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DEFENCE RESEARCH ESTABLISHMENT SUFFIELD  
RALSTON ALBERTA

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SUFFIELD MEMORANDUM NO. 45/69

ASSESSMENT OF THE VAPOUR HAZARD FROM GD CONTAMINATION  
ON PRAIRIE TERRAIN

PROCEDURES TO BE USED IN FIELD EXPERIMENT NO. 579,  
TRIALS 10 - 12

1. REFERENCES

DRB Project No. D-20-50-09.  
Suffield Memorandum Nos. 36/67 and 104/67.

2. PURPOSE

The purpose of these trials is to provide data for the assessment of the vapour hazard on and downwind of areas of terrain contaminated with GD. The trials are a continuation of the series reported in Suffield Memorandum No. 104/67.

3. MAIN OBJECTIVES

- (i) To measure vapour dosages at 1 ft on the downwind edge and at given distances downwind of a uniformly contaminated area to determine the downwind profile of vapour dosage. An area 150m crosswind x 25m downwind will be contaminated to a density of 4 g/m<sup>2</sup> approximately.
- (ii) To measure vapour dosages on vertical sampling arrays to determine vapour recoveries on the downwind edge and at given distances downwind of the contaminated area, and thus to obtain information on the sorption of GD in the liquid and vapour phases by prairie terrain.

4. SUPPLEMENTARY OBJECTIVES

- (i) To derive the field sensitivity of the U.S. M8 Automatic Chemical Alarm System, in collaboration with a DREO representative.
- (ii) To test the effectiveness of a proposed diazepam-atropine therapy in monkeys exposed to GD vapour.
- (iii) To determine the ingestion hazard to animals (rabbits) of vegetation on and downwind of the contaminated area on the day following the last trial.

5. SCOPE

Three successful trials are required.

6. SITE

The vertical grid site at DRES.

7. WEATHER

Wind Direction - 140T through 180T to 310T and steady for 4 hours.

Wind Speed - 5 to 20 mi/hr.

Weather - Any except continuous precipitation.

Ground Temp. - Preferably less than 90°F.

8. MATERIAL

Modified agricultural spray boom with towing vehicle - 2.

GD - 13.5 Kg for each boom - 27 Kg total each trial.

6 Kg will be recovered from each boom after each spray run.

Vapour Samplers - 852.

Ground Contamination Samplers - 99.

Aerosol Samplers - 36.

M8 Automatic Chemical Alarm System - 2.

Cages as required for Rabbits.

9. SAMPLING LAYOUT

The sampling layout consists of four concentric circles of 30, 75, 125 and 175m radii, see attached layout diagrams. Sampling positions, supplied with electrical power, are spaced at 6° intervals of arc on the 30m circle and at 10° intervals on the remaining circles.

10. VAPOUR SAMPLING ARRAY

(a) Vapour samples will be taken at 1 ft above ground at 13 consecutive positions each on the 125 and 175m arcs, covering 60 degree of arc each side of the expected downwind position.

(b) Vapour samples will be taken at  $\frac{1}{2}$ , 1, 2, 3 and 5m on 18 vertical arrays set up on the 30m circle to cover 180° of arc, and at  $\frac{1}{2}$ , 1, 2, 3, 5, 7 and 9m on 13 arrays on the 75m circle covering 120° of arc, positions as shown in the layout diagrams.

(c) In addition to the vertical arrays on the 30m circle, 1 ft vapour samples will be taken at 13 alternate positions, as shown in Fig. 2.

11. CONTAMINATED AREA

A rectangular area 150m x 25m, with its long axis acrosswind and displaced 5m upwind of the center of the layout, will be marked out for spraying.

12. GROUND CONTAMINATION SAMPLING ARRAY

Pie-plate samplers will be set out in the area to be contaminated on a 10m crosswind x 5m downwind grid. In addition the three middle downwind rows will be extended from the downwind edge of the contaminated area to the 75m circle with a 10m downwind spacing.

13. AEROSOL SAMPLING ARRAY

Pipe cleaner aerosol samplers will be provided at the  $\frac{1}{2}$ m and 1m vapour sampling levels on the 30m arc.

14. PROCEDURE

- (a) Zero for the trial will be chosen, preferably, on the basis of a forecast ground temperature of less than 90°F for the period Z to Z + 2 hr, in daylight, given suitable wind and weather conditions.
- (b) The samplers will be set out and the spray area marked according to the forecast wind direction. A meteorological station will be set up upwind of the layout to record meteorological conditions prior to and during the trial.
- (c) The M8 Automatic Chemical Agent Alarm System and a rack of 12 vapour samplers will be positioned at a location designated by the DREO representative.
- (d) In one trial monkeys will be tethered at chosen positions on the 30m and 75m circles.
- (e) The spray area will be contaminated in a single pass by the two spray booms travelling on parallel crosswind paths, commencing at Zero.
- (f) Vapour sampling will begin at Zero (commencement of spraying) and continue according to the following schedule:-

30m Circle                      Z to Z+25 sec, Z+25 sec to Z+2 min, Z+2 to Z+10 min, Z+10 to Z+120 min.

75m Circle                      Z to Z+40 sec, Z+40 sec to Z+2 min, Z+2 to Z+10 min, Z+10 to Z+120 min.

125 and 175m Circles      Z to Z+10 min, Z+10 to Z+120 min.

M8                                      As required by DREO representative.

- (g) When spraying is complete, pie-plate samplers will be collected, and personnel involved in animal experiment will be allowed access to the animal positions.
- (h) Vapour and aerosol samples will be collected at the end of vapour sampling.
- (i) Meteorological Observations

Wind Direction at 2m;  
Wind Speed Profile  $\frac{1}{2}$ , 1, 2, 4, 8 and 10m;  
R.H., Air and Ground Temperature;

will be recorded at 2 min intervals from Z to Z+10 min, then at 15 min intervals to cover the vapour sampling schedule.

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14. Continued

- (j) On the day following the last trial, rabbits in suitable cages, will be placed on the sprayed area and on the 30m circle for 24 hr periods.

15. ANALYSIS

The agent samples will be analysed by the dianisidine method supplemented by the enzyme method as required. A sample of the spray boom charging will be provided for analysis.

16. ADMINISTRATION

F.E.O. In charge of trial. Preparation of layout. Operation of spray boom. Record of Zero and duration of spray runs. Emplace stakes for tethering 6 monkeys. Assistance to chemical teams in collection of samplers.

H/Chem Provision of agent samplers. Analyses of samples. Provide chemical Trials Officer and field teams.

H/Units Provision of agent and charging of spray boom reservoirs. Sample of agent to Chemistry Section.

H/Met Meteorological forecast and observations.

H/Physiol Provision of animals and handlers, and suitable cages for rabbits. Provide stakes and tethers for monkeys.

D.R.E.O. Provide MB Alarms, supervise their operation and specify location and related vapour sampling schedule.

M.O. Attendance at trial.

H/PRS Trial Report.