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AN EXAMINATION OF FIRE REPORTS FROM THREE I.C.I. ESTABLISHMENTS

by

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Summary

Fire reports from three Division of I.C.I. have been examined. One Division reported 156 incidents and the others 17 and 3 incidents respectively. The cause pattern differs from that in manufacturing industries as a whole and is linked with the type of activities carried on; for example, spontaneous ignition was a more frequent cause than usual because of the hazards of some of the materials handled.

The systems of fire spotting, fire fighting and fire reporting appear to be highly efficient and none of the fires reached very serious proportions.

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I - INTRODUCTION

For a period of 12 months, from 1st May, 1954 to 30th April, 1955, reports were received on all fires occurring in each of three of the Divisions of Imperial Chemical Industries Ltd. The three Divisions concerned were:-

- (a) Billingham Division which was described as having "gas solvents, oil, oxidising agents, materials under high pressure and general chemical risks";
- (b) Metals Division with "light and heavy engineering risks, metallic dusts and a certain amount of explosives"; and
- (c) Paints Division with "primarily a solvents risk with a slight dust risk".

Reports of 157 incidents were received from the Billingham Division and a reasonably detailed analysis of these has been made, but the number received from each of the other establishments (17 from Metals Division and 3 from Paints Division) was too small to give much indication of the fire hazard in the establishment. Whether the apparent difference between these Divisions represents a real difference in the incidence of fire, or is merely the result of different reporting procedures, is not known.

II - REPORTS FROM BILLINGHAM DIVISION

1. SUPPOSED CAUSES OF FIRES

The supposed causes of the 157 fires reported in the Billingham Division are given in Table 1. The groupings used in this table differ somewhat from those used by the Organization in producing the annual tables of national fire statistics, mainly because the original reports were rather different in character from those normally received from Fire Brigades. It was also considered that the grouping used was the most informative method of presenting the material. For example, in the group of fires attributed to leakage of flammable gases, vapours, etc. it is clear that there are many potential sources of ignition present in the works, and the important feature of these fires was the uncontrolled emission of flammable material at some unusual point in the system.

The general cause pattern in the fires reflects the type of activity carried on in the establishment and differs from that of industry as a whole. It is interesting to note that fires of electrical origin constituted only about 7 per cent of the total number of fires whereas the figure for manufacturing industries as a whole is about 14 per cent; on the other hand fires due to welding, cutting and burning activities at Billingham caused about 14 per cent of the fires reported, despite the attention given to protective measures (which is obvious from the reports), while the overall figure for manufacturing industries is only about 4 per cent. The number of fires caused by friction (sparks and overheating), almost 9 per cent of the total, was not very different from the industrial average of about 8 per cent.

Spontaneous ignition, which caused nearly 9 per cent of the Billingham fires, gives rise to only 1 per cent of the fires in the manufacturing industries generally and this is obviously connected with the peculiar hazards of certain of the materials handled (particularly in the Research Section). Leakages of flammable liquids and gases from pipe lines, stills etc. were together responsible for about 17 per cent of the fires at Billingham and the handling and transmission of these materials present an obvious fire hazard. Hot pipes, valves, casings, etc. were given as the source of ignition in 11 per cent of the Billingham reports; the material ignited being generally oil or oil soaked lagging.

Fires caused by smoking materials and matches cause many fires in manufacturing industries generally (about 14 per cent of the fires attended by

fire brigades) and the very small number of such fires in the Billingham Division (only 3 in the 12 months considered) shows that a more fire-conscious approach could be effective elsewhere.

There were few fires for which the cause was given as "unknown" and few in which there appeared to be some doubt about the cause. All of these fires appeared to be fairly trivial.

2. MATERIALS IGNITED FIRST

The materials ignited first in the fires reported by the Billingham Division are given in Table 2.

The general pattern is again closely connected with the type of material handled by the Division and about 74 per cent of the incidents involved flammable liquids, gases, oils or grease.

3. TIMES OF OUTBREAKS

The times of outbreaks of the fires at Billingham, given in Table 3, are spread over the full 24 hours of the day, presumably because there is continuous activity in connexion with some of the processes. The incidence of fire is somewhat higher between the hours of 9.00 a.m. and 5.00 p.m. than at other times; this would be expected since it coincides with the normal period of maximum activity.

One of the fires was said to have been reported by a passer-by and 2 by contractor's men working in the Division. It appears that the remainder of the fires were reported either by the works personnel or by the Works Fire Brigade, an indication that the fire-spotting and reporting systems operate satisfactorily,

4. METHODS OF EXTINCTION AND PERSONNEL INVOLVED

Despite the fairly large number of outbreaks of fire in the Billingham Division the incidence of serious fires was low. Indications of this are given in Table 4 which shows the methods of extinction used and Table 5 which shows by whom the fires were extinguished.

In 135 of the fires only one method of extinction appears to have been used, although more than one of the particular type of extinguisher was sometimes needed. In 120 of these the method was a simple first aid one (i.e. extinguisher, bucket of water, etc.). CO₂ and CTC extinguishers were more frequently used than other types, and they are obviously especially suitable for the kind of risks encountered.

Most of the fires appear to have been extinguished by works personnel and the Local Authority Fire Brigade was required to assist in only 16 of them. It is clear that the generous provision of extinguishers and the speed with which they are brought into operation is effective in the avoidance of serious fires.

III - REPORTS FROM METALS DIVISION

Information from the reports received from the Metals Division is given in the appropriate tables together with that from the Billingham Division. Only 17 reports were received so that no very clear picture emerges.

Again it is clear that the fires were in general successfully dealt with before they had time to develop to serious proportions. Sixteen of them were extinguished by the Works Fire Brigade and 1 by other works personnel. The 7 fires shown in Table 4 as having been extinguished by "jets from pumps" actually necessitated the use of hose reel jets only, so that even these were only "first aid equipment fires".

IV - REPORTS FROM PAINTS DIVISION

Three fires were reported by the Paints Division. Two of these were caused by leakage of oil onto asbestos insulation between the inner and outer shells of a set pot and each was extinguished rapidly with a 2 gal. extinguisher. The other fire was caused by cutting slag from an oxyacetylene

welder and it also was extinguished with a 2 gallon soda-acid extinguisher.

V - GENERAL REMARKS AND CONCLUSIONS

The causes of the fires are closely linked with the type of work carried out in the Divisions and the pattern differs somewhat from that encountered in the manufacturing industries generally.

It is clear from the reports that the standard of fire protection in these Divisions is high. There is adequate provision of extinguishers, plant personnel appear to be aware of the hazards and of the precautions to be taken, the fire-spotting and fire-warning systems appear to operate satisfactorily and fires are tackled quickly before they have time to spread.

The fire reporting system is good and the comments made by reporting officers show that due importance is attached to the elimination of any fire hazards that become apparent.

It is obvious that the type of risk is liable to vary from time to time as new processes are started or plant is reorganised and fire protection measures have therefore to be on an ad hoc basis, the measures selected being those most appropriate to the particular risk.

Table 1

SUPPOSED CAUSES OF FIRE

Supposed cause	No. of fires	
	Billingham Division	Metals Division
Blow lamp	2	-
Bunsen burner or similar apparatus	4	-
Distillation flasks, test tubes etc. (breakage, spillage)	7	-
Electrical apparatus, cables, heaters, motors, etc.	11	4
Friction sparks	2	-
Friction causing overheating of belts, bearings, etc.	12	-
Furnaces, ovens, boilers (sparks or flames)	6	6
Hot ashes, breeze, clinker igniting various materials (mainly oil)	6	-
Hot pipes, valves, casings etc. igniting various materials (mainly oil and oily lagging)	17	1
Leakage of flammable liquids from pipes, stills, etc (various sources of ignition)	10	-
Leakage of flammable vapours and gases from pipes, glands, etc. (various sources of ignition)	17	-
Overheating of apparatus due to process	5	-
Rubbish burning	-	2
Smoking materials	3	-
Spontaneous combustion and decomposition	14	1
Tracer bullets	-	1
Vehicles (truck, lorry exhaust	2	-
(locomotive	1	1
Welding, cutting and burning	22	1
Zinc spray gun	1	-
Unknown or uncertain	15	-
Total	157	17

Table 2

MATERIALS IGNITED FIRST

Material ignited	No. of fires	
	Billingham Division	Metals Division
Asphalt	1	-
Belting, brake linings	4	-
Chemicals not otherwise specified below	10	-
Coal and powdered fuel	6	-
Dust accumulations	-	5
Dust sheet	2	-
Electrical insulation	10	4
Flammable liquids other than oils (including petrol, creosote, etc.)	24	-
Gases	24	-
Grassland	-	1
Grease and oils	26	1
Gland and valve packings	2	-
Lagging materials and sacking	7	-
Oil-soaked cord, lagging, waste	11	1
Paint	2	-
Soot	-	1
Spent oxide	3	-
Straw, rubbish, waste	7	3
Sulphur	6	-
Timber and hardboard	4	1
Miscellaneous and unknown	8	-
Total ...	157	17

Table 3

TIMES OF OUTBREAK OF FIRES

Time	No. of fires	
	Billingham Division	Metals Division
00 - 01	6	1
01 - 02	3	-
02 - 03	3	-
03 - 04	4	-
04 - 05	3	1
05 - 06	2	-
06 - 07	5	-
07 - 08	5	1
08 - 09	4	1
09 - 10	9	2
10 - 11	19	1
11 - 12	11	3
12 - 13	8	1
13 - 14	7	1
14 - 15	12	-
15 - 16	12	-
16 - 17	12	1
17 - 18	3	-
18 - 19	8	-
19 - 20	6	1
20 - 21	8	3
21 - 22	1	-
22 - 23	4	-
23 - 24	2	-
Total	157	17

Table 4

METHODS OF EXTINCTION

Method	No. of fires	
	Billingham Division	Metals Division
Asbestos blankets	2 (2)	-
Buckets of water	2	3 (2)
CO ₂ extinguishers	67 (17)	2 (2)
CTC extinguishers	41 (10)	6 (4)
Foam extinguishers	27 (7)	1 (1)
Foam generators, branches	4 (1)	-
Isolation (removal)	4 (1)	1
Jets from hydrants	12 (3)	-
Jets from pumps	1	7 (1)
Soda-acid extinguishers	14 (5)	1 (1)
Steam	1	-
Stirrup pump	-	2 (1)
No fire fighting or not stated	10	-

(Figures in brackets indicate number of fires in which more than one of these methods were used)

Table 5

BY WHOM FIRES WERE EXTINGUISHED

Personnel engaging fire	No. of fires	
	Billingham Division	Metals Division
Works personnel	119	1
Works Fire Brigade	16	16
L.A. Fire Brigade	16	-
Other or not stated	6	-
Total	157	17