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DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH AND

> FIRE OFFICES' COMMITTEE JOINT FIRE RESEARCH ORGANIZATION

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A REPORT ON TRIALS OF DRY CHEMICAL AGAINST LARGE FIRE

by

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Summary

The results of trials using proprietary dry powder equipment against a 900 ft² petrol fire are reported. Suggestions intended to improve the effectiveness of the equipment are made.

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A REPORT ON TRIALS OF DRY CHEMICAL AGAINST LARGE FIRES

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Introduction

One of the present tasks of the Working Party of the Joint Executive Standardization Committee for fire fighting equipment is to establish a suitable specification for dry powder extinguishing agents. This note describes work carried out by the Fire Service Department of the Air Ministry on large fires (900 ft²) with the object of comparing the fire extinguishing capabilities of fine and coarse powders. Earlier experiments ⁽¹⁾ on small scale fires had suggested that fine powders were likely to be more effective than coarse powders in fire extinction.

Equipment used

The equipment, which was of a proprietary make, comprised a pressure vessel of nominal capacity 200 lb, which supplied powder to two nozzles via two lengths of rubber hose. A 151b cylinder of carbon dioxide was used to expel the powder from the pressure vessel. The whole apparatus was mounted on a vehicle. Two makes of powder of different specific surface were used in the tests.

Test procedure

The fires were made in a shallow concrete bund of dimensions 30 ft x 30 ft. Before each test, a thin layer of sand was spread over the bottom of the bund and 160 gal. of uncontaminated "wide-cut gasoline" (Avtag) was distributed evenly over it. The fuel was ignited and allowed to burn for 30 seconds before extinction was attempted. The fire was attacked simultaneously by two operators wearing protective clothing. To determine the approximate rate of discharge of powder, the weights of powder before and after each test were noted and the total effective discharge time was taken.

The intensity of radiation from the fire was measured by two radiations positioned as shown in Figure 1.

Results

Table 1 shows the specific surface of powder, total rate of application of powder and the time from commencement of powder application to extinction, for each test.

A general layout of the test site is shown in Figure 1.

TABLE 1

Test N ^o	Operators	Specific surface cm ² /gm	Rate of application lb/sec.	Extinction time sec.
1	A and B	_*	3.1	50
2	A and B	3, 280	2.2	41
3	A and B	1,430	2.8	almost out 85
4	A and B	2,700	2.4	almost out 80
5.	C and D	1,460	2.6	not out
6	C and D	2,600	2.5	52

Test Results

In test 1 the powder used was of the same manufacture as that used in Tests 3 and 5.

Study of the records of radiation measurement did not produce any information additional to that given by the column of extinction times given in Table 1.

Discussion and conclusions

An analysis of the results of these tests shows that their variability is too great to permit any definite comparison between the two grades of powder on the basis of such a small number of tests. This variability is due in part to the fact that the rate of delivery from the nozzles (about 1 lb powder per second from each) is too near the "critical" rate of application for this type and size of fire, the "critical" rate being that rate below which extinction is not possible. It is also due in part to the change of operators after four tests; operators C and D for instance, only succeeded in extinguishing about half the fire area in test 5, before their powder was nearly exhausted. As the skill and experience of the operator is of great importance in using dry powders, a more definite comparison of the grades of powder would have been achieved if only one pair of operators had been used and they had been given some preliminary experience with this type of fire before embarking on the main comparison tests.

More rapid control or extinction of the fire would probably have resulted if the rates of application of powder had been higher. Wide-angle flat sprays, rather than the narrow-angle cone sprays used in these tests, may also have led to quicker extinctions,

- 2 -

although it is emphasized that this last suggestion does not necessarily apply to other types of fire for example those in which obstructions are present.

References

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 Hird, D. and Gregsten, M. J. The extinction of flammable liquid fires by dry chemical extinguishing agents. I. The effect of particle size. <u>Department of Scientific and Industrial</u> <u>Research and Fire Offices' Committee, Joint Fire Research</u> <u>Organization. F.R. Note</u> No. 239/1956.

- 3 -



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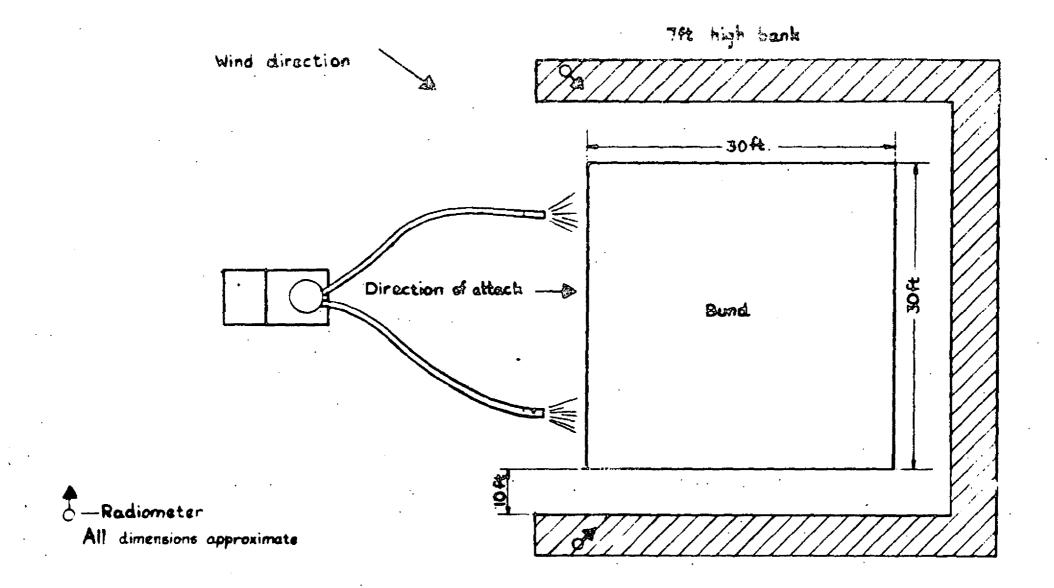


FIG.I. GENERAL LAYOUT OF TEST SITE