Image Cover Sheet

CLASSIFICATION	SYSTEM NUMBER
UNCLASSIFIED	140778

TITLE

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

System Number:

Patron Number:

Requester:

Notes:

DSIS Use only:

Deliver to:

[redacted]

[redacted]
COPY NO 41
8 June 1944

EXPERIMENTAL STATION

SUFFIELD ALBERTA

FIELD EXPERIMENT NO. 243

1. TRIAL

Casualty producing power of unthickened Mustard sprayed from low altitudes under temperate conditions.

2. REFERENCE

Request to Suffield to assess the casualty producing power of low spray with unthickened H made at meeting of U.S. Project Co-Ordination Board held at Edgewood 27 April 1944.

3. INTRODUCTION

(i) Field Experiment 229 investigated the physiological effect of low spray with unthickened HS Levinstein on observers protected by impermeable clothing except for two 4" x 4" windows cut over the shoulders, buttocks and calves. Under the impermeable clothing the observers wore battle dress, cotton shirts, long-limbed non-impregnated underwear, anklets, socks and boots. Respirators were worn at the gas position.

(ii) The results of the above trial showed that for men exposed to contamination densities of 3 g/m^2 and above (drop size 0.2 - 0.4 mm) a high percentage of casualties would be produced if the men were dressed as in (i) above, but without impermeable clothing.

4. OBJECT

The object of the present trials is to assess the casualty producing power of unthickened HS Levinstein in the contamination range below 1.5 g/m^2 with drop sizes below 0.02 mg drop weight (0.3 mm diam.). In this trial the assessment will be carried out on men dressed in battle dress, cotton shirts, boots and anklets, and wearing respirators at the gas position. Impermeable clothing will protect the men except for windows as indicated below.

5. WEATHER CONDITIONS

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

6. MATERIALS

1 - M10 smoke tank charged 326 lbs unthickened HS dyed 0.5% Williams Red.
Temperature of charging at take-off: 10°C.

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

7. PROCEDURE

Layout (See Appendix)

Filter Papers

(i) Eleven rows of filter paper assemblies, 100 yards between rows, will be laid out parallel to the wind direction.

(ii) Each row will be 160 yards long and will consist of filter paper assemblies at 20 yard intervals. At each observer position (see below) 3 additional papers and 4 large jump cards will be placed in proximity to the observer as shown in the appendix.

Observers

(iii) Twenty-eight observers will be disposed, in lines of seven each, 100 yards, 120 yards, 140 yards, and 160 yards downwind of the upwind edge of the layout as indicated in the Appendix.

(iv) 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.

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

(vi) 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.

(vii). A circular filter paper, as large as possible without shielding the 4" windows, will be fastened onto the impermeable clothing in the centre of the back of each observer.

Functioning of Spray Tank.

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

(ix). 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).

Height of Aircraft.

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

Control of Observers after Spray.

(xi) After the spraying, the observers will move off the contaminated area and the impermeable clothing will be removed.

(xii). The remainder of the clothing will be worn for 4 hours after the spraying during which time fourteen of the men will take part in out door Station fatigues. The remaining fourteen men will lie or sit about in a warmed (75°F) room.

(xiii). Plates containing chloroform, as used by Chem.S. on Field Experiment No.229 will be placed at positions 6,7,8, and 9 on lines C to J inclusive to obtain information on the extent of evaporation of mustard from the droplets during their descent.

8. Meteor Data

(xiv) Wind speed at 2 metres will be recorded at 1 minute intervals for at least 5 minutes before and 5 minutes after the spray. ~~Normal meteor observations will be made during vapour sampling.~~ Wind direction during spray will be noted.

9. ADMINISTRATION

M.E.O.
In charge of trial. Layout. Report.

P.& M.S.
Height of aircraft. Meteor observations. Assessment of contamination density and predominant drop size at observers positions and on observers.

R.C.A.F.
Discharge of S.C.I. Report.

Phys.S.
Provision and control of observers. Report.

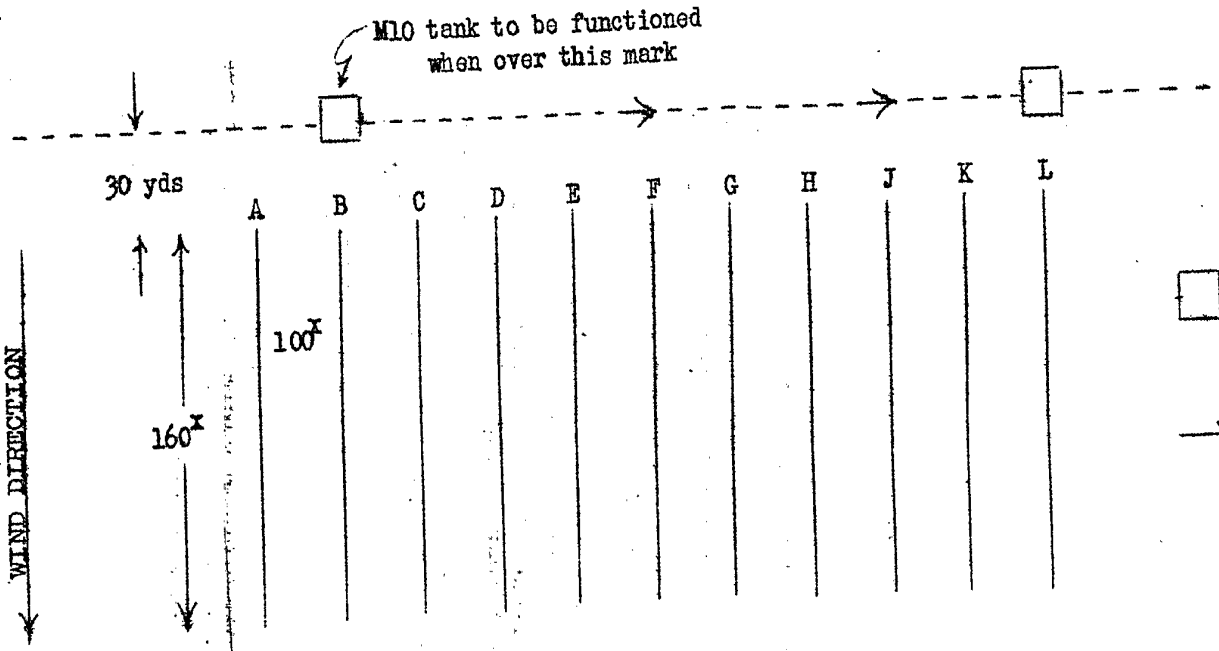
Chem.S.
Sampling as in 7 (xiii). Report.

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

AWB:rea

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

A.R. Harper
(A.R. Harper) Major, R.C.A.
A/C.E.O.
Experimental Station

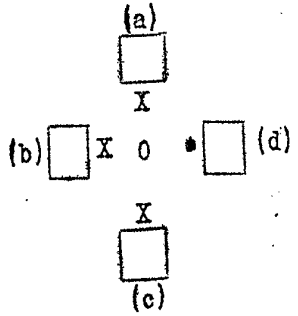


Tracking marks (white jump cards in form of inverted V 4 ft high) opposite rows B and L.

→ Aditional tracking marks - white jump cards - opposite rows F and J.

11 rows of filter paper asemblies 100 yards apart each row consisting of filter papers 20 yards apart (9 papers).

Observers will be positioned on lines C, D, E, F, G, H, and J, 100, 120, 140 and 160 yards downwind from the upwind edge of the layout. (28 observers) Each observer to have additional jump cards and filter papers as shown below.



• Layout filter papers.

Large jump cards touching outer edge of filter papers.

X Additional filter papers $2\frac{1}{2}$ yards from observer.

0 Observer, $2\frac{1}{2}$ yards from layout filter papers. (If observer were at F8 then additional filter papers would be marked F8(a), (b) and (c) and cards F8(a), (b), (c), and (d).)

#140278