Tentative program of fire tests at Aultsville

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SUBJECT Tentative Program of Fire Tests at Aultsville

The construction of the St. Lawrence Seaway necessitates the inundation of a large area including several small towns and villages. The Hydro Electric Power Commission of Ontario (HEPC) is responsible for rehabilitation, which includes arranging to move some of the buildings and buying the remainder for demolition. By arrangement between the HEPC and the Civil Defence Section of Defence Research Board, certain buildings may be made available for experiments. The Fire Section of the Division of Building Research, National Research Council, has been offered the chance to do fire tests on some of these buildings. This note is to describe one of the suggested programs of tests.

The first meeting with the Civil Defence Section was on 27 December 1956 and the first reconnaissance to the area on 9 January 1957. The village of Aultsville was then selected as the most suitable for fire tests. There has been a series of reconnaissances since. On 11 February 1957 the Fire Section party met the local representatives of HEPC and saw a few interiors. On the third trip, 27 February, each of the 80 available buildings was photographed from the front in a standardized manner, and certain of these were similarly photographed from the side on 13 March. It was clear that the most common size of house was two-storey, 600 to 900 square feet per storey, exclusive of sheds etc.

This size was tentatively selected for the tests, since:

a) it was plentiful
b) the fire should not be too hard to control.

Measurements of certain houses were made on 13 and 20 March and 4 July. A sixth trip had been made on 22 May to conduct a party from Building Design and Building Code Sections. Thus, on 8 July rough plans were available of eight houses and the interior lining materials had been recorded for these and for some others.

There has been much discussion on what should be the object of the tests. Starting from a suggested number of tests, six, can useful information be obtained on one or more topics? This scale is governed not by shortage of houses but by limitations of equipment for observations, and above all, of skilled men's time.

Experience has shown that the results of fire tests are variable. This is true even when all the parameters which appear to be relevant have been carefully controlled, as they cannot be in tests on houses already built and all different. Where large numbers of experiments can be done, this situation can be rectified by proper use of statistics. Where, as here, a small number only of tests can be done, a kind of uncertainty principle governs: one can get very unreliable information about a number of topics or one can get rather better confidence in the information gained on a very few topics.

For instance, if A, B and C are three factors which may influence the merit of a construction as regards fire safety, expressed in terms of an index such as, for instance, the estimated time available for escape from the building after ignition, one may measure the index for six cases:

With A
Without A
With B
Without B
With C
Without C

Suppose that the mean value of this index when A is present is twice what it is without. The mean value can only be determined by a great number of tests, and in the schedule above only one is provided. If the coefficient of variation of these measurements is say 25%, which is not unreasonable in the light of experience of model room burn-out experiments, then there is an appreciable probability that the single test will show the index less with A than without it: that is, the reverse of the truth.

If however one does six tests as follows:

With A
With A
With A
Without A
Without A
Without A

then some confidence can be placed in the result as regards the merit of A, though nothing has been learned about B and C.

3) Gas Analysis - The method of taking samples in evacuated bottles for subsequent analysis is thought to be cumbersome. It is planned to measure the oxygen content of the atmosphere magnetically and the carbon monoxide thermally by selective catalytic oxidation. These are the two components of the atmosphere which govern the survival of life. Each gas would be measured on a separate indicator and readings would be taken manually at frequent intervals.

An important detail is that the critical range of carbon monoxide concentration is higher than the range for which the indicator can be used directly. Thus it will be necessary to dilute the sampled gas, and to do this quantitatively.

Acknowledgement

It will be noted that the method proposed is closely modelled upon that used by the Joint Fire Research Organization (U.K.) in their experiments upon two specially-built houses in December 1949.