums at 1951 Selected Rates to Premiums at 1950 Rates* (4) ÷ (3) (5)
All Classes	$24,287,318	$142,885,355	$136,640,115	95.6
Manufacture and Utilities	9,934,070	63,761,355	62,146,034	97.5
Manufacture	9,822,627	62,499,633	60,858,143	97.4
Food Industries and Tobacco Mfg.	1,303,640	10,194,244	10,023,905	98.3
Textiles and Clothing Mfg.	2,778,548	6,263,940	6,153,515	98.2
Leather, Rubber and Composition Goods and Paper Manufacturing and Printing	1,369,810	7,026,289	6,932,953	98.7
Woodworking	433,461	5,081,051	4,906,472	96.6
Iron and Steel Making and Steel Fabricating	493,636	6,819,260	6,498,742	95.3
Foundries	338,123	3,594,293	3,667,533	102.0
Metal Working	1,025,013	8,515,326	8,057,007	94.6
Machinery Manufacturing	1,308,498	7,790,613	7,627,647	97.9
Stone and Clay Products and Glass Mfg.	476,652	4,590,869	4,442,867	96.8
Chemicals Industries	295,246	2,623,748	2,547,502	97.1
Utilities Operation	111,443	1,261,722	1,287,891	102.1
Contracting and Quarrying	2,051,784	30,234,052	28,163,420	93.2
Contracting	1,893,858	26,898,392	25,022,953	93.0
Mining and Quarrying	157,926	3,335,660	3,140,467	94.1
Excavation and Construction	319,355	6,287,273	5,916,135	94.1
Building Construction	713,215	10,054,352	9,396,843	93.5
Building Finishing	861,288	10,556,767	9,709,975	92.0
All Other Industries	12,301,464	48,889,948	46,330,661	94.8
Agriculture and Logging	74,378	3,723,970	3,567,330	95.8
Trucking, Storage and Material Dealers	1,549,405	17,232,447	15,985,474	92.8
Stores	3,124,303	9,389,028	8,966,972	95.5
Clerical and Professional Employments	5,584,570	6,410,981	6,019,873	93.9
All Other	1,968,808	12,133,522	11,791,012	97.2

EXHIBIT VI

PENNSYLVANIA RATE CHANGES

1939—1951

Rate Revision Date	*All Industries*		*Manufacture & Utilities*		*Contracting & Quarrying*		*Other Industries*	
	Rate Change	*Cumulative*	*Rate Change*	*Cumulative*	*Rate Change*	*Cumulative*	*Rate Change*	*Cumulative*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7–1–39	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
6–30–40	.895	.895	.900	.900	.898	.898	.888	.888
6–30–41	.865	.774	.848	.763	.864	.776	.884	.785
7–1–42	.903	.699	.875	.668	.845	.656	.981	.770
6–30–43	.905	.633	.935	.625	.857	.562	.907	.698
6–30–44	.917	.580	.945	.591	.910	.511	.886	.618
6–30–45	1.021[1]	.592	1.029[3]	.608	1.017[5]	.520	1.013[7]	.626
6–30–46	.899	.532	.968	.589	.872	.453	.835	.523
6–30–47	.996	.530	1.082	.637	.955	.433	.918	.480
6–30–48	.955	.506	.971	.619	.919	.398	.953	.457
6–30–49	1.042[2]	.527	1.075[4]	.665	.997[6]	.397	1.026[8]	.469
6–30–50	.926	.488	.915	.608	.857	.340	.987	.463
7–1–51	.956	.467	.975	.593	.932	.317	.948	.439

(1) Law Amendment Factor 1.08
(2) Law Amendment Factor 1.12
(3) Law Amendment Factor 1.07
(4) Law Amendment Factor 1.12
(5) Law Amendment Factor 1.09
(6) Law Amendment Factor 1.15
(7) Law Amendment Factor 1.09
(8) Law Amendment Factor 1.11

EXHIBIT VII

TOTAL EXPERIENCE—ALL INDUSTRIES

PAYROLLS, PREMIUMS AND LOSSES AS REPORTD BY POLICY YEARS, 1944—1948

Policy Year	Payroll (000 omitted)	Earned Standard Premium	Incurred Losses Unmodified	Ave. Rate	Loss Ratio	Pure Premiums					
						All	Death & P.T.	Major Perm.	Minor Perm.	Temp.	Med.
(1)	(2)	(3)	(4)	(3) ÷ (2) (5)	(4) ÷ (3) (6)	(4) ÷ (2) (7)	(8)	(9)	(10)	(11)	(12)
1944	$3,828,157	$25,494,079	$12,394,961	.67	.486	.32	.06	.07	.02	.06	.11
1945	3,900,231	25,641,034	12,970,624	.66	.506	.33	.06	.08	.02	.07	.11
1946	4,660,751	30,703,701	14,932,309	.66	.486	.32	.05	.07	.02	.06	.11
1947	5,438,519	34,208,857	17,032,348	.63	.498	.31	.04	.09	.02	.05	.11
1948	5,836,704	36,296,841	17,417,139	.62	.480	.30	.03	.10	.02	.04	.11
All	$23,664,362	$152,344,512	$ 74,747,381	.64	.491	.32	.05	.08	.02	.05	.11

PAYROLLS AND LOSSES AS REPORTED BY KIND OF INJURY—POLICY YEARS 1944—1948

Policy Year	Payroll (000 omitted)	All Losses	Death		Perm. Total		Major Perm.		Minor Perm.		Temporary		
			No.	Amount*	No.	Amount*	No.	Amount*	No.	Comp.	No.	Comp.	Medical
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1944	$3,828,157	$12,394,961	333	$1,300,175	110	$818,379	1,272	$2,775,921	1,447	$802,474	37,472	$2,403,667	$4,294,345
1945	3,900,231	12,970,624	375	1,361,670	98	786,932	1,434	3,104,550	1,471	881,924	37,123	2,540,089	4,295,459
1946	4,660,751	14,932,309	413	1,595,027	120	956,859	1,511	3,412,173	1,513	918,982	39,860	2,773,266	5,276,002
1947	5,438,519	17,032,348	425	1,653,757	97	758,943	1,753	4,768,984	1,550	969,900	39,309	2,740,520	6,135,244
1948	5,836,704	17,417,139	412	1,640,435	46	284,256	1,814	5,740,266	1,449	912,698	35,491	2,580,522	6,308,962
All	$23,664,362	$74,747,381	2,008	$7,556,064	471	$3,605,369	7,784	$19,801,894	7,430	$4,485,978	189,255	$12,988,064	$26,310,012

*Includes Medical Cost

Note: The above tabulations include Silicosis, Asbestosis and Lead cases at reported cost. They exclude Payrolls, Premiums and Losses for policies written under the War Projects Rating Plan.

EXHIBIT VIII

EXPERIENCE EX. LARGE AND EX. MINIMUM PREMIUM RISKS—ALL INDUSTRIES

PAYROLLS, PREMIUMS AND LOSSES AS REPORTED BY POLICY YEARS 1944—1948

Policy Year	Payroll (000 omitted)	Earned Standard Premium	Incurred Losses Unmodified	Ave. Rate	Loss Ratio	Pure Premiums					
						All	Death & P.T.	Major Perm.	Minor Perm.	Temp.	Med.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1944	$2,780,136	$17,909,330	$8,720,884	.64	.487	.31	.05	.07	.02	.06	.11
1945	3,006,645	19,421,008	9,657,874	.65	.497	.32	.05	.08	.02	.06	.11
1946	3,696,382	24,116,989	11,540,522	.65	.479	.31	.05	.07	.02	.06	.11
1947	4,266,809	26,480,080	13,037,995	.62	.492	.31	.04	.08	.02	.05	.11
1948	4,603,575	28,101,575	13,515,640	.61	.481	.29	.03	.10	.02	.04	.11
All	$18,353,547	$116,028,982	$56,472,915	.63	.487	.31	.04	.08	.02	.06	.11

PAYROLLS AND LOSSES AS REPORTED BY KIND OF INJURY—POLICY YEARS 1944—1948

Policy Year	Payroll (000 omitted)	All Losses	Death		Perm. Total		Major Perm.		Minor Perm.		Temporary		Medical
			No.	Amount*	No.	Amount*	No.	Amount*	No.	Comp.	No.	Comp.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1944	$2,780,136	$8,720,884	264	$873,067	64	$547,727	892	$1,876,474	1,036	$584,015	27,609	$1,741,220	$3,098,381
1945	3,006,645	9,657,874	249	917,525	54	504,153	1,094	2,312,330	1,142	675,556	28,961	1,948,478	3,299,832
1946	3,696,382	11,540,522	285	1,131,494	64	649,610	1,184	2,591,267	1,181	716,141	32,261	2,218,243	4,233,767
1947	4,266,809	13,037,995	310	1,187,692	48	487,895	1,350	3,578,971	1,195	756,473	31,581	2,174,773	4,852,191
1948	4,603,575	13,515,640	303	1,174,922	10	122,346	1,434	4,442,125	1,133	723,741	28,664	2,020,940	5,031,566
All	$18,353,547	$56,472,915	1,411	$5,284,700	240	$2,311,731	5,954	$14,801,167	5,687	$3,455,926	149,076	$10,103,654	$20,515,737

* Includes Medical Cost.

Note: These tabulations exclude Silicosis, Asbestosis and Lead Cases.

EXHIBIT IX

PAYROLLS AND LOSSES—EX. LARGE AND EX. MINIMUM PREMIUM RISKS—ALL INDUSTRIES
POLICY YEARS 1944—1948

Policy Year (1)	Payroll (000 omitted) (2)	All Losses (3)	Death No. (4)	Death Amount* (5)	Perm. Total No. (6)	Perm. Total Amount* (7)	Major Perm. No. (8)	Major Perm. Amount* (9)	Minor Perm. No. (10)	Minor Perm. Comp. (11)	Temporary No. (12)	Temporary Comp. (13)	Medical (14)	Pure Prem. (15)
DEATH, PERMANENT TOTAL, MAJOR PERMANENT AND MINOR PERMANENT COMPENSATION REVISED FOR 7-1-49 BENEFITS TEMPORARY COMPENSATION AND MEDICAL AS REPORTED; PAYROLLS AS REPORTED														
1944	$2,780,136	$9,697,214	264	$1,138,501	64	$759,838	892	$2,222,488	1,036	$736,786	27,609	$1,741,220	$3,098,381	.349
1945	3,006,645	10,442,729	249	1,137,050	54	618,087	1,094	2,627,045	1,142	812,237	28,961	1,948,478	3,299,832	.347
1946	3,696,382	12,323,701	285	1,374,764	64	759,279	1,184	2,892,753	1,181	844,895	32,261	2,218,243	4,233,767	.333
1947	4,266,809	13,975,659	310	1,465,863	48	563,667	1,350	4,012,961	1,195	906,204	31,581	2,174,773	4,852,191	.328
1948	4,603,575	14,472,415	303	1,429,540	10	140,951	1,434	4,988,306	1,133	861,112	28,664	2,020,940	5,031,566	.314
All	$18,353,547	$60,911,718	1,411	$6,545,718	240	$2,841,822	5,954	$16,743,553	5,687	$4,161,234	149,076	$10,103,654	$20,515,737	.332
TRANSLATED PAYROLLS, LOSSES AND PURE PREMIUMS														
1944	$4,164,133	$12,611,667	264	$1,634,914	64	$398,976	892	$2,444,232	1,036	$821,081	27,609	$2,465,633	$4,846,831	.303
1945	4,383,985	13,086,863	249	1,543,141	54	335,751	1,094	2,834,266	1,142	887,768	28,961	2,569,734	4,916,203	.299
1946	5,218,229	14,654,322	285	1,765,611	64	393,932	1,184	3,070,290	1,181	907,880	32,261	2,835,213	5,681,396	.281
1947	5,494,186	15,969,416	310	1,917,383	48	295,638	1,350	4,192,596	1,195	954,775	31,581	2,753,924	5,855,100	.291
1948	5,482,884	16,090,044	303	1,874,500	10	62,896	1,434	5,147,510	1,133	890,798	28,664	2,510,559	5,603,781	.293
All	$24,743,417	$72,412,312	1,411	$8,735,549	240	$1,487,193	5,954	$17,688,894	5,687	$4,462,302	149,076	$13,135,063	$26,903,311	.293
Pure Premium		.293		.035		.006		.071		.018		.053	.109	

*Includes Medical.

EXHIBIT X

PREMIUMS, LOSSES AND LOSS RATIOS REPORTED ON SCHEDULE Z, 1916–1948

ALL BUSINESS EXCEPT COAL MINING

Policy Year (1)	*Earned Premiums* (2)	*Incurred Losses* (3)	*Loss Ratio* (4)
All	$596,173,355	$316,760,017	53.1
1948	*32,847,073	17,417,139	53.0
1947	*31,553,518	17,032,348	54.0
1946	*28,400,833	14,932,309	52.6
1945	*24,167,292	12,970,624	53.7
1944	*23,853,688	12,394,961	52.0
1943	*25,061,537	12,462,169	49.7
1942	*25,227,932	12,371,735	49.0
1941	*25,689,254	11,587,701	45.1
1940	*24,410,626	10,445,846	42.8
1939	24,128,119	10,357,954	42.9
1938	26,559,185	12,298,641	46.3
1937	23,090,373	11,730,327	50.8
1936	19,037,858	10,356,332	54.4
1935	14,828,661	8,379,300	56.5
1934	14,019,352	7,559,295	53.9
1933	11,957,323	7,284,716	60.9
1932	10,769,288	7,185,892	66.7
1931	12,091,874	8,601,945	71.1
1930	15,031,567	11,012,894	73.3
1929	17,218,940	11,272,079	65.5
1928	17,020,083	10,164,332	59.7
1927	15,236,421	8,501,742	55.8
1926	14,393,349	8,273,042	57.5
1925	13,655,188	8,505,034	62.3
1924	12,241,359	8,079,041	66.0
1923	11,420,137	8,072,320	70.7
1922	9,718,041	6,792,394	69.9
1921	8,972,690	5,172,682	57.6
1920	14,352,391	6,290,100	43.8
1919	13,749,043	4,885,615	35.5
1918	14,521,691	4,683,397	32.3
1917	11,589,303	4,885,360	42.2
1916	9,359,366	4,800,751	51.3

* Net Premiums after returns under Retrospective and Defense Rating Plans.

THE NATIONAL DEFENSE PROJECTS RATING PLAN

BY
WILLIAM LESLIE, JR.

As this is written, a little more than a year has passed since it became the announced policy of the United States to rearm herself and her friends against a new threat to peace and security. American industry has shifted large amounts of industrial capacity to defense production with remarkable dispatch and the casualty insurance companies have followed suit with a revival of the special retrospective rating plan used for government contractors during the last war.

When work was begun on the present plan, the World War II Comprehensive Rating Plan for War Risks[1] was still in effect on a handful of projects although its official application to new projects had ceased as of July 1, 1947 when filings in the various states were withdrawn. Fundamentally, the National Defense Projects Rating Plan is simply a revival of the World War II plan, although sufficient changes in detail have been made to warrant bringing Mr. Haugh's paper up to date for the benefit of students and members of the Society.

The new plan, like its predecessor, provides for the wholesaling of automobile liability, general liability and workmen's compensation insurance in a retrospectively rated package to eligible defense contractors. As was the case with the World War II plan, this form of rating on a net as to commission basis places all types of insurance carriers on an equal footing, price-wise, and permits the Defense Department to place these forms of casualty insurance without resorting to bid.[2]

DEVELOPMENT OF THE PLAN

In the early summer of 1950 there were indications that the stepping up of the defense program might bring a request from the Defense Department for reactivation of the Comprehensive Rating Plan. Representatives of the insurance industry, aware of this, realized that such a revival would have to be made in the light of experience encountered in the operation of the old plan, the changed conditions with respect to workmen's compensation rate levels and the limitations imposed by the post-war development of universal rate regulation by the states in the liability field. (With a few notable exceptions, compensation insurance rates had been regulated by the states when the former plan was adopted). These considerations led the Mutual Casualty Insurance Rating Bureau and the National Bureau of Casualty Underwriters to appoint committees to meet jointly for the purpose of preparing concrete proposals on which the industry, through the National Council on Compensation Insurance and the independent state compensation rating bureaus, could agree prior to an official request for revival of the old plan from the Defense Department.

Their Joint Committee was composed of:
(American) Lumbermen's Mutual Casualty Company
American Mutual Liability Insurance Company
Employers' Mutual Liability Insurance Company of Wisconsin

[1] *Cf.* "The Comprehensive Insurance Rating Plan" by Charles J. Haugh; *Proceedings* Vol. XXVIII (1941-2) p. 535. A reading or rereading of this paper is essential to a clear understanding of the present plan.

[2] Mr. Haugh's paper, referred to above, gives a history of the unworkable situation resulting from the placing of this insurance on the basis of bids.