DISTRIBUTION OF INSPECTION COST BY LINE OF INSURANCE

BY

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The task of assigning the expenses of a multiple-line insurance company to line of insurance is not an easy one. Where the expenses are incurred in the home office, it is possible to make a series of tests closely allied to those carried on in a physical laboratory and reach results which can be defended with considerable confidence. But where the expenses are incurred through the field at points widely separated and where a considerable proportion of the salaried force involved is on the road, the problem of satisfactory distribution to line of insurance becomes intensified.

Possibly the difficulties in the way of correct distribution are greatest for the two service departments of a casualty company, viz., Inspection and Claim Adjustment. Therefore, this paper which is devoted to the distribution of inspection expense by line of insurance deals with what has proved to be one of the most difficult expense problems confronting companies writing casualty insurance.

As the cost of making an inspection varies materially by line of insurance, some method must be devised to determine just what the difference is in cost per inspection by line. There seems to be no reliable method other than a time study which requires all inspectors and clerks to keep records of the time devoted to each line of insurance over a given period.

In planning a time study it is well to keep in mind the necessity of securing expense analysis data with as little report work by the inspector in the field as possible. The cost of the inspection department, especially during these times, is under close scrutiny and it is, therefore, important that the inspectors spend as much of their time as possible in making actual physical inspections and as little time as possible in report writing, particularly upon that part of report work which is used only for the distribution of expense.

In order that the inspectors shall not have to keep records of

their time for a longer period than is necessary, it is well to look over past records in order to make sure that a period is selected for a time study sufficient to make certain that an adequate number of inspections will be made for some of the minor lines of insurance. The period of the time study should also be sufficient to include seasonal inspections made on some lines of insurance.

Most companies require their inspectors to submit to the home office daily or weekly reports of their activities. These reports usually show the number of inspections and the line of insurance, as well as the inspection branch office, location of risk, etc. If these reports are amplified so as to include the number of minutes required to make the various kinds of inspections, the basic data necessary for the allocation of inspection costs by line are obtainable.

Appendix "A" is a copy of the inspector's time study report used in The Travelers Companies. These weekly reports were completed by the inspectors for the months of June and July, 1934, and added little extra work in the field. The last six columns of this report—office, travel, inspection, writing report, call and unassignable—expressed in terms of minutes, were added for the period of the time study to the weekly report previously used by the inspector for expense analysis. Strictly from an expense by line viewpoint, however, two subdivisions of time—(1) Travel Time and (2) All Other—would have been sufficient. The other subdivisions of time were included so that the cost of the various operations by line of insurance could be obtained. It was felt that if perhaps some of the above operations for some lines of insurance were more expensive than was necessary, and if the actual cost of these various operations could be brought to the attention of the proper officials, something might be done to reduce the cost. For example, if it were found that the average cost for all lines of insurance for writing a report was $2.00 and that the cost for line "A" was $6.00, which seems excessive when the average premium is considered, the amount of information on the inspection report for line "A" might be reduced without sacrificing any important underwriting information, thereby reducing the cost of this report.

It is possible to produce for each line of insurance and, if thought advisable, for various divisions within a line, the percent-

age of time spent on the various operations. As an example of how this record looks, the following exhibit is shown:

	% OF TIME						
Line of Insurance	Office	Travel	Inspection	Report	Call	Un-assigned	Total
"A"	5%	23%	53%	11%	2%	6%	100%

From the above exhibit it is possible to tell at a glance just how the inspector spends his time for each line of insurance. The advantage of this record is that it draws attention to variations between lines of insurance in the percentages for the various duties with the possibility that corrections in requirements may be made so as to reduce expense. For example, if the average percentage of total time for all lines of insurance for office work is 20% and for line "B" it is 40%, an investigation of the amount of office work required for line "B" might result in shorter methods, thereby reducing the cost of office work for this line of insurance. Another important result obtained from this record is that it directs attention to the large percentage of time spent in travel for some lines of insurance, occasioned by special trips made for inspections where all travel time from the inspection office to the risk and back to the office again is chargeable to this line of insurance.

A brief description of just what is included under the various headings of the inspector's weekly report and time sheet (Appendix "A") will make this subject seem less complicated. Some of the information called for is self-explanatory and is not discussed. The narrow columns on the right under the headings, "line," "kind" and "type," are for the use of the code clerk at the home office.

Line

In this column are shown the major lines of insurance as follows:

Compensation
Public Liability
General Liability
Elevators
Theatres
Teams
Garage
Fleet
Plate Glass
Burglary
Aircraft
Fire
Boiler
Machinery
Marine
No Line

KIND AND TYPE

In these columns is entered information which will produce results that will permit the break-down of costs within line of insurance to the following subdivisions:

Line	*Kind*	*Type*
Compensation	Industrial	*No. of Employees
	Contracting	Calls
	Stevedoring	
	All Other	
Fleet Risks	Service	*No. of Cars
	Trailing	Calls
	Observation	
Fire	Rate Analysis	Inspection
	General Fire	Bureau Call
	All Other	Agency Call
		Call—All Other
Boiler	Fire Tube	Internal
	Water Tube	External
	Cast Iron Sectional	Calls
	Piping	
	Refrigerating System	
	Unfired Vessels	
	Shop Inspections	
	Use & Occupancy	
	Special Mechanical Service	
	All Other	
Machinery	Engines	Running
	Compressors & Pumps	Static
	Turbines	Calls
	Electrical Units	
	Use & Occupancy	
	Special Mechanical Service	
	All Other	

Line	*Type*	*Code*
Compensation	No. of Employees	1-5
		6-10
		11-25
		26-100
		101-500
		Over 500

* No. of Employees or Cars.

Line	*Type*	*Code*
Fleet Risks	No. of Cars	1-5
		6-10
		11-25
		26-100
		Over 100

By use of the above number groups it is possible to make a rough compilation of inspection costs by size of risk, for the several lines. Although the use of the actual premium in place of the number of employees and number of cars would give more accurate results, it has been found that the inspector can obtain the number of employees and the number of cars without much difficulty, while the actual premium can be obtained for some lines only after audit and then only with a considerable amount of work.

NUMBER

In this column is entered the number of units of inspections for each line of insurance. For Boiler, Machinery and Elevator the number of inspections is the number of objects inspected, while for other lines the number of inspections is the number of risks inspected. For example, if an inspector visits a plant and makes a compensation inspection and two internal water tube boiler inspections, Compensation would be charged with one inspection and Boiler with two. The reason for this is that for a compensation inspection the unit is always a risk inspected whereas the number of units for boiler insurance is determined by the number and type of boilers at the risk.

OFFICE

In this column is entered the time taken up by routine work and in preparing to make inspections, including correspondence and conferences.

TRAVEL

The time consumed in travel is entered in this column. For the first risk inspected during the day the time entered is that which is consumed in travel to the risk. In case of subsequent inspections the time entered is the time consumed in travel from the first risk to the second, from the second risk to the third, and so on throughout the day.

Travel time where more than one inspection is made at a single risk is divided equally among the major lines of insurance on the theory that the travel salary and travel expenses are just as important for one line of insurance as for another. If a compensation industrial inspection and three internal boiler inspections are made at the time of a visit to a plant and thirty minutes are consumed in travel, fifteen minutes would be charged to compensation industrial inspections and fifteen minutes to boiler inspections.

Inspections

In this column the number of minutes shown is the number of minutes between the time of arriving at the risk and the time of leaving. Where two or more lines of insurance are inspected at the same risk, the time charged to each line is the actual time spent in making the inspection for each line.

Report Writing

A "report" is any written or typed report, whether or not on a prepared form, for the home office, the manager, etc., or for submission to any state or municipal authority. Letters, specially prepared analyses or accident prevention programs sent to an assured are to be considered as correspondence and the time spent preparing and writing them is to be included in the column "Office."

Call

When a call is made on an assured, agent, bureau, etc., and no inspection is made, the number of minutes consumed at the place of call is entered in this column.

Unassignable

In this column are entered in some cases minutes which cannot be assigned to the various duties but can be assigned to line of insurance and in other cases unassignable time which cannot be assigned either to class of duty or to line of insurance. It is important that Unassignable Time be kept down to a minimum

because it is possible for the inspector correctly to assign the greater part of his time A reasonable percentage of Unassignable Time for this type of time study is from 5% to 10%. From a cost analysis viewpoint Unassignable Time which cannot be charged to a line of insurance might be omitted as it has no effect upon the final percentage by line of insurance.

There is, however, an advantage to be gained from the inclusion of Unassignable Time in that it makes possible a rough check of the activities of the inspectors in the hours supposed to be given daily to inspections or related duties during the period of the time study.

Length of Working Day

The number of hours or minutes per day to be reported in the inspector's weekly report is not limited in any way. If an inspector works ten or twelve hours on certain days during the time study period he reports his time on that basis. In connection with a previous time study a working day was fixed at eight hours with the result that if an inspector worked more or less hours per day, it was necessary for him to apportion his time up or down to equal eight hours. As the actual time per inspection by line is an important factor in gaging the activity of the inspector his time should be so reported.

Allocation of Time by Clerks

Appendix "B" is the time sheet for the field clerks of the Inspection Department. For the convenience of the home office these time sheets are submitted on a daily basis. No attempt is made to divide clerical time other than by line of insurance with the exception of fire insurance where rate analysis requires considerably more clerical work than other fire inspections. The columns showing the number of minutes between "8:30 and 9," "9 and 10," etc., are shown in this report for the convenience of the inspection clerks in the field. When these reports reach the home office the minutes are totalled by line of insurance only.

Home Office

In studying the duties of the home office personnel it was found that the work was fairly well divided by line of insurance. Groups of clerks were found to work on one line of insurance only. Some were found to work on two or three lines, etc. The subdivision of the salaries of these clerks by line of insurance follows that of the field clerks. General inspection officials and supervisors are assigned to line of insurance on an overhead of field and home office combined.

Punch Card System

The punch card system is ideal for transferring in detail from the inspection weekly reports the information contained in these reports. The tabulation of complete results can be made in very small groups, if thought advisable, without excessive cost.

Appendix "C" is a copy of the Inspection Time Study Punch Card. It will be noted that the 80-column card has been used, although the 45-column card would have been sufficient. The reason for this is that the 80-column equipment is now standard in the company. In making up a punch card for the time study it was found that the punch card already in use by the Inspection Department could be enlarged to take care of the various time elements shown on the weekly inspection report. The last six columns containing number of minutes were added to the present card by means of imprinting. This method saved the cost of new electrotypes necessary in the make-up of a new punch card.

It is believed that the fields on this punch card will be found self-explanatory. It will be noted that there are two dates—date punched and date reported. The date punched is a gang-punch operation and is used by the punching department for their convenience and information. The report date is the date on which the inspection was actually made. As stated above, the inspector's reports are on a weekly basis and are sometimes not received at the home office until the following month. In gaging the activities of the inspector in the field, comparisons are made, based on the number of inspections in previous years or months

so that it is necessary to tabulate monthly records on the basis of the actual month of inspection rather than on the basis of the month punched.

Tabulation of Time Study Punch Cards

For the two months' time study period 90,000 cards were punched and tabulated. The total units of exposure were 64,000, i.e., inspections, objects and calls.

In tabulating the Inspection Time Study punch cards the procedure outlined below was followed:

Sort each line of insurance by
each kind by
each type.

Tabulate each line, kind and type to show number of inspections, number of calls, number of objects, travel time, office work, inspection, writing reports, calls and unassignable. In order to obtain the number of calls it was necessary to use a card count because in some cases, particularly on fire insurance, an inspection and a bureau call are made on the same inspection. Therefore, all cards punched with time in the "Call" field were sorted out and a card count made in order to produce the number of calls. It would seem that an additional field on this punch card to be used as a count for calls would be an improvement. The number of inspections was obtained, of course, by using the "number of objects" field as an adding field.

It is advisable to make a complete tabulation by line, kind and type so that it will not be necessary to make a new time study for some minor change in procedure. For example, in the near future the information on the inspection report for a particular line of insurance might be reduced 50% by a direct order from the home office. If the average time for writing reports per inspection is not obtained on the first basic tabulation, difficulty will be experienced in giving proper credit in cost to this line for the economy effected without a further time study.

There is also the added advantage that changes in distribution of business within lines of insurance will be recognized if averages are developed by kind and type instead of by line of insurance only. Using boiler insurance as an example, an increase in the

year 1935 over the year 1934 in the total number of boiler inspections might be due to a large increase in heating boiler inspections and a decrease in power boiler inspections. As the average number of minutes required to complete a heating boiler inspection is much smaller than that for a power boiler inspection, a reduction in total boiler inspection cost might be warranted but would not be recognized if averages were not developed by type of boiler.

It will be noted that no attempt was made to tabulate results on other than a countrywide basis. The main purpose of this study was to produce the average number of minutes required to make the various kinds of inspections and the larger the statistical sample obtained, the more reliable the average. Fortunately, by computing the average number of minutes required to make an inspection for any line of insurance the average cost in dollars and cents was easily obtained because the same inspectors work on all lines of insurance. This was not the case in a claim department time study where it was found that high salaried adjusters or investigators worked principally on certain lines of insurance and lower salaried men on other lines.

After the expense analysis tabulation has been completed and control figures established on a countrywide basis, a second record is drawn off by office. This record is used by the officer in charge of the inspection department to compare by office the length of time consumed per inspection by line of insurance for the various duties of the inspector. It is also possible further to subdivide, if found necessary, the average time of any office to individual inspector.

The establishment of the average time or cost per inspection for some lines of insurance among the various coverages such as Public Liability and Property Damage, does not seem possible by the use of time study methods. In most cases it is not possible for the inspector when making an inspection where these coverages are involved to tell when he is inspecting for one coverage and when for the other, so that some arbitrary method must be used for the division of costs between these coverages. The premium method in such cases seems to be the most satisfactory because it at least produces results which follow the inspection loading in the premiums for each coverage.

YEAR-END DISTRIBUTION OF EXPENSE

The number of inspections and calls for the twelve months' period ending October 31 for each line, kind and type, together with the Time Study averages, are used for each calendar year to distribute inspection cost by line of insurance. This is necessary because the number of inspections for a January to December calendar year is not obtainable until after the accounting books of the company have been closed. The substitution of the months of November and December of the previous year for the same months of the current year has a very small effect on any line of insurance in any one year and over a period of years this method will, of course, on the average produce correct results.

The 12 months' number of inspections for each line, kind and type, multiplied by the average number of minutes required to complete an inspection for each line, kind and type, as developed during the time study period, will produce the total number of minutes worked for each line of insurance. The ratio that the number of minutes for each line of insurance bears to the total number of minutes for all lines of insurance is the percentage of inspection field cost chargeable to each line of insurance.

The clerical punch cards should be tabulated separately, because unassignable time requires treatment for clerks different from that for inspectors. In pro-rating unassignable clerical time to line of insurance, an overhead of inspectors' assignable time, excluding travel and inspection time, seems to be the proper basis.

The traveling expense of the inspector is assigned by line of insurance on the basis of the number of inspections, together with the average travel time by line, by use of the above method.

Salaries and expenses of home office inspection employees are charged by line of insurance on separate percentages developed from a study of this department as mentioned in a previous paragraph.

It is possible for the sake of simplicity to make a composite percentage of field salaries and expenses and field and home office traveling expense so that one set of percentages can be applied to total inspection cost to produce the cost for each line of insurance.

For the final division of expense the attached condensed tabulation (Appendix D) is set up from the cards punched during

the Time Study period. This exhibit produces the average number of minutes required to make the average inspection under the various subdivisions for each line of insurance.

The following items of expense are chargeable to inspections:

Inspection Department

Salaries
Travel
Rent
Telephone
Telegraph
Postage
Printing and Stationery
State or City Boiler Certificate Fees
Expert Mechanical Service (Income)

Home office inspection department salaries and expenses are for this department only. No attempt has been made to charge a part of the general officers' salaries and expenses to the inspection department.

Home office inspection postage is determined by a count of outgoing mail in the mail department during a sufficient period of time to produce reliable results. Field inspection postage and telephone charges are obtained also by means of time studies at convenient periods.

In order that the general ledger of the company can be kept on a condensed basis, inspection costs are shown as one item—"Inspections." A sub-ledger is kept, however, which shows inspection costs by account (salaries, rents, etc.) for each line of insurance divided between home office and field. As expense schedules are changed only once a year, the sub-ledger shows the actual amount of money which has been charged to each line and account so that the proper cross entries can be made between lines. This sub-ledger also shows items which are directly chargeable to one line of insurance, such as boiler certificate fees, so that these items will not be apportioned to all lines on a year-end adjustment.

The average time required to make the various kinds of inspections developed from the 1934 time study was compared with that of a similar study made in 1931 for a five months' period for each line of insurance. This comparison showed that there

had been no marked change in averages for any line of insurance, proving that, unless some very radical change in inspection procedure (which might affect only certain lines of insurance) was made in the future, the 1934 averages should be good for some time to come. When the changes in industrial activity within the last few years are considered, particularly for compensation insurance, the results of this comparison are remarkable.

No averages or costs per inspection by line of insurance are submitted with this paper because the amount of money spent for inspections is governed by company policy and must of necessity vary by company. There is also the additional point that the distribution of business by location and line of insurance would vary by company to such an extent that the average inspection cost developed by one company would be of little, if any, value to other companies. It is possible, however, to compare inspection and bureau costs per dollar of earned premiums by line of insurance for stock companies in the New York Casualty Experience Exhibit compiled by the National Bureau of Casualty and Surety Underwriters. As bureau assessments are readily assignable by line of insurance and as these assessments per dollar of premium should not vary greatly by company, it can be seen that inspection costs, excluding bureau costs, can be obtained by company for comparative purposes from this Exhibit.

(APPENDIX "A")

ALL TIME IN MINUTES

CODE CLERK: F / V

SUPV. ENG. | DIST. SUPV. ENG.

ENGINEERING AND INSPECTION DIVISION
INSPECTORS WEEKLY REPORT AND TIME SHEET
/ To / 198 Sheet No.

NAME

DISTRICT

DATE	NAME OF ASSURED, APPLICANT, FIRM OR PERSON CALLED UPON	APPLICANT TRAINING M.O.UNDR. B.O.UNDR.	A T H O B O		LOCATION (TOWN OR CITY)	LINE		KIND		NO EMP. NO CARS TYPE	No.	OFFICE—ROUTINE-PREPARING TO MAKE INSPECTION, ETC.	TRAVEL	INSPECTION	WRITING REPORT	CALL	UNASSIGNABLE

DAILY TIME SHEET FOR CLERKS

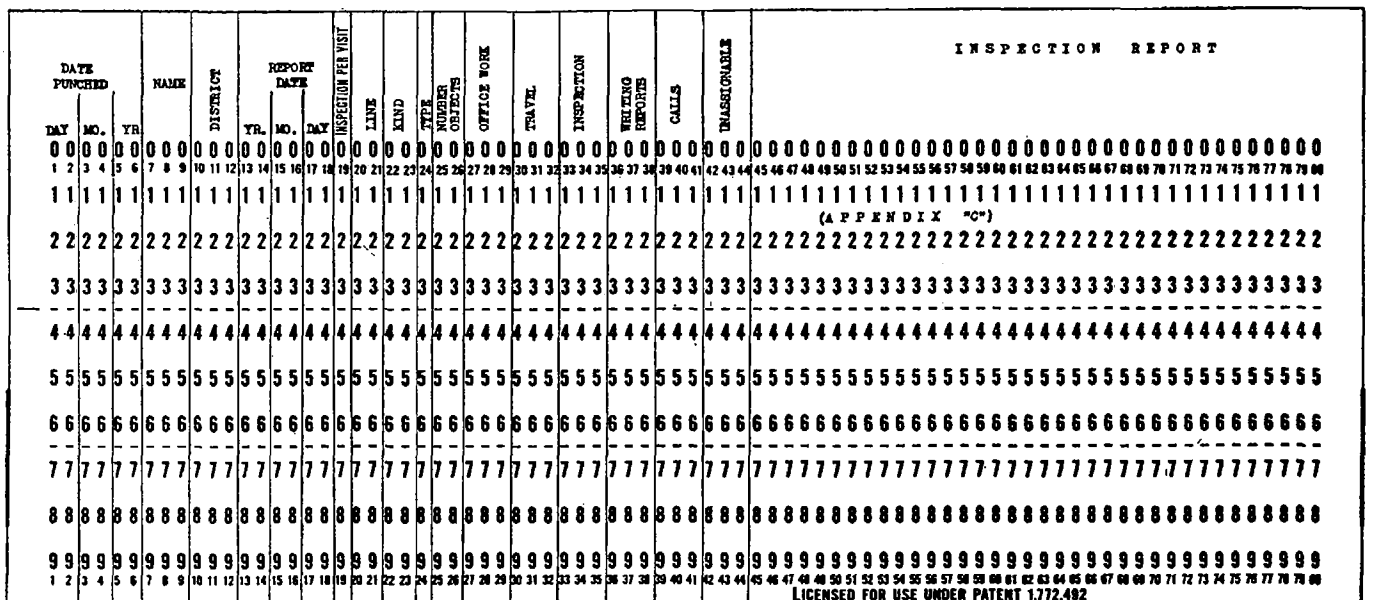
Name of Clerk_____ Office_____ Date_____
On which work is done

LINE OF INSURANCE	NUMBER OF MINUTES BETWEEN HOURS OF										DO NOT WRITE IN THESE COLUMNS	
	8:30—9	9—10	10—11	11—12	12—1	1—2	2—3	3—4	4—5	5—6		
Compensation												01–00
Public Liability												02–00
General Liability												04–00
Elevator												05–00
Theatre												06–00
Teams												07–00
Garage												08–00
Fleet												10–00
Plate Glass												13–00
Burglary												14–00
Aircraft												15–00
Fire—Rate Analysis												16–01
Fire—All Others												16–03
General Fire												16–04
Boiler												17–00
Machinery												18–00
Marine												22–00
Unassignable												30–00

INSTRUCTIONS

1. To be submitted by every clerk in an Inspection Division Branch Office.
2. To be submitted every working day during Time Study period.
3. To be submitted for each working day when absent from duty.

APPENDIX ("C")


DATE PUNCHED
DAY
MO.
YR
NAME
DISTRICT
REPORT DATE
YR.
MO.
DAY
INSPECTION PER VISIT
LINE
KIND
TYPE
NUMBER OUTLETS
OFFICE WORK
TRAVEL
INSPECTION
WELDING REPORTS
CALLS
UNASSIGNABLE
INSPECTION REPORT
(APPENDIX "C")
LICENSED FOR USE UNDER PATENT 1,772,492

INSPECTION TIME STUDY—JUNE AND JULY 1934—ALL OFFICES—SHEET NO. 1

KIND	TYPE	NO. INSP. OR CALLS	OFFICE	TRAVEL	INSP.	REPORT	CALL	TOTAL	UNASSIG.	TOTAL
INDUSTRIAL	1 2 3 4 5 6 Calls Total									
CONTR.	1 2 3 4 5 6 Calls Total									
STEV.	—									
A. O.	1 2 3 4 5 6 Calls Total									
TOTAL										
UNASSG.	No. Kind or Type	———	———	———	———	———	———	———		