

A STUDY  
OF SALVAGE  
AT FIRES

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**SAB**



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FIRE RESEARCH

A STUDY OF SALVAGE AT FIRES

BY

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SUMMARY

Two studies of salvage have been undertaken in order to estimate the financial benefits of salvage at fires. In the first study the emphasis was on assessing the potential benefits of salvage, assuming that there were always sufficient men not required for fire fighting to do the necessary salvage work. The second study was intended to estimate the amount of salvage which could be done in practice, and took the form of a survey carried out in a brigade. Officers in the brigade were asked to report on the amount of salvage that had been done at the fires they attended. From the two studies, there is apparently less salvage work completed in practice than the potential identified by the first study. It is not possible to say from the evidence available why this should be so. It is suggested that if the discrepancy between salvage potential and practice is to be examined, a survey of fires by an independent and expert observer would be necessary.

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## 1. INTRODUCTION

It is known that the salvage activities undertaken by firemen during and after a fire can be very important in reducing the damage and financial loss incurred in the fire, and fire brigades have a statutory duty to undertake salvage. Section 1.1(e) of the Fire Services Act 1947 requires that the fire authority shall secure "efficient arrangements for ensuring that reasonable steps are taken to prevent or mitigate damage to property resulting from measures taken in dealing with fires".

This report describes two studies of salvage which were intended to measure, in quantitative terms, the benefits resulting from salvage work. The first study of salvage was aimed at measuring the potential benefits of salvage, and a second, smaller scale, study was then undertaken to determine the extent to which these potential benefits could be realised in practice.

### 1.1 Definition of salvage

The damage incurred in a fire can be mitigated in three ways:-

- by judicious fire fighting tactics and the use of appropriate extinguishing media
- by the protection or removal of goods and property from the effects of fire, water and smoke during fire-fighting.
- by the cleaning, drying and protection of goods and property after the fire.

Only the last two of these activities are considered here.

In these studies salvage is defined as being those activities undertaken in order to reduce fire, heat, smoke and water damage, over and above those actions which are a necessary part of good fire fighting practice. It is impossible to define salvage precisely. There will be some activities on the border line between fire fighting and salvage. For example ventilation may be carried out to reduce smoke damage but smoke ventilation also improves visibility and therefore aids fire fighting. Although there may be differences of opinion about whether such border line activities should be regarded as salvage, the majority of salvage activities will be clearly recognised as such, and therefore the general definition of salvage given above is sufficient for the purpose of these studies.

## 2. THE STUDY OF THE POTENTIAL BENEFITS OF SALVAGE

### 2.1 The Study method

The first Home Office study of the benefits of salvage was undertaken by consultants Peat, Marwick, Mitchell and Company (PMM). This study has been reported separately and only a brief description of the study will be given here.

The objectives of this study were:

- to provide an estimate of the reduction in direct fire loss which might be achieved by salvage work at fires.
- to provide a method of analysis which could be used by brigades to estimate the benefits of salvage in their own brigade area.

In the PMM study five levels of salvage were considered and the benefits estimated for each of these defined levels. The first level, referred to as "limited" salvage, was defined as that salvage work which could be done by the crews of the first line appliances using only the four salvage sheets which would be carried on each appliance. The remaining four levels cover salvage which could be done using the equipment carried on a salvage tender. These four levels of salvage are defined according to the time taken for the salvage tender to get to the fire, and whether or not limited salvage was done before the tender arrived.

In estimating the salvage savings which could be achieved only the limitations imposed by the availability of sheets and other equipment were considered. It was always assumed (in accordance with the consultants' terms of reference) that there were sufficient men available at all time to undertake the necessary salvage work without limiting firefighting activities. The findings of the study therefore represent the maximum or ideal savings which might be achieved through salvage.

The benefits of salvage were estimated in a survey of fires in five brigades. Each fire was attended by a survey team comprising an officer from one of the Salvage Corps and a loss adjuster. The Salvage Officer and loss adjuster then made an estimate of the amount of damage which could have been prevented, and the reduction in fire loss, if salvage work at each of the 5 defined levels had been carried out. The salvage team also estimated the salvage savings actually achieved, although they did not enquire into the reasons for any discrepancy between the actual and the estimated maximum savings.

The method of predicting the salvage savings in a brigade area is based on a classification of fires into 4 classes. Each class is defined according to the type of building and the type of fire fighting.

- Class 1: Fires in which salvage will have no value.
- Class 2: Fires at which salvage savings will have low value.
- Class 3: Fires in residential buildings where salvage will have a high value.
- Class 4: Fires in non-residential buildings where salvage will have a high value.

A definition of the fires which fall into each of these categories is given in Appendix A.

The average potential salvage savings in each class of fires was estimated from the survey of actual fires. For a complete brigade area the numbers of fires falling into each salvage class can be determined by examining a sample of the fires occurring in the area and classifying these fires according to the definition of the salvage classes. Hence the total salvage savings at each level of salvage effort can be predicted for any brigade.

## 2.2 The Results of the PMM Study

The PMM study provided an estimate of the savings which can be achieved in different types of fires, according to the level of salvage activity. It is estimated, using the PMM results, that on a national scale the maximum savings which could be achieved by "limited" salvage are £11m. per year (at 1976 prices this is equivalent to about 4<sup>1</sup>/<sub>2</sub>% of the total fire losses), and that the maximum savings which could be achieved if "limited" salvage was undertaken, and, additionally, a salvage tender was sent to each fire, would be £14m per year (at 1976 prices this is equivalent to about 6% of the total fire loss). It should be noted that the savings quoted here are the savings compared to doing no salvage at all.

An estimate was also made of the savings actually achieved at the fires examined in the study. Excluding the work done by salvage corps it was estimated that the actual salvage savings were 28% of the maximum savings in the class 2 fires and 4<sup>3</sup>/<sub>4</sub>% of the maximum savings in the class 4 fires. The class 4 fires account for by

far the largest salvage savings, and over all fires the actual salvage savings were equal to 15% of the maximum achievable. Further savings were achieved by the salvage corps.

A point which emerges very strongly from this salvage study is the importance of starting salvage early, preferably at the same time as fire fighting commences. If this early salvage work is not done, then no amount of salvage work later can compensate for the earlier losses. For instance it is estimated that "limited" salvage on its own could achieve 79% of the maximum achievable salvage savings, while if a salvage tender arrived 20 minutes after firefighting had begun and if no salvage had yet been done, only 77% of the maximum savings could be achieved.

The amount of effort required during the fire for "limited" salvage varied from an average of 15 man-minutes for class 2 fires to an average of 205 man-minutes for class 4 fires. More men would be required for salvage at the larger fires than at the smaller, but there would be a larger brigade attendance anyway at the bigger fires. Typically , it appeared that the number of men required for salvage during the fire was about 20% of the number of men likely to be in attendance.

A list of the most important salvage tasks together with a summary of the principal results of the study are shown in Appendix A.



### 3. THE PILOT APPLICATION STUDY

#### 3.1 The Study Method

As the PMM study was concerned principally with estimating the potential salvage savings under ideal conditions, a second study was undertaken to try to determine the extent to which the potential salvage savings could be realised in practice, and to investigate the reasons for any discrepancy between the potential salvage savings and the savings actually being achieved.

This application study, which was run on a much smaller scale than the original study, involved a survey of the salvage work carried out in a brigade. The brigade which took part in this study was one which was well aware of the importance of salvage and which paid particular attention to salvage during the fire-fighting. Salvage tenders were also available in the brigade. The results obtained from a study of this brigade can therefore be regarded as being representative of good brigade salvage practice.

The information on the amount of salvage work done by the brigade was obtained from salvage reports which were completed by the officer in charge at the fire. The officers were asked to record the amount of time spent on salvage, the salvage tasks which were done, whether all the potential salvage work was done, and for those fires where the salvage work did not reach its full potential, the reasons why. A copy of the salvage report form is shown in Figure 1.

The salvage report forms were completed for all fires in buildings, and during the 5 month survey a total of about 1300 salvage forms were completed.

The results of the survey are based on the officers' own assessments of the salvage they had done at the fires. The nature of the information obtained in the survey must therefore be borne in mind when interpreting the results. Some further, and more objective, information on fires was obtained from a senior brigade officer who visited a number of fires in order to observe and record the salvage work, and the circumstances of the fires.

It was not possible in the pilot application study to estimate the reduction in fire losses achieved through salvage work. The assistance of a loss adjuster would be necessary to make the estimates of financial losses or savings. The pilot application study was therefore directed towards measuring the amount of

time spent on salvage work. This can then be compared with the amount of salvage effort which was assumed necessary in the PMM Study to achieve the potential savings.

### 3.2 The results of the pilot application study

The information collected in the brigade survey provides the evidence for the comparison of the actual and the potential salvage work. The information which is relevant to this comparison includes the following items:-

- The number of fires at which there was salvage work to be done.
- The number of fires at which all the salvage work could not be done.
- the amount of salvage work done
- the type of salvage work done
- the attendance of a salvage tender
- the time at which salvage was started

Each of these items is discussed in turn and the evidence is then brought together and some general conclusions are drawn.

#### 3.2.1 The number of fires at which there was salvage work to be done

The PMM report identified three classes of fires which in general offered salvage savings, and one class of fires in which there were unlikely to be any savings. However, even within the three classes of fires which offered savings there were some fires where no salvage savings were possible. An examination of the reports of the individual fires in the PMM survey shows the proportion of the fires in each class in which it was considered that salvage savings could be achieved.

The equivalent information can be derived from the number of fires in the brigade survey where it was reported that "no salvage work was required".

TABLE 1: THE NUMBER OF BUILDING FIRES WITH SALVAGE POTENTIAL

	Class 1	Class 2	Class 3	Class 4
Total number of fires in brigade survey	1015	236	19	88
Number of fires in the brigade survey at which salvage was required.	212	152	14	63
Proportion of fires in brigade survey at which salvage was required.	21%	64%	74%	72%
Proportion of fires in PMM study at which it was judged that salvage was required.	0%	31%	81%	74%

Comparing the proportions of fires at which there was salvage work to be done, Table 1 shows that the results of the brigade survey were higher than the PMM study for Class 1 and Class 2 fires, but similar to the PMM study for Class 3 and Class 4 fires.

The fact that the brigade survey showed a considerably higher proportion of salvage work in the Class 1 and Class 2 fires raises the question of whether different definitions of salvage were being used in the two studies. (However it must be remembered that the Class 1 and 2 fires are the smallest fires, and the fires in which salvage is of least importance). Some ideas can be obtained of the meaning of salvage to the reporting officers in the brigade survey by examining the description of salvage in the salvage report forms. The table below summarises some of the class 1 fires at which salvage work was reported to have been done. This class of fires is considered because it most clearly illustrates the possible differences in the interpretation of salvage.

TABLE 2: DESCRIPTIONS OF SOME OF THE CLASS 1 FIRES AT WHICH SALVAGE WORK WAS DONE

Occupancy	Size and type of fire	Firefighting methods used	Salvage tasks	Salvage effort (man-minutes)
School	Overheated pan	Removal outside	Ventilation	2
Hospital	Small fire in pile of papers	1 hosereel	Mopping, drying	10
Boiler House	Small fire, smoke spread to club house	1 hosereel	Smoke control	40
Fish and Chip Shop	Duct fire, some smoke damage.	Unknown	Removal of goods, smoke control.	40
Shop	Fire outside, some smoke damage indoors.	1 hosereel	Removal of goods, smoke control.	75
Boiler room	Smoke damage only.	Unknown	Smoke Control	4
Shop	Small fire	Out on arrival	Removal of goods.	9

It appears that some of the salvage tasks reported in the brigade survey in the smaller fires are on the borderline between fire fighting and salvage, or are cleaning-up activities which are part of a useful service provided by the brigade but do not necessarily reduce the fire loss. Thus it appears that the brigades' definitions of salvage may include some activities which were not included as salvage in the PMM study, particularly in the smaller fires.

### 3.2.2. The salvage work which could not be done

Question 2.1 of the salvage report asked whether all the potential salvage could be done, and if not, why not.

TABLE 3: THE CASE IN WHICH SALVAGE COULD NOT BE DONE

	TYPE OF FIRES				
	Class 1	Class 2	Class 3	Class 4	All fires
No. of fires with salvage potential	212	152	14	63	441 (100%)
No. of fires at which <u>all</u> salvage work was done.	205	150	14	57	426 (96%)
No. of fires at which <u>only part</u> of the salvage work could be done.	4	1	0	2	7 (2%)
No. of fires at which <u>none</u> of the salvage work could be done.	3	1	0	4	8 (2%)

In the large majority of fires at which there was reported to be a salvage potential, all the potential work was reported as having been done. In the (15) cases where the work achieved fell short of the potential, the reasons cited were men not available (8 cases); equipment not available (3 cases); building unsafe (1 case); to preserve evidence (3 cases).

At first sight this is an encouraging result. However, the answers to this sort of question on a self-assessment form must always be treated with caution, and no conclusions should be drawn from this item of information on its own.

### 3.2.3 The amount of salvage work done

In the brigade survey the officers were asked to record the time spent on salvage work. The average time spent on salvage can be calculated for fires in each class. The average can either be calculated for only those fires at which salvage work was done, (Table 4), or an overall average can be calculated including all the fires in the group whether or not there was salvage potential (Table 5).

In calculating the averages those fires at which a salvage tender attended, or where it was recorded that not all the salvage work could be done, have been excluded. The figures therefore provide a comparison of potential salvage at the "limited" salvage level. The brigade figures can be compared with the required salvage effort predicted in the PMM study.

TABLE 4: THE AVERAGE AMOUNT OF SALVAGE DONE AT THOSE FIRES WITH SALVAGE POTENTIAL

		Class 1	Class 2	Class 3	Class 4
Average time spent on salvage (man-minutes)	Brigade survey	27	40	112	370
	PMM Predictions	0	91	100	548

TABLE 5: THE AVERAGE AMOUNT OF SALVAGE DONE AT ALL FIRES

		Class 1	Class 2	Class 3	Class 4
Average time spent on salvage (man-minutes)	Brigade survey	5	25	79	245
	PMM Predictions	0	28	82	407

The amount of salvage work recorded in the brigade survey is more than the PMM predictions in the Class 1 fires, and less in the Class 2 fires (although in these two classes there may be a difference in the definition of salvage). In the more important Class 3 and Class 4 fires, the actual salvage effort recorded in the brigade survey was similar to the PMM predictions in the Class 3 fires but rather less in the Class 4 fires.

While the estimates of the amount of time spent on salvage depend partly on the definition of salvage, the number of salvage sheets used is a simple, factual matter. The number of sheets used in the brigade fires and the number of sheets predicted as being required for "limited" salvage are compared below.

TABLE 6: THE NUMBER OF SALVAGE SHEETS USED AT FIRES WHERE ALL THE SALVAGE WORK WAS REPORTED TO HAVE BEEN DONE

	Class 1	Class 2	Class 3	Class 4
No. of fires at which all salvage work was done - brigade survey.	205	150	14	57
No. of fires at which salvage sheets were used - brigade survey.	27	61	10	20
Percentage of fires at which salvage sheets were used - brigade survey	13%	41%	71%	35%
Percentage of fires at which salvage sheets would be required - PMM survey.	-	71%	100%	85%
Average number of sheets used (when sheets were used) - brigade survey.	1.4	2.1	4.2	6.0
Average number of sheets required (when sheets were required) - PMM survey.	-	2.5	5.8	12.0

With the exception of class 1 fires, it appears that the brigade used salvage sheets less frequently, and used fewer salvage sheets, than was predicted in the PMM survey.

In order to eliminate the effects of the possible differences in the definition of salvage, the use of salvage sheets at all fires can be considered.

TABLE 7: THE USE OF SALVAGE SHEETS AT ALL FIRES

		Class 1	Class 2	Class 3	Class 4
Percentage of fires at which salvage sheets were used.	Brigade Survey	3%	26%	56%	23%
	PMM Survey	0%	22%	81%	63%

From Table 7, the results of the brigade survey now show that salvage sheets were used by the brigade more often than predicted by the PMM Study in the Class 1 and Class 2 fires, but less often in the more important Class 3 and Class 4 fires.

#### 3.2.4 The type of salvage work done

The type of salvage work done in the brigade fires was recorded on the salvage report form. The table below shows, for those fires at which all the salvage work was done, the proportion of fires at which each of the tasks listed on the questionnaire was done. This pattern of activity can be compared with the tasks which were judged to be required in the PMM study. The proportion of the PMM fires at which certain tasks were required is also shown in the table.

Certain of the salvage tasks were judged, in the PMM study, to be more important and to result in greater financial savings. These tasks are identified in the table below by marking the boxes in heavy type.



TABLE 8: THE PERCENTAGE OF FIRES AT WHICH THE DIFFERENT SALVAGE TASKS WERE DONE (WHERE THE SEPARATE TASKS WERE RECORDED)

- Brigade fires
- (PMM Study fires)

	TYPE OF FIRE			
	Class 1	Class 2	Class 3	Class 4
Sheeting up (covering goods, equipment etc).	9 (0)	36 (78)	75 (92)	35 (75)
Sheeting up (weather protection).	1 (0)	2 (11)	25 (33)	2 (21)
Diverting Water	4 (0)	6 (17)	42 (67)	44 (58)
Removal of goods	37 (0)	35 6	50 (0)	55 (13)
Mopping/drying up.	39 (0)	41 (28)	42 (8)	45 (29)
Smoke control	36 (0)	31 (17)	42 (25)	18 (15)
Other Work	38 (0)	30 (17)	8 (33)	11 (54)

The Table shows that in Class 2 fires the brigade did more mopping/drying up and removal of goods (both important activities), but less sheeting up (also an important activity) than was judged to be necessary in the PMM study.

In Class 3 fires the brigade did more removal of goods and more mopping/drying up (an important activity) but less diverting of water and less sheeting up (an important activity) compared to the PMM study results.

In the Class 4 fires brigades removed goods more often and more mopping/drying up (an important activity) but sheeted up less often (an important activity) compared to the PMM study results. They also did less "other activities" than in the PMM study. These other activities in the PMM study included preventing deterioration by oiling and drying machinery.

### 3.2.5 The attendance of a salvage tender

Salvage tenders were in attendance at 12 of the fires reported in the brigade survey - 3 Class 2 fires, 1 Class 3 fire and 8 Class 4 fires.

According to the PMM findings it is generally only in Class 4 fires that salvage tenders can lead to appreciable additional savings if all the "limited" salvage work has already been done. In the PMM survey it was estimated that the attendance of salvage tenders was valuable in about 20% of the class 4 fires.

### 3.2.6 The time at which salvage was started

In the PMM report the importance of starting salvage work early was stressed. In the brigade survey the reporting officers were asked to record the time at which salvage work was started. The table below shows the analysis of these attendance times. The percentages exclude the fires for which the times were not stated.

TABLE 9: THE TIME AT WHICH SALVAGE WAS STARTED - numbers of fires in each group (figures in brackets denote percentages of total number of fires in each class).

	Class 1	Class 2	Class 3	Class 4
Within 5 minutes of arrival.	171 (81%)	83 (55%)	5 (36%)	16 (27%)
6-10 minutes after arrival	18 (9%)	38 (25%)	3 (21%)	10 (17%)
11-20 minutes after arrival.	9 (0.5%)	15 (10%)	3 (21%)	16 (27%)
More than 20 minutes after arrival.	1 (4%)	7 (5%)	2 (14%)	14 (24%)
Times not stated	10 (5%)	8 (5%)	1 (7%)	3 (5%)
Total number of fires at which Salvage work was done.	209 (100%)	151 (100%)	14 (100%)	59 (100%)

The figures show that generally salvage work was started early.

### 3.3 Discussion of the results

The results of the salvage survey can be summarised as follows:-

- a. In the brigade survey, salvage opportunities were identified more frequently, in the Class 1 and Class 2 fires, than in the PMM study (Table 1). This suggests that the brigade may be using a broader definition of the term "salvage" in the smaller fires.
- b. In the brigade survey the reporting officers claimed that in 96% of the fires which required salvage, all the salvage work was done.(Table 3)

c. In the Class 3 and Class 4 fires (where the two surveys identified a similar proportion of fires with salvage potential, and where the financial benefits of salvage are greatest) the brigade spent about as much time on salvage in the Class 3 fires as the PMM predictions but less time than predicted in the Class 4 fires. (Tables 4 and 5). The record of salvage sheets used (Tables 6 and 7) and salvage tasks undertaken (Table 8) shows that the brigade made less use of salvage sheets than was considered to be necessary in the PMM study.

While the brigade claim to have done almost all the potential salvage work in the larger fires, the evidence suggests that less work was done than the potential salvage requirements predicted in the PMM study.

There are two possible explanations for this apparent contradiction. One explanation is that the brigades are in fact doing all the salvage work which they identify, but that there are further salvage opportunities identified in the PMM study.

A second explanation is that the brigade officers do recognise the additional salvage opportunities but have claimed that all salvage work has been done because they consider that all the salvage which could reasonably be done in the circumstances had been done.

The general conclusion to be drawn from this survey of salvage is that in a brigade which makes strong efforts to do the salvage work, less salvage work is in fact done compared to the amount of salvage work identified by the salvage officers in the PMM study. It appears that in the Class 3 and Class 4 fires the first line crews spend approximately 60% of the time on salvage relative to the predicted salvage requirements. It is not possible to say whether the financial savings achieved by the brigade are less than or greater than 60% of the potential salvage savings.

The discrepancy between the amount of salvage actually done and the potential salvage work may be due to two causes - the inability to recognise all the salvage opportunities, and the lack of the manpower and equipment needed to do the work. It is not possible to say to what extent each of these factors accounts for the discrepancy.

#### 3.4 Further information on the salvage done by the brigade

Some further information on the salvage done by the brigade was obtained from visits by a senior brigade officer and an officer from the Scientific Advisory Branch to 17 fires. However, the information obtained from this small sample of fires provides no further answers to the question of what salvage work was not done, and why this work could not be done. There was one fire visited, a very large fire involving a number of shops, in which it was observed that even if more men had been available they would have been used for fire fighting rather than salvage.

#### 3.5 Further investigations of salvage

The PMM study provided an estimate, based largely on the judgements of a salvage officer, of the potential salvage opportunities at fires. These estimates have provided a theoretical ideal against which the brigade performance has been judged in the subsequent application study.

A self-assessment survey provides the simplest way of obtaining information about the salvage done at fires, but a self-assessment form inevitably has disadvantages and in the application study it has not been possible to reach any firm conclusions about salvage practice. Even if an independent observer is used to collect the information about the salvage work actually being done (and this would involve many practical difficulties), this would not necessarily provide the answers. As the basis of the comparison is the standard implied in the PMM study an observer who could reproduce the standards used in the PMM study would be necessary for any further study intended to explain the difference between brigade practice and the PMM results. A salvage officer may be the person best qualified for this task, for he would be able to identify the particular jobs not done in any particular fire, and discuss with a brigade officer whether these jobs were recognised by the brigade as salvage tasks, and why these tasks were not done or could not be done.

The assessment of fire losses is a very difficult task and a professional judgement is required. A loss adjuster would be needed in any study in which fire losses or salvage savings were to be estimated.

#### 3.6 The amount of salvage which should be done

The emphasis in this report has been on the discrepancy between the maximum

salvage potential and the salvage actually done. However, this should not be taken as implying that all the potential salvage should be done. It would be undesirable to undertake salvage to the extent that an insufficient number of men were available for rescues on fire fighting, or there were so many men in attendance at the fire that the remaining fire cover was inadequate. The "right" amount of salvage would be that level of activity which resulted in savings in fire losses without unduly increasing other fire losses or other costs.

The two possible factors which explain why more salvage is not done are that some of the salvage opportunities are not recognised; and that there is insufficient manpower or equipment available to do the work. The first factor - the recognition of salvage work - may be overcome by training and education, although there may be some tasks, for example cleaning and drying after a fire, which the fire brigade do not regard as part of their duties. The second factor - the shortage of resources - may be a more difficult problem to overcome, and the costs of providing additional resources may be prohibitive.

#### 4. CONCLUSIONS

The PMM salvage study provided estimates of the potential savings which can be achieved by salvage at fires. The results of this study are as follows:-

1. The maximum savings which can be achieved by salvage are about £14m per year (Great Britain, 1976 prices) equivalent to about 6 per cent of the total fire losses.
2. Much of the salvage savings can be achieved using simple equipment, but it is important that salvage is started early. It is estimated that 79 per cent of the maximum salvage savings can be achieved by "limited" salvage (ie by salvage undertaken by the crews of the first line appliances, using no more than the four salvage sheets which could be carried on each appliance).
3. The estimates of the maximum salvage savings, and the savings which can be achieved by "limited" salvage are based on ideal conditions, assuming that all the men necessary to do the salvage work are available. The number of men required for salvage during the fire would depend on the size of the fire, but typically the number of men required would involve about one man for each appliance in attendance.
4. It was estimated that in the fires visited during the PMM survey about 15 per cent of the potential salvage savings had actually been achieved by the brigades, and some further salvage had been done by the salvage corps. The brigades participating in the study were not necessarily a representative sample of brigades.

A further, small scale, study was undertaken in a brigade which is representative of good salvage practice. The salvage done by the brigade was assessed in a survey of fires, using self-assessment forms. The results of the pilot application study are as follows.

5. It appears that the amount of salvage work done by the brigade is considerably less than the maximum salvage requirements predicted in the PMM study, although it is not possible to estimate the proportion of salvage savings which are being achieved.



6. The brigade spend approximately 60% of the time on salvage compared to the PMM predictions in the larger and more important Class 3 and Class 4 fires. Sheeting up is an important activity and the brigade use about 40% of the number of salvage sheets compared to the PMM predictions.

7. It is not possible to deduce from the available information to what extent the discrepancy between the amount of salvage actually done by the brigade and the salvage potential is due to the salvage opportunities not being recognised, and to what extent the discrepancy is due to a shortage of manpower or equipment.

Two further points must be made in order to put the above results in perspective.

8. The maximum salvage savings are based on the judgements made by an officer from a salvage corps. It is not known exactly what salvage tasks were assumed in these judgements, and therefore it is not known whether all these salvage tasks should be considered to be part of the duties of the fire brigades.

9. The emphasis in this report is on the shortfall between the PMM salvage predictions and the brigades actual achievement. However, it is not intended to imply that all this salvage should be done by brigades. The right level of salvage will depend partly on the savings in fire damage which can be achieved by salvage, but will also depend on the costs and other consequences of attempting to do more salvage.

If a clear answer is required to the questions of why more salvage work is not done, and whether more salvage can be done, then a survey using self-assessment forms is insufficient.

10. In order to investigate the reasons for the discrepancy between the potential salvage opportunities identified by PMM, and the salvage actually done in practice, a survey of fires is required, and this survey must be undertaken by an independent observer who is capable of identifying all the salvage opportunities, recognising what the brigade has and has not done, and discussing the actual salvage and the salvage opportunities with the brigade.



APPENDIX A - THE RESULTS OF THE PMM SALVAGE STUDY

A1. The classification of fires

The results of the PMM study are presented in terms of 4 classes of fires, defined according to the potential salvage savings. The four classes of fires are as follows:-

Class 1: Fires at which salvage was likely to have been of very little value.

- fires in which buildings were not involved, or where the building contents were of little value, including fires in derelict or unoccupied buildings, fires in lock-up garages, huts, greenhouses, cycle sheds etc.
- fires where the building or group of buildings was completely burnt out.
- fires where neither jets nor hoses were used and where sprinklers did not operate.
- fires where not more than one hose was used on the lowest floor.

Class 2: Fires at which salvage was likely to be of low value.

- fires in occupied premises, whether residential or not, excluding those fires in Class 1, where only hoses were used, or not more than one jet was used on the lowest floor (basement or ground).

Class 3: Fires in residential premises at which salvage was likely to be of high value

- fires in occupied residential property, including hotels, where main jets were used (except for one jet on the lowest floor). Public houses are also included in this group.

Class 4: Fires in non residential property at which salvage was likely to be of high value.

- Fires in premises including industrial and commercial buildings, offices, schools, colleges, warehouses and shops, where jets were used (except for one jet on the lowest floor), or sprinkler systems operated.

A2. The potential salvage savings

The estimated potential salvage savings, defined according to the class of fire and the level of salvage are as follows: (the savings are at 1976 prices):

	Class 1	Class 2	Class 3	Class 4
"Limited" Salvage.	0	£48	£285	£3090
Tender at 10 minutes	0	£45	£231	£3480
Tender at 20 minutes	0	£40	£173	£3080
Tender at 10 minutes + limited salvage	0	£52	£297	£3960
Tender at 20 minutes + limited salvage	0	£52	£297	£3770

These are average savings per fire. Within each of classes 2-4, there are some fires at which there are no salvage savings, while there are other fires in which large savings can be achieved.

A3. The effort required for salvage

An estimate was made of the amount of effort required to achieve all the potential savings in the case of "limited salvage" ("limited" salvage is the salvage which could be done by the crews of the first line appliances, using the salvage sheets carried on the appliances, but without the additional equipment which would be carried on a salvage tender). The average figures are as follows:

	Class 2		Class 3		Class 4	
	During	After	During	After	During	After
During or after fire						
Effort (man-minutes)	15	130	56	240	205	510
Men required	1 or 2	2	2 to 3	4	3	4
Duration of activity (minutes)	10 to 15	60	20 to 30	60	70	125
Men required as % of men attending.	20%	-	20%	-	20%	-

More time is required for salvage after the fire than during the fire but it is the salvage work during the fire and particularly, during the early part of the fire fighting which is most important, and which results in the greatest saving.

#### A4. The important Salvage Tasks

In the PMM study an assessment was made of the importance of each salvage task in reducing fire losses. The relative importance of each task varies according to the type of fire. The assessed importance of the difference tasks is summarised below.

	Class 2	Class 3	Class 4
High importance Tasks.	Sheeting, protection of goods. Removing, diverting water. Removal of goods Mopping, drying.	Sheeting, protection of goods. Mopping/drying.	Sheeting protection of goods. Weather protection "Other" tasks.
Medium importance	Weather protection "other" tasks.	Weather protection Removing, diverting water. Smoke control "other" tasks.	Removing, diverting water. Removal of goods. Mopping/drying
Low importance	Smoke control.	-	Smoke Control.

"Other" tasks include oiling machinery, turning off sprinklers, prevention of deterioration.

Appendix B: THE ESTIMATION OF THE TOTAL SALVAGE SAVINGS

The proportion of fires falling into each of the 4 salvage categories is as follows:-

Class 1	85%
Class 2	10%
Class 3	1.5%
Class 4	3.5%

(These proportions are estimated from the national fire incidence).

The latest published fire statistics are the 1976 statistics, and in that year there were 92,500 fires in occupied buildings in Great Britain. The estimating potential salvage savings at 1976 prices are therefore:

"Limited" salvage	-	£11m
"Limited" salvage + tender at 10 minutes	-	£14m

These potential salvage savings can be compared with the total fire losses of £230m.



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