Image Cover Sheet

CLASSIFICATION	SYSTEM NUMBER
UNCLASSIFIED	140783

TITLE

CASUALTY PRODUCING POWER OF UNTHICKENED MUSTARD SPRAYED FROM LOW ALTITUDES UNDER TEMPERATE CONDITIONS

System Number:

Patron Number:

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Notes:

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Suffield Field Experiment Bunker
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COPY NO 44
20 July 44

EXPERIMENTAL STATION

SUFFIELD ALBERTA

FIELD EXPERIMENT NO. 251

Casualty Producing Power of Unthickened Mustard Sprayed from Low Altitudes under Temperate Conditions

REFERENCE

D.C.W. & S. Project S.143.
Field Experiments 229, 243.

INTRODUCTION

1. Field Experiments 229 and 243 have been carried out as part of a series of trials to evaluate the casualty producing power of low spray with unthickened mustard. In Field Experiment 229 the contamination densities at observer positions varied from 0.06 to 6.6 g/sq.m., though very few were in the range 1.5 to 2 g/sq.m. Since it appeared that this latter range was borderline between casualty producing and non-casualty producing Field Experiment 243 was designed to expose observers to a contamination density of the order of 1.5 g/sq.m. Actual contamination densities encountered at observer positions on Field Experiment 243 were, however, considerably lighter than was intended. In one case only was the density in excess of 1 g/sq.m.

OBJECT

2. (i) The object of this trial is to assess the casualty producing power of low spray with unthickened mustard in the contamination range 1 - 2 g/sq.m. It is intended to expose observers to a maximum density of 2 g/sq.m.

(ii) The drop spectrum and ground contamination distribution will be assessed in more detail on this trial than in Field Experiments 229 and 243.

March

WEATHER CONDITIONS

3. Wind Speed: 8 - 15 mi/hr.
Wind Direction: any, but steady.
Air Temperature: 40 to 70°F.
Temperature Gradient: lapse.

SITE

4. Permanent Layout, for Field Experiment 227.

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MATERIALS

5. 1 - M10 smoke tank charged 326 lbs. unthickened HS Levinstein dyed 0.5% Williams Red. (The charging will be filtered into the tank.)

Temperature of charging at take-off 10°C.

P & M. S. and Chem. S. will approve charging after dyeing. O. M. & E. will measure the viscosity before and after dyeing.

PROCEDURE

6. Layout (see Appendix)

(i) 21 rows of filter paper assemblies, 50 yards between rows, will be laid out parallel to wind direction.

(ii) Each row will be 250 yards long and will consist of filter paper assemblies at 5 yard intervals for the first 150 yards downwind, and at 10 yard intervals for the remaining 100 yards. At each observer position, 3 additional papers will be placed as shown in the Appendix.

7. Observers

(i) Twenty-five observers will be disposed, in lines of five each, 60, 80, 90, 100 and 120 yards downwind of the upwind edge of the layout as indicated in the Appendix. The observers will be positioned a distance d from their four filter papers as given by the formula: $d(\text{yds}) = \frac{\text{wind speed at 6 ft in mi/hr}}{4}$.

(ii) During the spray, the observers will stand facing downwind. They will be dressed as follows:-

Battle Dress, non-impregnated
Shirts, long-sleeved, cotton.
Anklets, socks and boots.
Respirators at the gas position.

(iii) Impermeable clothing (coat and trousers) will be worn over the battle dress, impermeable hoods worn over the head, and rubber gloves on the hands.

(iv) Windows 4" x 4" will be cut in the impermeable clothing in the following positions:-

(a) one window at the back of each shoulder.
(b) one window in the centre of the back, just above the belt, on the loose fitting part of the battle dress blouse.
(c) one window at the level of each collar bone. (Trials at Dugway have shown that there is a certain amount of contamination deposited on the downwind surface of observers.)

(v) A filter paper assembly fitted with a card board stiffener will be fastened over the buttocks of each observer so as to hang in a vertical plane.

8. Functioning of Spray Tank

(i) The M10 tank will be loaded onto a Boston aircraft. (A second dummy tank may have to be loaded.)

(ii) The aircraft will fly at a height decided by P & M. S. to give a height wind product of 1,000 and at a T.A.S. of 200 to 250 mi/hr. The track will be 30 yards upwind of the upwind edge of the layout, and will be indicated by a line of markers. The tank will be functioned over the aiming mark (see Appendix).

(iii) If A/C checks altimeter on runway M.E.O. can give them a zero correction for the height of the target area. (Correction of the day for barometric pressure will of course be made.) This will enable the pilot to fly as closely as possible to the designated height.

9. Height of Aircraft

The height of the aircraft during the spray will be checked by P & M. S. using theodolites.

10. Control of Observers after Spray

After the spraying, the observers will move off the contaminated area and the impermeable clothing will be removed. The remainder of the clothing will be worn for 4 hours after the spraying during which time twelve of the men will take part in out door Station fatiques. The remaining fourteen men will lie or sit about in a warmed (75°F) room.

11. Chemical Sampling

Plates containing chloroform, as used by Chem. S. on Field Experiment No. 229 will be placed at positions 9, 13, 17, 21, 25, 29 on rows G, J, and L, to obtain information on the extent of evaporation of mustard from the droplets during their descent.

METEOR DATA

12. Wind speed at 2 metres will be recorded at 1 minute intervals for at least 5 minutes before and 5 minutes after the spray. Wind direction during spray will be noted.

ADMINISTRATION

13.

M.E.O.

In charge of trial. Layout. Report.

P & M. S.

Height of aircraft. Meteor observations. Assessment of contamination. The contamination at observer positions will be reported as both densities and % of contamination/the drop weight in ranges: <0.01 mg.

0.01 - 0.025 mg.
0.025 - 0.05 mg.
0.05 - 0.1 mg.
0.1 - 0.25 mg.
>0.25

The areas contaminated to varying degrees and % of original charging in these drop weight ranges will also be reported.

R.C.A.F.

Discharge of S.C.I. Report.

PHYS. S.

Provision and control of observers. Report.

CHEM. S.

Sampling as in 11. Report.

PHOTO. S.

Photographs of contaminated observers will be made at the discretion of Phys. S.

O. M. & E.

Provision of M10 tank charged dyed and filtered HS Lovinstein. Measurement of viscosity before and after charging.

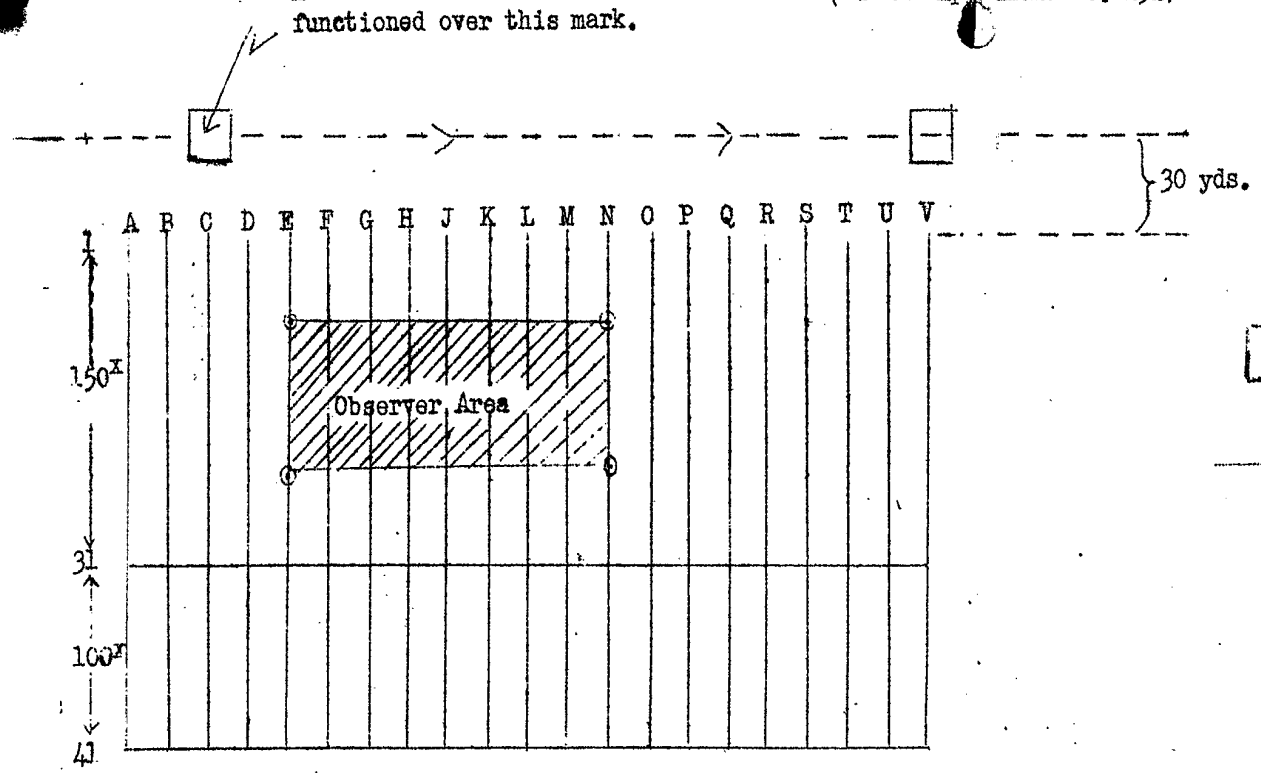
Kyle D. W. Jarvis Flt Lt
FOR (A.R. Harper) Major, R.C.A.
A/C.E.O.
Experimental Station

AWB:roa

A.W. Birnie
(A.W. Birnie) Capt, R.C.E.
P.R.S.

APPENDIX

(Field Experiment No. 251)



tracking marked (white jump cards in form of inverted V 4 ft. high) opposite rows C and V.

additional tracking marks - white jump cards opposite rows J and Q.

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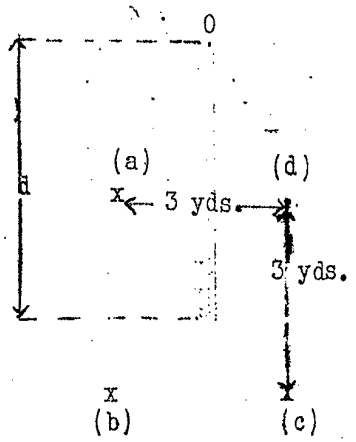
Rows A to V are 50 yards apart.
Each row consists of 31 filter paper assemblies 5x apart (positions 1 to 31) and 10 papers 10x apart (positions 32 to 41.)
Observers will be positioned on rows E, G, J, L, and N, 60, 80, 90, 100 and 120 yds. downwind of the upwind edge of the layout (25 observers). Near each observer additional filter paper assemblies will be placed as indicated below.



0 observer.
. layout filter paper assembly.
x additional paper assembly.