MULTIPLE INJURY ACCIDENTS AND LOSSES IN EXCESS OF ANY SPECIFIC RETENTION: - PENNSYLVANIA WORKMEN'S COMPENSATION

BY
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INTRODUCTION

In the fall of 1945, at the request of the Pennsylvania Insurance Commissioner, the Pennsylvania Compensation Rating and Inspection Bureau made an analysis of multiple injury accidents occurring under the workmen's Compensation Act. While at present the question of rate-making for this form of insurance in Pennsylvania is somewhat academic, the tabulations made in connection with the Bureau's study, as well as others which have been compiled since that time, are factual, and it is hoped they will serve as a statistical approach to the problem of determining pure premiums for excess workmen's compensation insurance.

SCOPE OF THE STUDY

Experience under excess contracts issued to self-insurers was available for policy years 1942 and 1943, but it was so limited that it had little value for rate-making purposes. Accordingly, the experience of the fifteen policy years 1928 to 1942, for insured risks other than coal mining, was selected as the basis for the study. This information was supplemented from the records of the Coal Mine Section of the Rating Bureau, for the fifteen calendar years 1930 to 1944. For risks other than coal mining, the experience of "Large Risks" and "Small Risks" was tabulated separately. "Large Risks" are those risks having a premium of approximately $10,000 or more at manual rates. "Small Risks" include all other risks with the exception of minimum premium risks, and it is this group whose experience forms the basis of Pennsylvania manual rates. The validity of a rate-making theory which expresses the rates for excess insurance contracts issued to self-insurers (usually very large risks) as a percentage of manual rates which, in Pennsylvania, are developed from the experience of the smaller risks, and in other states from the experience of all risks, both large and small, was questioned both by the Rating Bureau and the Insurance Department. For that reason the separate tabulations referred to above were made. Mr. Howard Crane, in his discussion of Mr. Cahill's excellent paper on "Excess Coverage (Per Accident Basis) for self-Insurers," (1) voiced much the same criticism of the "per cent of manual rate" method.

(1) P. C. A. S., Vol. XXVII.

The material here presented is developed for losses in excess of $10,000 per accident under a relatively low scale of benefits. However, the method used is equally applicable to experience under other benefit levels and with the same or higher retentions.

The experience, including coal mining, of the fifteen years included in the study developed a payroll exposure (translated to 1946 wage levels) of $55,607,373,000, total incurred losses of $235,815,200 (1946 basis), and excess losses over $10,000 per accident of $2,116,972 (1946 basis). There were 2,546 single accident cases involving cost in excess of $10,000 and 397 multiple injury cases involving injury to two or more persons.

MODIFICATION OF LOSSES AND PAYROLLS

Since the accidents under review occurred over a period of fifteen years, under different benefit levels, and in periods of varying wage rates, some means of translating the cost of the multiple injury cases, as well as all losses, to present-day levels was necessary. The first step in computing total losses was to tabulate the accidents by degree of injury for all classifications having multiple injury accidents, as well as for the total experience by major industry divisions. Separate tabulations were made for "Large Risks" and "Small Risks." The average cost per case for each kind of injury (except Permanent Total) as used in the 1946 rate revision was then multiplied by the number of accidents and the results tabulated in the manner shown in Table III. The values for single accident cases are as follows:

Kind of Injury (1)	Average Comp. and Med. (2)	Average Comp. (3)
Death	$ 4 100	
Perm. Total	9 200	
Major Perm.	2 469	
Minor Perm.	690	$592.00
Temporary		71.36

Medical cost of Minor Perm., Temp., and Non-Comp. as reported x 1.05.

(The Value assigned to Permanent Total cases will be discussed later in connection with the valuation of losses for excess of $10,000.)

Payrolls were translated by wage factors to the current wage level by the following procedure:

(1) The average weekly compensation wage for each of the major industry divisions was tabulated for each policy year of the fifteen-year period and the numerical average was then determined. These averages are as follows:

Manufacture and Utilities	$25.04
Contracting and Quarrying	28.63
Other Industries	22.32

(2) The anticipated average weekly compensation wages for 1946-1947 are as follows:

Manufacture and Utilities	$46.00
Contracting and Quarrying	49.00
Other Industries	39.00

(3) Payroll multipliers were determined by finding the ratio between 1946-1947 anticipated wages and the numerical averages shown for the fifteen-year period. These multipliers, which were applied to payrolls as reported, are as follows:

Manufacture and Utilities	$ 1.84
Contracting and Quarrying	1.71
Other Industries	1.75

VALUATION OF LOSSES FOR EXCESS OVER $10,000

1. FATALITIES.

Of the several kinds of injury, the cost of death cases varies with dependency. The No Dependency cases were taken at $300 - the funeral and medical cost. A death case involving a widow and three

children at maximum weekly compensation rates, without discount for death or remarriage of the widow, and with the average ages of the children being 5.5, 8.9 and 11.4 years respectively, (2) amounts to $7,458, including funeral and medical, under the present Pennsylvania scale of benefits. In the case of a widow and nine children of ages 0, 2, 6, 8, 9, 11, 13, 14 and 16 years, the amount is $10,836. Out of 1635 Fatalities in Policy Years 1939 to 1942, Table V, there were 320 "No Dependency" cases, and 145 with a widow and three or more children. The aggregate cost of the cases of widow and three or more children was $1,159,028 or an average of $7,993 ($8,000). In every one hundred cases, therefore, it was assumed that Fatalities would be distributed in the following manner:

Dependency	No.	Average Cost
All	100	4 100
Widow and 3 or more children	9	8 000
Other dependents	71	4 676
No dependents	20	300

In the case of two-person injuries involving one or more deaths and also in the three-person and four-person cases, the range in possible cost - from $300 to $10,836 for a single death - is so great that the average death value has little significance. The probability of a death with widow and three or more children must be taken into account.

Given a two-death accident, the probability that both deaths will be of the $8,000 class is:

$$(.09)^2 = .0081$$

The probability that one will be an $8,000 case and the other a $4,676 case is:

$$2(.09)(.71) = .1278$$

and the amount of the probable excess over $10,000 is:

(2) See "A Statistical Approach to Compensation Benefits" by G. C. Kelly, P. C. A. S. Vol. XXXII.

($16,000 - $10,000).0081 = $ 49

($12,676 - $10,000).1278 = 342

$391

Given a three-death accident, the combinations which will produce a loss in excess of $10,000 have the following probabilities:

(1) Three $8,000:

$(.09)^3 = .0073$

(2) Two $8,000, one $4,676:

$3(.09)^2(.71) = .01725$

(3) Two $8,000, one $300:

$3(.09)^2(.20) = .00486$

(4) One $8,000, two $4,676:

$3(.09)(.71)^2 = .13611$

(5) One $8,000, one $4,676, one $300:

$6(.09)(.71)(.20) = .07668$

(6) Three $4,676:

$(.71)^3 = .35791$

The sum of these probabilities, that is, the chance that in any three-death accident the cost will exceed $10,000 is .59354.

The value of these probabilities is as follows:

(1) ($24,000 - $10,000) = $ 10

(2) ($20,676 - $10,000) = 184

(3) ($16,300 - $10,000) = 31

(4) ($17,352 - $10,000) = 1,001

(5) ($12,976 - $10,000) = 228

(6) ($14,028 - $10,000) = $1,442

$2,896

Similarly, in four-death accident, the combinations which will produce a loss in excess of $10,000 have the following probabilities:

(1) Four $8,000:

$(.09)^4 = .00007$

(2) Four $4,676:

$(.71)^4 = .25412$

(3) Three $8,000, one $4,676:

$4(.09)^3(.71) = .00207$

(4) Three $8,000, one $300:

$4(.09)^3(.20) = .00058$

(5) Two $8,000, two $4,676:

$6(.09)^2(.71)^2 = .02450$

(6) Two $8,000, two $300:

$6(.09)^2(.20)^2 = .00194$

(7) Two $8,000, one $4,676, one $300:

$12(.09)^2(.71)(.20) = .01380$

(8) One $8,000, three $4,676:

$4(.09)(.71)^3 = .12885$

(9) One $8,000, two $4,676, one $300:

$12(.09)(.71)^2(.20) = .10889$

(10) One $8,000, one $4,676, two $300:

$12(.09)(.71)(.20)^2 = .03067$

(11) Three $4,676, one $300:

$$4(.71)^3(.20) \quad .28633$$

The sum of these probabilities is .85182, and their value is:

(1)	($32,000 - $10,000).00007 =	$ 2
(2)	($18,704 - $10,000).25412 =	2,212
(3)	($28,676 - $10,000).00207 =	39
(4)	($24,300 - $10,000).00058 =	8
(5)	($25,352 - $10,000).02450 =	376
(6)	($16,600 - $10,000).00194 =	13
(7)	($20,976 - $10,000).01380 =	151
(8)	($22,028 - $10,000).12885 =	1,550
(9)	($17,652 - $10,000).10889 =	833
(10)	($13,276 - $10,000).03067 =	100
(11)	($14,328 - $10,000).28633 =	1,239
		$6,523

Accidents involving five or more deaths can be used at the general average, as is evident from the following tabulation:

Multiple Injury Involving	Value for Excess of $10,000	Value at General Average
Two Deaths	$10,391	$ 8,200
Three Deaths	12,896	12,300
Four Deaths	16,523	16,400

2. PERMANENT TOTAL DISABILITY.

Because of the advanced age of persons incurring Permanent Total Disability, it is reasonable to include a mortality factor for

deaths occurring during the 500 week benefit period provided under the Pennsylvania Act. The average age of persons incurring Permanent Total Disability for the four policy years 1939 to 1942 was 49.9 years. Using the mortality rates of the Table for Lives Disabled by Industrial Accidents, it was found that 30.51 deaths per hundred could be expected during the 500 week period. (See Table VI.) If it is assumed that these 30 deaths will be equally distributed over the 500 week period, then the average compensation period for such cases will be 250 weeks. This is equivalent to $8,500 compensation at the maximum rate of $20 per week, and, with medical costs of $700, makes a total cost per case of $9,200. This average can be represented by 70 cases of $10,700 and 30 cases of $5,700. The value of these for excess of $10,000, because of the relatively small number of cases, can be taken at ($10,700 - $10,000).70 or $490 each.

3. MULTIPLE INJURIES.

An accident involving one Death and one case of Permanent Total Disability, since nearly all such cases will exceed $10,000, can be taken at:

$$(4,100 + \$9,200) - \$10,000 = \$3,300.$$

Cases of two Permanent Total Disabilities can be taken at ($9,200 x 2) - $10,000 = $8,400; one Permanent Total Disability and one Major Permanent at ($9,200 + $2,469) - $10,000 = $1,669.

The following cases may be disregarded, since there is little chance they will exceed $10,000:

Two Major Permanents

One Death and one Major Permanent

One Death and one Minor Permanent

One Permanent Total and one Minor Permanent

One Major and one Minor Permanent

Two Minor Permanents

The values used for excess of $10,000 may be summarized as follows:

Values for Excess of $10,000:

Single Accident Cases:	
1 Permanent Total	$ 490
Multiple Injury Cases:	
2 Permanent Totals	8 400
1 Death, 1 Perm. Total	3 300
1 Perm. Total, 1 Major Perm.	1 669
2 Deaths	391
2 Deaths, 1 Perm. Total	7 400
1 Death, 1 Perm. Total, 1 Major Perm.	5 769
1 Perm. Total, 2 Major Perm.	4 138
3 Deaths	2 896
2 Deaths, 1 Major Perm.	669
4 Deaths	6 523
2 Deaths, 2 Major Perm.	3 138

TABULATION OF MULTIPLE INJURY ACCIDENTS

All multiple injury accidents occurring during the fifteen-year period were reviewed. There were very few Temporary injuries in these accidents, and the cost of such injuries, as well as the medical cost of non-compensable cases was disregarded. The remaining multiple injury accidents were tabulated by manual classification and by type of accident. The cost of each case was computed and if it exceeded $10,000 the excess loss above that amount was tabulated in the manner shown in Table IV. The excess cost for single cases of Permanent Total Disability was added to that for the multiple injury cases in order to determine the total excess cost for each classification and industry group. Tables VIII and IX show a summary by industry group of the accidents and the cost in excess of $10,000 per accident, by number of persons injured. Pure premiums were calculated for total losses and for excess losses. These pure

premiums, as well as the ratios of excess losses to total losses, for each industry group, are shown in Table I.

COAL MINING

The period selected for study of coal mine experience was the fifteen calendar years 1930-1944. In general, the same methods were followed and need not be repeated in detail here. The following summary shows the values used in computing the excess cost for coal mining:

1. Averages for Computing Total Losses:

Kind of Injury	Average Comp. & Med.	Average Comp.
Death	$4 600	
Perm. Total	9 400	
Major Perm. (ex. Disfig.)	3 815	
Disfigurement		$270
Minor Perm.		590
Temporary		98.34

Medical Cost of Disfigurement, Minor Perm., Temp. and Non-Comp. as reported.

2. Dependency Distribution of Fatal Cases:

Dependency	No.	Average Cost
All	100	$4 600
Widow and 3 or more Children	21	8 300
Other dependents	65	4 331
No dependents	14	300

3. Comparison of Values of Death Cases Calculated from Dependency Distribution and General Average:

Multiple Injury Involving	Value for Excess of $10,000	Value at General Average
2 Deaths	$11 009	$ 9 200
3 Deaths	14 217	13 800
4 Deaths	18 475	18 400

4. Values for Excess of $10,000

Single Accident Cases:

1 Permanent Total	$ 518

Multiple Injury Cases:

2 Permanent Totals	8 800
1 Death, 1 Perm. Total	4 000
1 Perm. Total, 1 Major Perm.	3 215
2 Deaths	1 009
3 Deaths	4 217
1 Death, 2 Major Perm.	2 230
3 Major Perm.	1 445
4 Deaths	8 475
2 Deaths, 2 Major Perm.	6 830
3 Deaths, 1 Perm. Total, 1 Major Perm.	17 015
4 Deaths, 1 Major Perm.	12 215

5. Calculation of Wage Factors for Translation of Payrolls:

(a) Numerical average of compensation wages of each year of the fifteen years is as follows:

Anthracite Mining	32.01
Bituminous Mining	27.81

(b) Anticipated Compensation Wages - 1946

Anthracite Mining	57.50
Bituminous Mining	56.50

(c) Ratios - (b) ÷ (a)

Anthracite Mining	1.80
Bituminous Mining	2.03 (Use 2.00)

CONCLUSION

Several conclusions may be drawn from a review of the material compiled in the course of this study. First, with the exception of Coal Mining and Explosives Manufacturing, the cost in excess of $10,000 per accident under current Pennsylvania benefits is so small as to be almost negligible. Reference to the pure premiums shown in Table I, will readily support such a conclusion. As a matter of fact, the Classification and Rating Committee of the Pennsylvania Bureau adopted the following motion in its meeting of December 6, 1945:

> "To adopt an 'A' rating procedure for the premium rates, with a minimum rate of $.01 for a limit of $250,000 in excess of $10,000."

The minimum rate of $.01 was selected since it was felt that, even though the pure premium in the Manufacturing and Other Industries groups indicated that rates of less than $.01 would be adequate, contracts involving a potential castastrophe hazard should not be written at a lower figure. Even at a rate of $.01 per hundred dollars of payroll, the premium collected amounts to little more than a "service charge," and a very small one, at that.

Secondly, it is the writer's opinion that rates for excess coverage on a per-accident basis, which are expressed as a percentage of the manual rate, are not calculated on a sound actuarial basis, in view of the well-defined differences between "large" and "small" risks found in this study. Again referring to Table I, it will be noted that the difference in excess pure premium between large and small risks is quite marked for Manufacturing and Explosives. In the Manufacturing group, the pure premium for large risks is about three times that for small risks, whereas in the Explosives Manufacturing classification, on a much smaller exposure, the situation is reversed, the pure premium for small risks being about eight times that for the large risks. In the Contracting and Quarrying and Other Industries groups, the difference is not so great, but in each case the excess pure premium is greater for the large risks than it is for the small risks. Significant differences will

also be noted in the ratios of excess losses to total losses - an important factor in the consideration of rates for this type of insurance. In the Manufacturing group, this ratio for large risks is more than double that for small risks, but in the Contracting and Quarrying group, the situation is just the reverse, the ratio for the small risks being nearly three times that for the large risks. Therefore, in view of the differences between the experience of large and small risks, as demonstrated in this study, as well as others, (3) it does seem that the rate-making method which relates the premium rate for excess insurance to the manual rate, should be given further study, and an effort made to develop a method which will produce rates based on the experience of risks which are similar to those to which the rates will be applied.

(3) For example, "Small Risks versus Large Risks in Workmen's Compensation Insurance" by Mark Kormes, P. C. A. S., Vol. XXIII.

TABLE I

SUMMARY OF EXPERIENCE TAKEN FROM PENNSYLVANIA SCHEDULE Z - EXCLUSIVE OF MINIMUM PREMIUM RISK EXPERIENCE
POLICY YEARS 1928-1942
PAYROLLS AND LOSSES TRANSLATED TO CURRENT WAGES AND BENEFITS

Industry (1)	Modified Payrolls (000 omitted) (2)	All Losses (3)	Excess Losses Over $10,000 Per Accident (4)	Pure Premium All Losses (5)	Pure Premium Excess Losses (6)	Ratio (Per Cent) - Excess Losses to Total Losses (7)
All	$55 607 373	$235 815 200	$2 116 972	$.4241	$.0038	0.90
Mfg. (Ex. Explosives) and Utilities	23 147 161	78 908 483	369 040	.3409	.0016	0.47
Large Risks	4 871 762	20 447 674	162 055	.4197	.0033	0.79
Small Risks	18 275 399	58 460 809	206 985	.3199	.0011	0.35
Explosives	29 731	323 843	74 008	1.0892	.2489	22.85
Large Risks	8 326	41 993	3 386	.5044	.0407	8.06
Small Risks	21 405	281 850	70 622	1.3167	.3299	25.06
Contracting and Quarrying	3 403 732	54 163 007	543 598	1.5913	.0160	1.00
Large Risks	494 648	19 771 413	94 415	3.9971	.0191	0.48
Small Risks	2 909 084	34 391 594	449 183	1.1822	.0154	1.31
Other Industries	27 320 695	64 099 779	445 837	.2346	.0016	0.70
Large Risks	5 230 951	12 121 332	111 839	.2317	.0021	0.92
Small Risks	22 089 744	51 978 447	333 998	.2353	.0015	0.64
Coal Mining *	1 706 054	38 320 088	684 489	2.2461	.0401	1.79
Anthracite	351 590	10 073 528	202 803	2.8651	.0577	2.01
Bituminous	1 354 464	28 246 560	481 686	2.0854	.0356	1.71

Note: The term "small risks" in this tabulation refers to risks greater than Minimum Premium but less than approximately $10,000 annual premium at Manual rates.

* Coal Mining experience is for calendar years 1930-1944.

TABLE II

ACCIDENTS BY DEGREE OF INJURY
AND
PAYROLLS AS REPORTED
LARGE RISK EXPERIENCE - POLICY YEARS 1928-1942
BY INDUSTRY DIVISIONS AND CLASSES WITH MULTIPLE INJURY ACCIDENTS
RISKS OF APPROXIMATELY $10,000 OR MORE ANNUAL PREMIUM AT MANUAL RATES

Manual Code No.	Industry (1)	Payroll as Reported (000 omitted) (2)	Number of Accidents by Kind					Medical Cost - Minor, Temp., Non-Comp. as Reported x 1.05 (8)
			Death (3)	Perm. Total (4)	Major Perm. (5)	Minor Perm. (6)	Temp. (7)	
	All	5 930 605	1 793	611	3 607	3 284	88 322	22 257 443
	Mfg. (Ex. Explosives) and Utilities	2 647 697	891	291	1 515	2 452	48 762	5 445 599
	Explosives Mfg.	4 525	5	1	1	-	34	7 398
	Contracting and Quarrying	289 268	304	110	929	358	12 399	14 122 583
	Other Industries	2 989 115	593	209	1 162	474	27 127	2 681 863
	CLASSIFICATIONS WITH MULTIPLE INJURY ACCIDENTS							
255	Paper Mfg.	52 325	14	-	37	53	1 731	168 963
257	Paper Goods Mfg.	3 110	4	-	2	3	151	7 228
401	Blast Furnaces	9 120	12	1	8	6	257	42 326
404	Steel Mills	130 886	33	7	129	143	3 210	410 929
411	Bridge Shops	65 602	26	4	64	105	1 551	223 653
416	Railroad Car Mfg.	52 211	12	2	61	93	1 552	194 759
718	Ship Building	15 276	6	1	21	14	332	70 620
421	Steel Foundries	132 502	50	16	97	166	2 411	296 668
425	Iron Foundries	55 566	7	4	37	44	1 692	174 164
431	Forging Works	30 896	4	1	26	52	1 217	126 882
451	Auto Body Mfg.	76 999	11	2	83	240	1 272	163 920
454	Sheet Metal Shop	37 273	4	-	18	86	651	88 064

TABLE II (Cont'd)

ACCIDENTS BY DEGREE OF INJURY
AND
PAYROLLS AS REPORTED
LARGE RISK EXPERIENCE - POLICY YEARS 1928-1942
BY INDUSTRY DIVISIONS AND CLASSES WITH MULTIPLE INJURY ACCIDENTS
RISKS OF APPROXIMATELY $10,000 OR MORE ANNUAL PREMIUM AT MANUAL RATES

Manual Code No.	Industry (1)	Payroll as Reported (000 omitted) (2)	Number of Accidents by Kind					Medical Cost - Minor, Temp., Non-Comp. as Reported x 1.05 (8)
			Death (3)	Perm. Total (4)	Major Perm. (5)	Minor Perm. (6)	Temp. (7)	
463	Auto Mfg.	78 852	4	1	16	65	932	111 950
501	Cement Mfg.	25 343	12	-	11	12	160	59 166
555	Drug Mfg.	376	1	-	2	-	12	987
581	Oil Refining	50 484	12	1	25	18	711	100 584
755	Electric Utilities	174 105	110	10	93	36	1 600	337 964
005	Tree Pruning	2 017	3	-	14	1	102	14 343
593	Explosives Mfg.	4 525	5	1	1	-	34	7 398
028	Oil and Gas Production	17 302	9	2	32	30	521	63 400
051	Quarries	16 134	26	1	26	13	696	58 067
601	Road Construction	74 068	75	22	149	66	4 376	289 754
605	Railroad Construction	23 427	43	6	89	18	1 265	102 444
615	Tunneling	4 214	8	4	42	27	320	45 904
654	Concrete Construction	46 928	63	14	179	58	2 418	314 665
675	Millwrighting	6 872	2	1	6	8	109	18 674
910-928	Stores	815 707	43	16	136	83	5 796	693 381
980	Cities, Towns and Boroughs	820 031	296	107	594	202	8 875	850 151
701	Stevedoring	22 491	22	10	164	50	3 133	165 024

TABLE III

MODIFIED LOSSES AND PAYROLLS
LARGE RISK EXPERIENCE - POLICY YEARS 1928-1942
BY INDUSTRY DIVISIONS AND CLASSES WITH MULTIPLE INJURY ACCIDENTS
RISKS OF APPROXIMATELY $10,000 OR MORE ANNUAL PREMIUM AT MANUAL RATES

Manual Code No.	Industry (1)	Modified Payrolls (000 omitted) (2)	Total Incurred Losses (3)	Death (4)	Perm. Total (5)	Major Perm. (6)	Minor Perm. (7)	Temp. (8)	Modified Medical Cost (9)
	All	10 605 687	52 382 412	7 351 300	5 621 200	8 905 683	1 944 128	6 302 658	22 257 443
	Mfg. (Ex. Explosives) and Utilities	4 871 762	20 447 674	3 653 100	2 677 200	3 740 535	1 451 584	3 479 656	5 445 599
	Explosives Mfg.	8 326	41 993	20 500	9 200	2 469	-	2 426	7 398
	Contracting and Quarrying	494 648	19 771 413	1 246 400	1 012 000	2 293 701	211 936	884 793	14 122 583
	Other Industries	5 230 951	12 121 332	2 431 300	1 922 800	2 868 978	280 608	1 935 783	2 681 863
	CLASSIFICATIONS WITH MULTIPLE INJURY ACCIDENTS								
255	Paper Mfg.	96 278	472 616	57 400	-	91 353	31 376	123 524	168 963
257	Paper Goods Mfg.	5 722	41 117	16 400	-	4 938	1 776	10 775	7 228
401	Blast Furnaces	16 781	142 370	49 200	9 200	19 752	3 552	18 340	42 326
404	Steel Mills	240 830	1 242 852	135 300	64 400	316 501	84 656	229 066	410 929
411	Bridge Shops	120 708	697 908	106 600	36 800	158 016	62 160	110 679	223 653
416	Railroad Car Mfg.	96 068	578 775	49 200	18 400	150 609	55 056	110 751	194 759
718	Ship Building	28 108	188 249	24 600	9 200	51 849	8 288	23 692	70 620
421	Steel Foundries	243 804	1 158 682	205 000	147 200	239 493	98 272	172 049	296 668
425	Iron Foundries	102 230	477 806	28 700	36 800	91 353	26 048	120 741	174 164
431	Forging Works	56 849	334 305	16 400	9 200	64 194	30 784	86 845	126 882
451	Auto Body Mfg.	141 678	665 197	45 100	18 400	204 927	142 080	90 770	163 920
454	Sheet Metal Shop	68 582	246 273	16 400	-	44 442	50 912	46 455	88 064
463	Auto Mfg.	145 088	282 042	16 400	9 200	39 504	38 480	66 508	111 950
501	Cement Mfg.	46 631	154 047	49 200	-	27 159	7 104	11 418	59 166
555	Drug Mfg.	692	10 881	4 100	-	4 938	-	856	987
581	Oil Refining	92 891	282 102	49 200	9 200	61 725	10 656	50 737	100 584

TABLE III (Cont'd)

MODIFIED LOSSES AND PAYROLLS
LARGE RISK EXPERIENCE - POLICY YEARS 1928-1942
BY INDUSTRY DIVISIONS AND CLASSES WITH MULTIPLE INJURY ACCIDENTS
RISKS OF APPROXIMATELY $10,000 OR MORE ANNUAL PREMIUM AT MANUAL RATES

Manual Code No.	Industry (1)	Modified Payrolls (000 omitted) (2)	Total Incurred Losses (3)	Death (4)	Perm. Total (5)	Major Perm. (6)	Minor Perm. (7)	Temp. (8)	Modified Medical Cost (9)
755	Electric Utilities	320 353	1 246 069	451 000	92 000	229.617	21 312	114 176	337 964
005	Tree Pruning	3 711	69 080	12 300	-	34 566	592	7 279	14 343
593	Explosives Mfg.	8 326	41 993	20 500	9 200	2 469	-	2 426	7 398
028	Oil and Gas Production	29 586	252 647	36 900	18 400	79 008	17 760	37 179	63 400
051	Quarries	27 589	295 424	106 600	9 200	64 194	7 696	49 667	58 067
601	Road Construction	126 656	1 518 878	307 500	202 400	367 881	39 072	312 271	289 754
605	Railroad Construction	40 060	654 611	176 300	55 200	219 741	10 656	90 270	102 444
615	Tunneling	7 206	258 021	32 800	36 800	103 698	15 984	22 835	45 904
654	Concrete Construction	80 247	1 350 600	258 300	128 800	441 951	34 336	172 548	314 665
675	Millwrighting	11 751	63 402	8 200	9 200	14 814	4 736	7 778	18 674
910-928	Stores	1 427 487	1 815 404	176 300	147 200	335 784	49 136	413 603	693 381
980	Municipalities	1 435 054	5 267 641	1 213 600	984 400	1 466 586	119 584	633 320	850 151
701	Stevedoring	39 359	1 005 311	90 200	92 000	404 916	29 600	223 571	165 024

TABLE IV

EXCESS LOSSES OVER $10,000 PER ACCIDENT
LARGE RISK EXPERIENCE - POLICY YEARS 1928-1942
BY INDUSTRY DIVISIONS AND CLASSES WITH MULTIPLE INJURY ACCIDENTS
RISKS OF APPROXIMATELY $10,000 OR MORE ANNUAL PREMIUM AT MANUAL RATES

Industry (1)	Modified Payrolls (000 omitted) (2)	All Losses (3)	Excess Over $10,000 Per Accident - Injury to Specified No. of Persons						
			Total (4)	Single Cases of P. T. Disability (5)	Multiple Injury Accidents: All Multiples (6)	2 (7)	3 (8)	4 (9)	5 or More (10)
All	10 605 687	52 382 412	371 695	299 390	72 305	17 081	20 249	6 523	28 452
Mfg. (Ex. Explosives) and Utilities	4 871 762	20 447 674	162 055	142 590	19 465	3 128	5 792	-	10 545
Explosives Mfg.	8 326	41 993	3 386	490	2 896	-	2 896	-	-
Contracting and Quarrying	494 648	19 771 413	94 415	53 900	40 515	7 420	8 665	6 523	17 907
Other Industries	5 230 951	12 121 332	111 839	102 410	9 429	6 533	2 896	-	-
CLASSIFICATIONS WITH MULTIPLE INJURY ACCIDENTS									
Paper Mfg.	96 278	472 616	-	-	-	-	-	-	-
Paper Goods Mfg.	5 722	41 117	2 896	-	2 896	-	2 896	-	-
Blast Furnaces	16 781	142 370	881	490	391	391	-	-	-
Steel Mills	240 830	1 242 852	3 821	3 430	391	391	-	-	-
Bridge Shops	120 708	697 908	2 351	1 960	391	391	-	-	-
Railroad Car Mfg.	96 068	578 775	980	980	-	-	-	-	-
Ship Building	28 108	188 249	490	490	-	-	-	-	-
Steel Foundries	243 804	1 158 682	10 736	7 840	2 896	-	2 896	-	-
Iron Foundries	102 230	477 806	1 960	1 960	-	-	-	-	-
Forging Works	56 849	334 305	490	490	-	-	-	-	-
Auto Body Mfg.	141 678	665 197	980	980	-	-	-	-	-
Sheet Metal Shop	68 582	246 273	391	-	391	391	-	-	-
Auto Mfg.	145 088	282 042	490	490	-	-	-	-	-
Cement Mfg.	46 631	154 047	782	-	782	782	-	-	-

TABLE IV (Cont'd)

EXCESS LOSSES OVER $10,000 PER ACCIDENT
LARGE RISK EXPERIENCE - POLICY YEARS 1928-1942
BY INDUSTRY DIVISIONS AND CLASSES WITH MULTIPLE INJURY ACCIDENTS
RISKS OF APPROXIMATELY $10,000 OR MORE ANNUAL PREMIUM AT MANUAL RATES

Industry (1)	Modified Payrolls (000 omitted) (2)	All Losses (3)	Excess Over $10,000 Per Accident - Injury to Specified No. of Persons						
			Single Cases of P. T. Disability		Multiple Injury Accidents				
			Total (4)	(5)	All Multiples (6)	2 (7)	3 (8)	4 (9)	5 or More (10)
Drug Mfg.	692	10 881	-	-	-	-	-	-	-
Oil Refining	92 891	282 102	881	490	391	391	-	-	-
Electric Utilities	320 353	1 246 069	5 291	4 900	391	391	-	-	-
Tree Pruning	3 711	69 080	10 545	-	10 545	-	-	-	10 545
Explosives Mfg.	8 326	41 993	3 386	490	2 896	-	2 896	-	-
Oil and Gas Production	29 586	252 647	980	980	-	-	-	-	-
Quarries, N. O. C.	27 589	295 424	881	490	391	391	-	-	-
Road Construction	126 656	1 518 878	32 025	10 780	21 245	3 338	-	-	17 907
Railroad Construction	40 060	654 611	3 331	2 940	391	391	-	-	-
Tunneling	7 206	258 021	8 483	1 960	6 523	-	-	6 523	-
Concrete Construction	80 247	1 350 600	15 525	6 860	8 665	-	8 665	-	-
Millwrighting	11 751	63 402	3 790	490	3 300	3 300	-	-	-
Stores	1 427 487	1 815 404	10 736	7 840	2 896	-	2 896	-	-
Municipalities	1 435 054	5 267 641	58 963	52 430	6 533	6 533	-	-	-
Stevedoring	39 359	1 005 311	4 900	4 900	-	-	-	-	-

TABLE V

DEPENDENCY DISTRIBUTION OF FATAL CASES
PENNSYLVANIA EXPERIENCE - EXCLUDING COAL MINING
POLICY YEARS 1939-1942

Dependency	Number of Cases
All	1 635
No Dependents	320
Widow Only	521
All Widows and Children:	534
Widow and 1 child	234
" " 2 children	155
" " 3 "	74
" " 4 "	37
" " 5 "	16
" " 6 "	13
" " 7 "	3
" " 8 "	1
" " 9 "	1
All Other Children:	52
1 Orphan child	21
2 " children	14
3 " "	10
4 " "	4
5 " "	2
6 " "	-
7 " "	1
Parents	192
Brothers or Sisters	1
Dependents Unknown	15

TABLE VI

CASES OF PERMANENT TOTAL DISABILITY
AS REPORTED ON PENNSYLVANIA SCHEDULE "Z"
POLICY YEARS 1939-1942

Age of Injured (1)	No. of Cases (2)	Average Age (3)	Number, per 100, of Deaths During 500 Weeks from Date of Accident * (4)	No. of Deaths (4) x (2) ÷ 100 (5)
All	286	49.9	30.51	87.27
Under 20	5	17.8	22.88	1.14
20 and under 25	16	22.2	21.12	3.38
25 and under 30	12	27.2	18.25	2.19
30 and under 35	16	32.2	15.76	2.52
35 and under 40	23	36.6	15.72	3.62
40 and under 45	28	42.0	18.39	5.15
45 and under 50	26	46.7	22.51	5.85
50 and under 55	37	51.8	27.06	10.01
55 and under 60	29	57.4	30.88	8.96
60 and under 65	38	62.0	36.27	13.78
65 and under 70	28	66.9	48.31	13.53
70 and under 75	8	71.5	60.90	4.87
75 and under 80	12	76.3	74.98	9.00
80 and under 85	2	82.0	87.73	1.75
Age not given	6	49.9	25.27	1.52

* From "Table for Lives Disabled by Industrial Accidents"

TABLE VII

EXHIBIT OF MULTIPLE INJURY ACCIDENTS
PENNSYLVANIA INSURED RISKS - POLICY YEARS 1928-1942
LARGE RISK EXPERIENCE

Code No.	Industry	INJURY TO SPECIFIED NUMBER OF PERSONS							
		Two		Three		Four		Five or More	
		Number of Accidents	Type of Accident	Number of Accidents	Type of Accident	Number of Accidents	Type of Accident	Number of Accidents	Type of Accident
	ALL MFG. (EX. EXPLOSIVES)	18	-	3	-	-	-	-	-
255	Paper Mfg.	2	1 D., 1 M.	-	-	-	-	-	-
259	Paper Goods Mfg.	-	-	1	3 D.	-	-	-	-
401	Blast Furnaces	1	2 D.	-	-	-	-	-	-
404	Steel Mfg.	1	2 D.	-	-	-	-	-	-
411	Bridge Shops	1	2 D.	-	-	-	-	-	-
	" "	1	1 D., 1 M.	-	-	-	-	-	-
416	Rwy. Car Mfg.	1	1 M., 1 Min.	-	-	-	-	-	-
421	Steel Foundries	2	1 D., 1 M.	1	3 D.	-	-	-	-
425	Iron Foundries	1	1 D., 1 M.	-	-	-	-	-	-
431	Forging Works	1	2 M.	-	-	-	-	-	-
451	Auto Body Mfg.	1	1 D., 1 M.	-	-	-	-	-	-
454	Sheet Metal, Shop	1	2 D.	-	-	-	-	-	-
463	Auto Mfg.	1	1 D., 1 M.	-	-	-	-	-	-
501	Cement Mfg.	2	2 D.	-	-	-	-	-	-
555	Drug Mfg.	-	-	1	1 D., 2 M.	-	-	-	-
581	Oil Refining	1	2 D.	-	-	-	-	-	-
718	Ship Building	1	2 M.	-	-	-	-	-	-
593	EXPLOSIVES MFG.	-	-	1	3 D.	-	-	-	-
	UTILITIES	5	-	-	-	-	-	1	-
755	Electric Utilities	3	1 D., 1 M.	-	-	-	-	-	-
	" "	1	2 D.	-	-	-	-	-	-
	" "	1	2 M.	-	-	-	-	-	-
005	Tree Pruning	-	-	-	-	-	-	1	2 D., 5 M.

TABLE VII (Cont'd)

EXHIBIT OF MULTIPLE INJURY ACCIDENTS
PENNSYLVANIA INSURED RISKS - POLICY YEARS 1928-1942
LARGE RISK EXPERIENCE

Code No.	Industry	INJURY TO SPECIFIED NUMBER OF PERSONS							
		Two		Three		Four		Five or More	
		Number of Accidents	Type of Accident	Number of Accidents	Type of Accident	Number of Accidents	Type of Accident	Number of Accidents	Type of Accident
	CONTRACTING AND QUARRYING	9	-	3	-	1	-	1	-
028	Oil and Gas Production	1	1 D., 1 M.	-	-	-	-	-	-
051	Quarries, N. O. C.	1	2 D.	-	-	-	-	-	-
601	Road Construction	1	1 D., 1 M.	-	-	-	-	1	5 D., 3 M.
	" "	2	1 P.T., 1 M.	-	-	-	-	-	-
605	R. R. Construction	1	2 D.	-	-	-	-	-	-
615	Tunneling	1	2 M.	-	-	1	4 D.	-	-
654	Concrete Construction	1	2 M.	1	3 D.	-	-	-	-
	" "	-	-	1	3 M.	-	-	-	-
	" "	-	-	1	1 D., 1 M., 1 P.T.	-	-	-	-
675	Millwrighting	1	1 D., 1 P.T.	-	-	-	-	-	-
	OTHER INDUSTRIES	15	-	1	-	-	-	-	-
910-928	Stores	1	2 M.	1	3 D.	-	-	-	-
980	Cities, Towns and Boroughs	4	2 D.	-	-	-	-	-	-
	" " " "	3	1 D., 1 M.	-	-	-	-	-	-
	" " " "	2	2 M.	-	-	-	-	-	-
	" " " "	1	1 D., 1 P.T.	-	-	-	-	-	-
	" " " "	1	1 P.T., 1 M.	-	-	-	-	-	-
701	Stevedoring	2	2 M.	-	-	-	-	-	-
	"	1	1 D., 1 M.	-	-	-	-	-	-

TABLE VIII

MULTIPLE INJURY ACCIDENTS
AND
EXCESS LOSSES OVER $10,000 PER ACCIDENT
PENNSYLVANIA INSURED RISKS - POLICY YEARS 1928-1942
LARGE RISK EXPERIENCE

Number of Persons Injured	Total - All Groups		Mfg. (Ex. Explosives) and Utilities		Explosives		Contracting & Quarrying		Other Industries	
	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess
1	611	299 390	291	142 590	1	490	110	53 900	209	102 410
2	47	17 081	23	3 128	-	-	9	7 420	15	6 533
3	8	20 249	3	5 792	1	2 896	3	8 665	1	2 896
4	1	6 523	-	-	-	-	1	6 523	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-
7	1	10 545	1	10 545	-	-	-	-	-	-
8	1	17 907	-	-	-	-	1	17 907	-	-
Total	669	371 695	318	162 055	2	3 386	124	94 415	225	111 839

TABLE IX

MULTIPLE INJURY ACCIDENTS
AND
EXCESS LOSSES OVER $10,000 PER ACCIDENT
PENNSYLVANIA INSURED RISKS - POLICY YEARS 1928-1942
EXCLUSIVE OF MINIMUM PREMIUM RISKS AND LARGE RISKS

Number of Persons Injured	Total - All Groups		Mfg. (Ex. Explosives) and Utilities		Explosives		Contracting & Quarrying		Other Industries	
	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess
1	1 182	579 180	311	152 390	2	980	380	186 200	489	239 610
2	211	104 988	37	7 534	1	391	103	57 200	70	39 863
3	22	48 897	7	21 261	-	-	9	17 610	6	10 026
4	6	35 753	-	-	1	6 523	4	22 707	1	6 523
5	5	75 004	1	25 800	1	10 500	2	27 997	1	10 707
6	2	32 669	-	-	-	-	2	32 669	-	-
7	1	27 269	-	-	-	-	-	-	1	27 269
8	-	-	-	-	-	-	-	-	-	-
9	2	52 228	-	-	2	52 228	-	-	-	-
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
28	1	104 800	-	-	-	-	1	104 800	-	-
Total	1 432	1 060 788	356	206 985	7	70 622	501	449 183	568	333 998

TABLE X

MULTIPLE INJURY ACCIDENTS
AND
EXCESS LOSSES OVER $10,000 PER ACCIDENT
PENNSYLVANIA INSURED RISKS - CALENDAR YEARS 1930-1944
COAL MINING

Number of Persons Injured	All Coal Mining		Anthracite Mining		Bituminous Mining	
	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess	No. of Accidents	Amount of Excess
1	753	$390,054	138	$ 71,484	615	$318 570
2	75	117 140	34	54 040	41	63 100
3	7	24 760	3	10 664	4	14 096
4	2	15 305	-	-	2	15 305
5	2	29 230	1	12 215	1	17 015
6	1	17 600	-	-	1	17 600
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	1	36 000	-	-	1	36 000
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	-	-	-	-	-	-
14	1	54 400	1	54 400	-	-
Total	842	684 489	177	202 803	665	481 686