

Image Cover Sheet

CLASSIFICATION

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SYSTEM NUMBER

126805



TITLE

THE CASUALTY PRODUCING POWER OF MUSTARD SPRAY

System Number:

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EXPERIMENTAL STATION, SHEFFIELD, ALBERTA
SHEFFIELD REPORT NO. 47
SERIAL NO. 1111
X 25th JANUARY, 1943

SHEFFIELD REPORT NO. 47

THE CASUALTY PROTECTING POWER OF MUSTARD SPRAY

AMENDMENTS

SUMMARY



CONCLUSIONS

Delete para 1 - substitute:-

1. The casualty producing potentialities of mustard spray emitted from two 500 lb S.C.I.'s functioned simultaneously from a Bolingbroke aircraft flying crosswind at heights between 650 - 1000 ft. under the conditions of this trial, are low amongst troops wearing winter clothing without greatcoats.

Par 6. after "snow", insert of depth 6 inches."

Page 3 line 11.

Delete "No. of non-casualties in this area 11"

Substitute "No. of non-casualties in this area 9"

Classification / Designation _____
Changed to / Remplacée par U/K
By Authority of _____
Sur l'Autorisation de C. Laforce
Date 25 Feb 48 Signature D. Kuseler
Appointment _____ Unit _____
Fonction _____ Unité _____

G. L. Davies
Chief Superintendent,
Experimental Station.

JTH/ERI

Mr. Shipper (SW)

324

11

S

Comments of U.S. C.W.S. on Suffield Report No. 147, The
Casualty Producing Power of Mustard Spray.

Two tests were made, spraying HTV (thickened mustard containing vesicant anti-freeze) on troops attired in winter clothing. The SCI's used have about the same capacity as M-10 tanks; however, the airplane used can carry only two SCI's, and its airspeed was only 150 m.p.h.

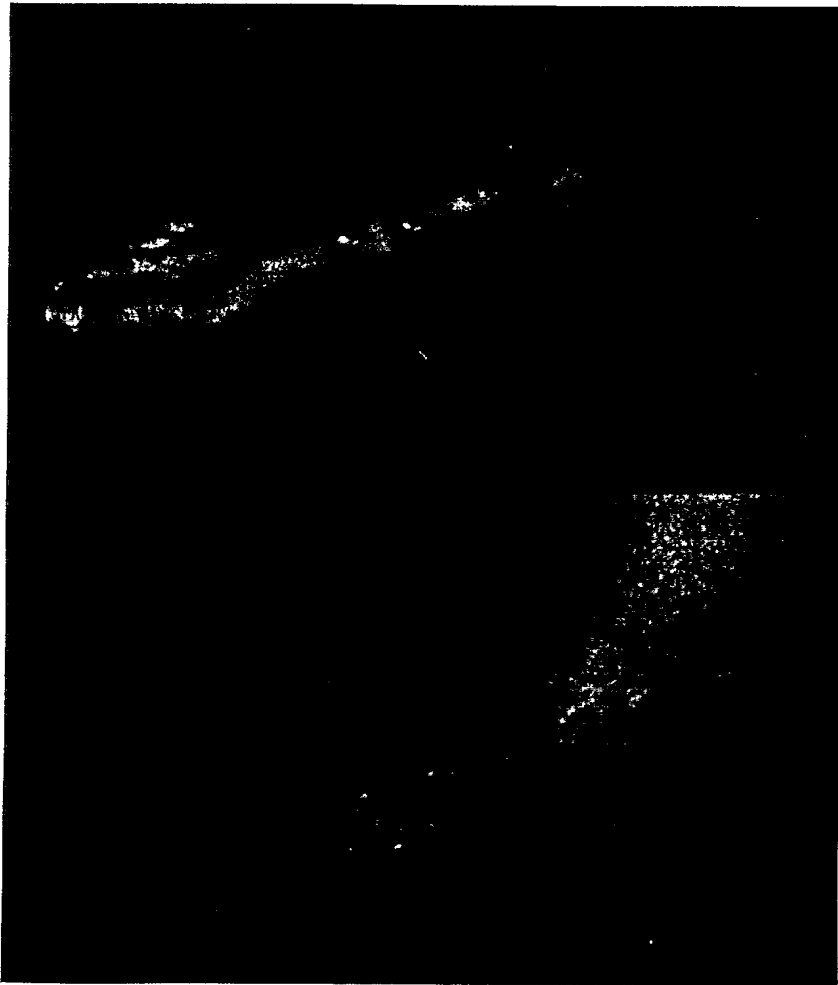
In view of data given in Fig. 1, the statement given in paragraph 3 of the conclusions seems erroneous; casualties were produced by concentrations much lower than those stipulated in P.M. No. 14. For drops larger than 1.5 mm (2.2 mg.), it appears that a concentration of 0.4-0.5 g/sq.m. (37-47 mg/sq.ft.) will produce casualties; the Porton report gives a requirement of 0.5-1.0 g/sq.m. for this range.

A significant aspect of the tests is that the production of casualties is affected to a large degree by the behaviour of personnel after being sprayed. Those who returned to their barracks and kept their clothes on for four hours suffered extensively from liquid burns, while those who were kept on their feet by marching them for four hours had relatively few liquid burns, but were mostly affected by the vapor. The difference in effects is considered due to the fact that since the marching troops did not sit down while wearing contaminated clothing, they had fewer opportunities for contact with penetrating liquid. It appears also, that the seriousness of injury depends principally on what parts of the body are contaminated, rather than on the actual weight of agent or number of drops striking the subject. This conclusion is discussed in P.M. No. 14, and the implication appears to be that since a matter of probability is involved, accurate specification of the quantities of vesicants required for personnel spray missions can be derived only from statistical analysis of tests using personnel.

An important difference between these tests and those conducted by the Munitions Development Division in October is that men, instead of animals, were exposed by the Canadians, and their data are proportionately more valuable. They have made what appears to be an excellent classification of casualty effects, which makes possible an accurate evaluation of spray. The results indicate the advantages of using human rather than animal subjects, particularly because, aside from physiological differences, an animal tied to a stake is unlikely to behave in the same way as a soldier in the field, and this is a determining factor in effectiveness of spray. It is suggested that a satisfactory evaluation of spray against personnel wearing protective clothing can be made only by actually spraying personnel under closely simulated field conditions, and the Canadian procedure appears to be a good basis for test methods. We have no accurate data correlating the effects of sprayed vesicants on men and animals. It would be advantageous to conduct tests using men and spray panels; after correlating contamination and casualty data, only panels would be necessary in subsequent tests. Animals might still be used to determine the effectiveness of vapor concentrations, but with sufficient data, they too could be dispensed with. A series of such explanatory tests would be required for each agent and type of clothing involved; but subsequent tests for evaluating munitions, for example, could be conducted with the use of spray panels and vapor sampling apparatus only. With regard to the possibility of secondary infection of contaminated troops due to rupture of lesions, the Canadians claim that the danger of infection is slight with the use of ordinary field first-aid treatment.

The liquid concentrations are much lower than would be obtained with an A-20A or A-20B airplane carrying four M-10 tanks. Due to the shorter time of emission and the higher speed of the airplane, the A-20A, discharging four tanks in pairs, would contaminate the same area as the Bolingbroke carrying two SCI's, but since the A-20A can carry twice the weight of agent, the ground contamination would be twice as heavy, with a corresponding increase in the number of casualties produced.

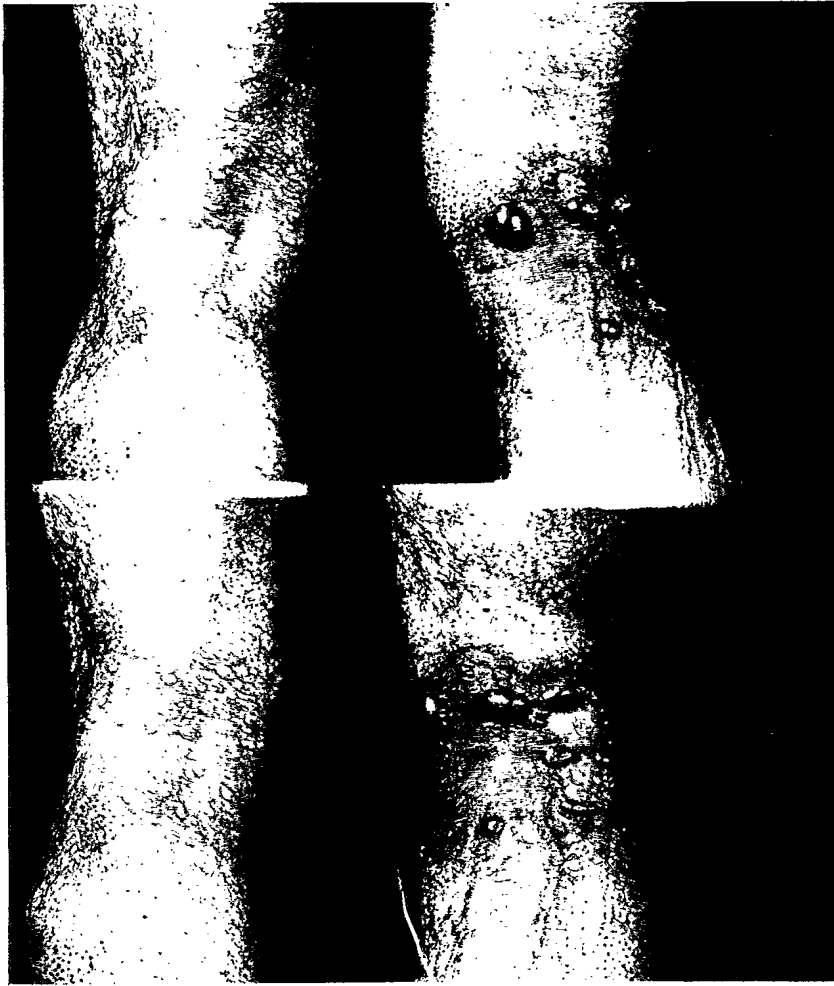
PLATE 1.



G. B. 12-254-7
3-11-42

OBSERVER A.21

Showing vesicles on the instep.

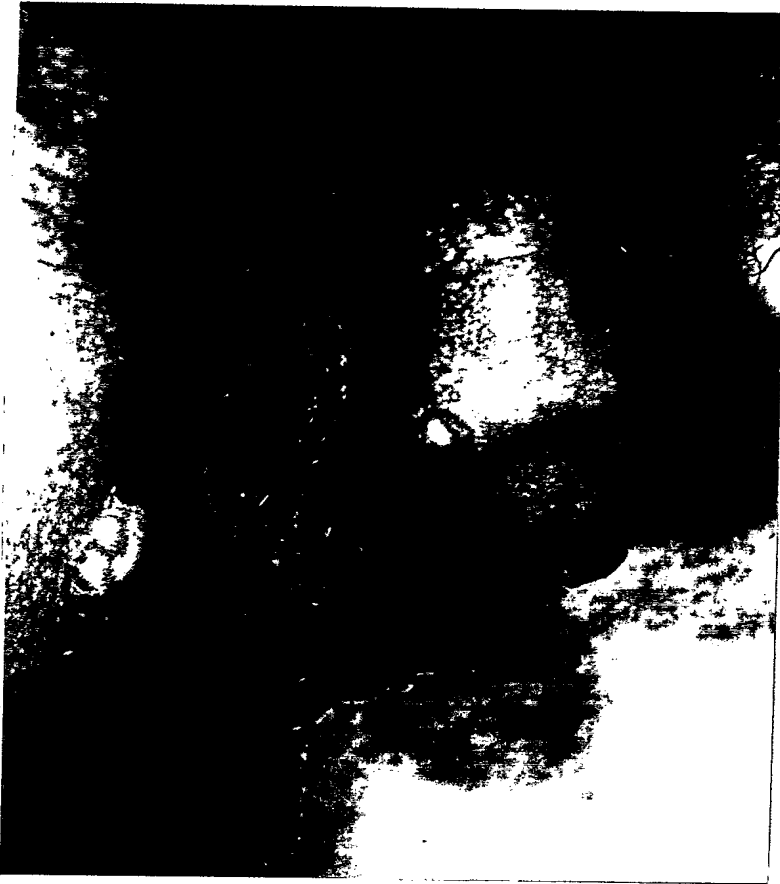


6-B-12-254-6
3-11-42

Observer No. 24

The bend of the right knee is involved by an intensely vesicated area. Movement in the joint was restricted by the size of the blisters and the swelling of the tissues.

Plate No. 3



6-B-12-254-2
3-11-42

Observer No. A-29
Single blister on penis. Irritation
due to walking would cause rapid inflam-
mation of this lesion.

Plate No. 4



6-B-13-255-9
4-11-42

Observer A-30

After 48 hours, "Kissing" blisters
between buttocks made walking very difficult.
Area was also involved by diffuse vapour burn.

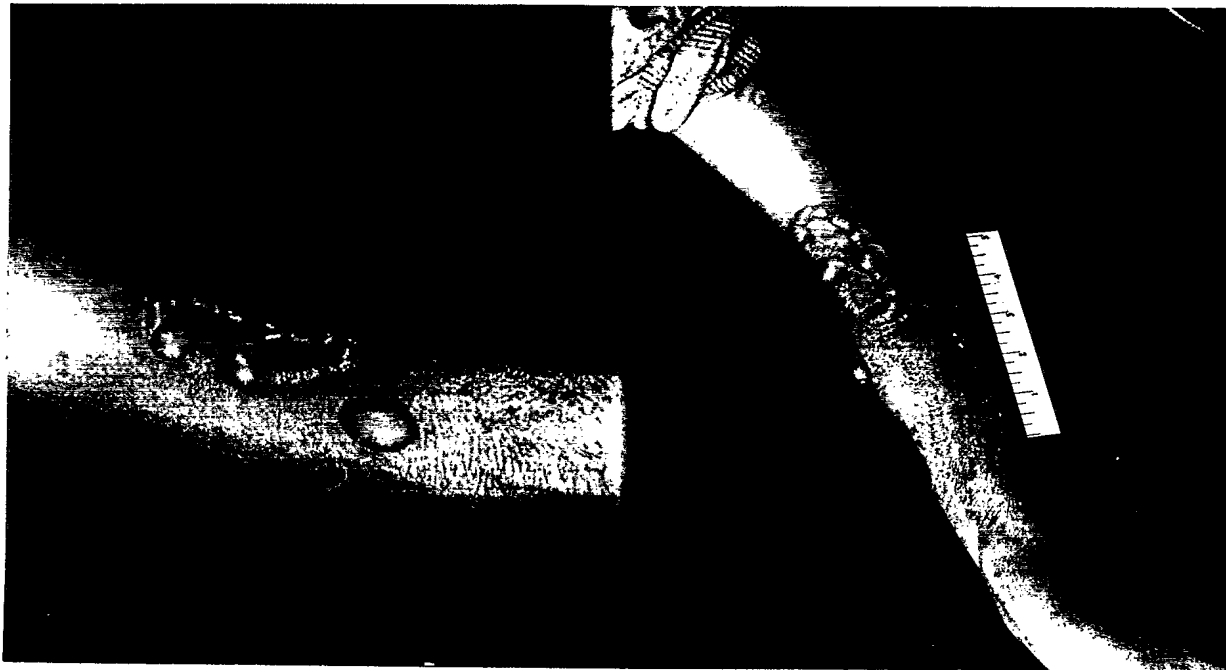


Observer B-22

6-B-13-255-11
4-11-42

After 24 hours, Bend of the elbow involved by large vesicle which limited movement in the joint. This and other lesions made this man a casualty.

Plato No. 6

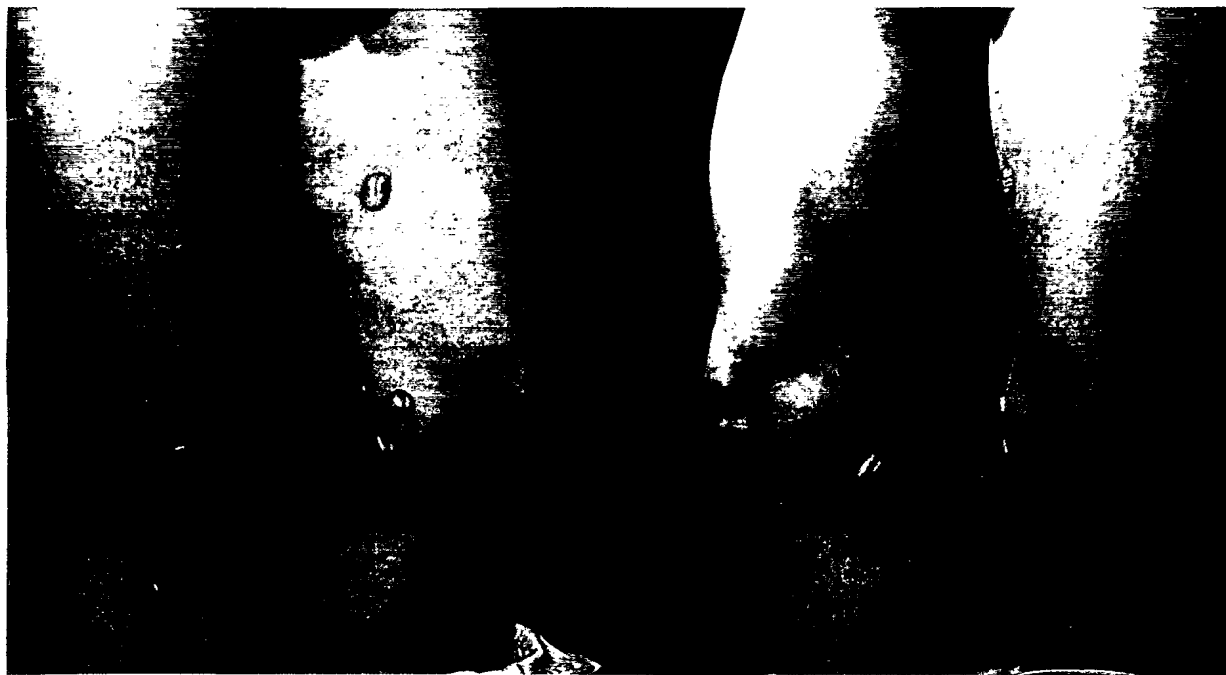


Observer B-25

6-B-12-254-3
3-11-42

After 24 hours, Bend of elbow involved by intense vesication which limited movement in the joint. Scale of the rule is in inches.

PLATE 7.



6-B-12-254-16
3-11-42

Observer B.27

After 48 hours.

Three large vesicles escaping bends of the knees which were involved by intense vapour burns. These and other lesions made this man a casualty.

Plate No. 8



Observer A-27

6-B-15-289-1
15-12-42

Plate No. 9

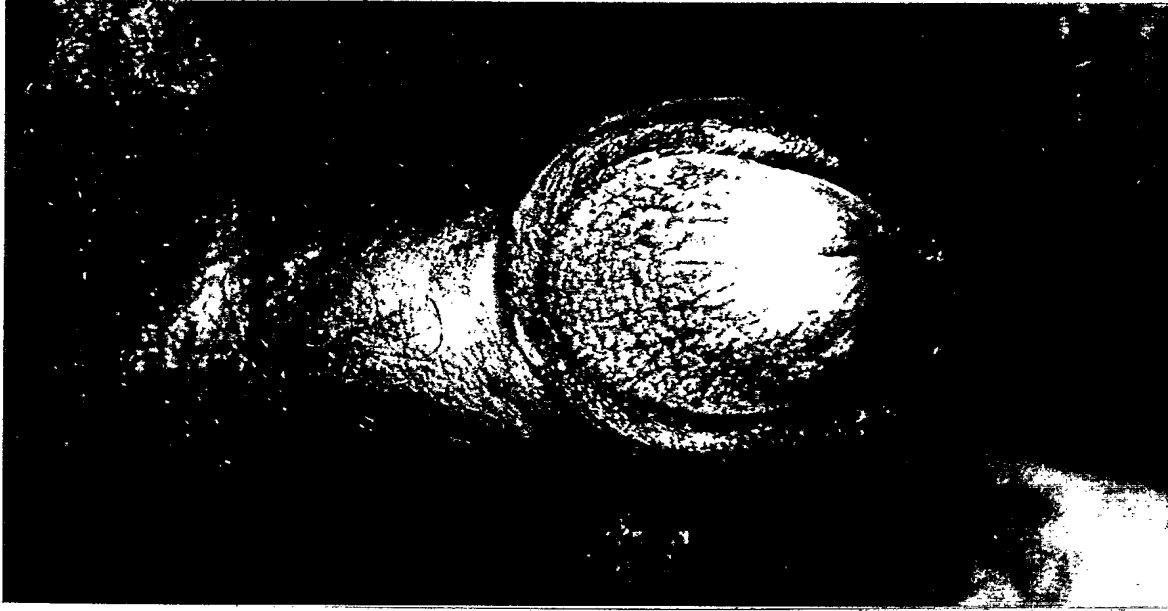


Observer A-27
Trial II

6-B-15-289-2
14-12-42

After 72 hours. These two plates show intense swelling, involving penis. Within another 24 hours, swelling was more marked.

PLATE 10.



Observer A-37
Plate No. 11

6-B-16-290-1
14-12-42



Observer A-37

6-B-16-290-2
14-12-42

After 72 hours. The swelling was even more pronounced after another 24 hours. Compare with Plates 8 and 9.

Fig. 1

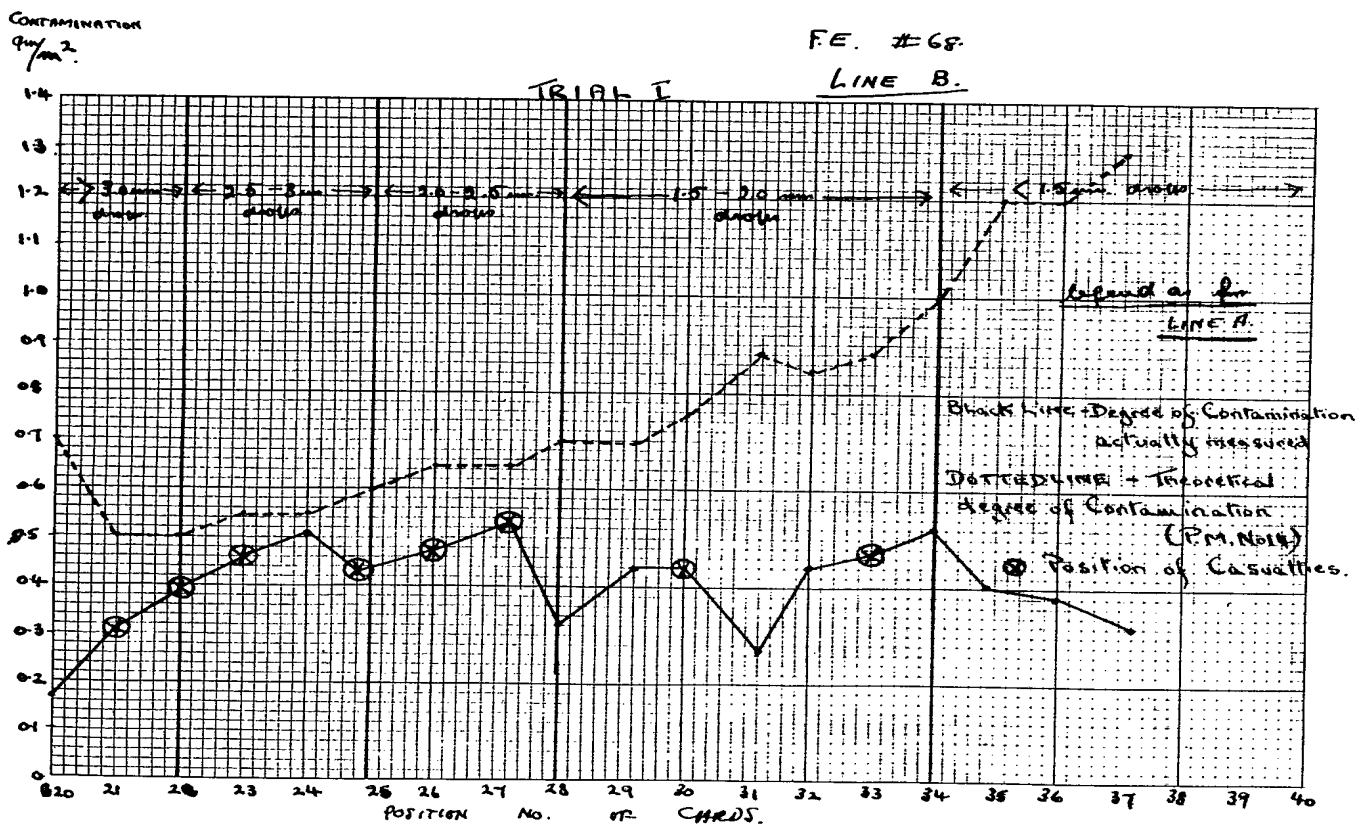
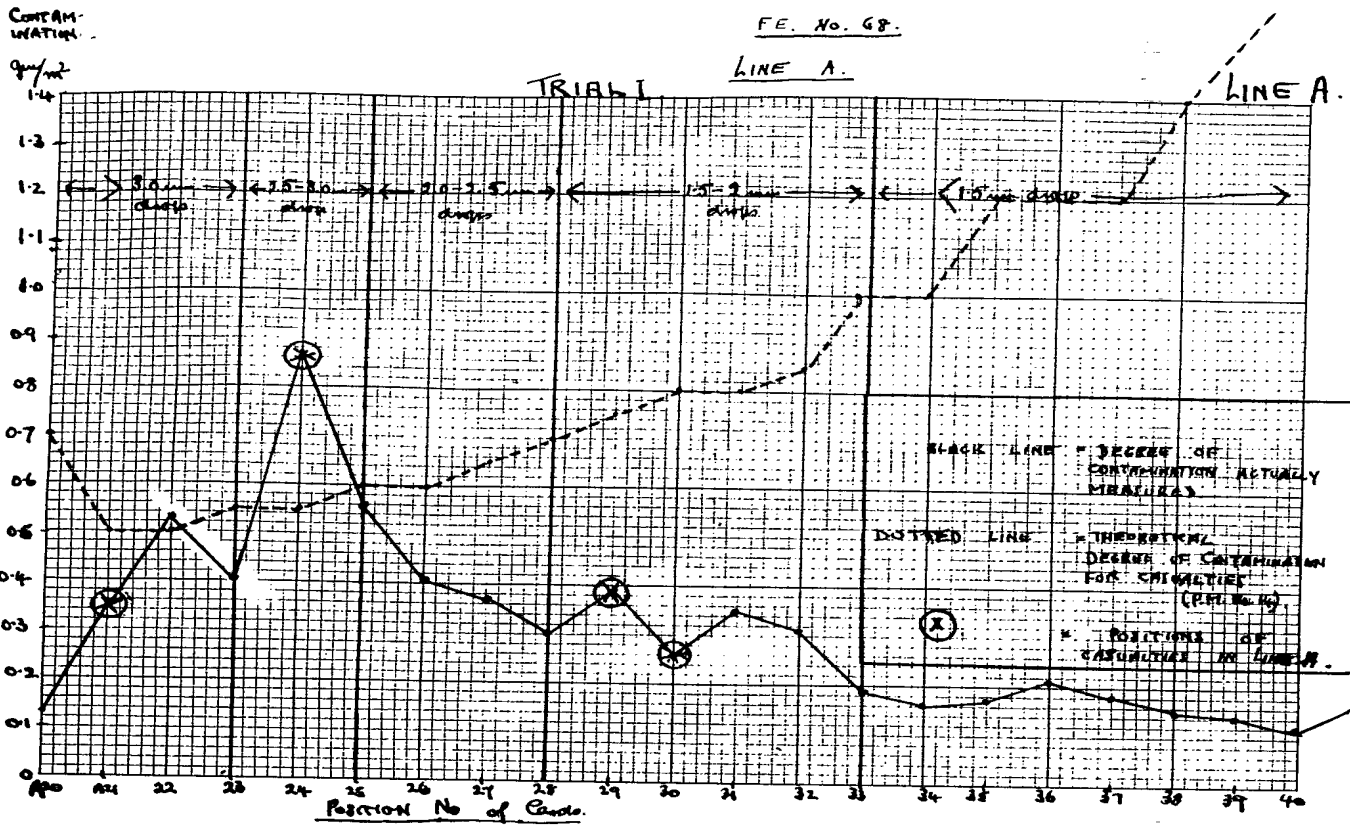
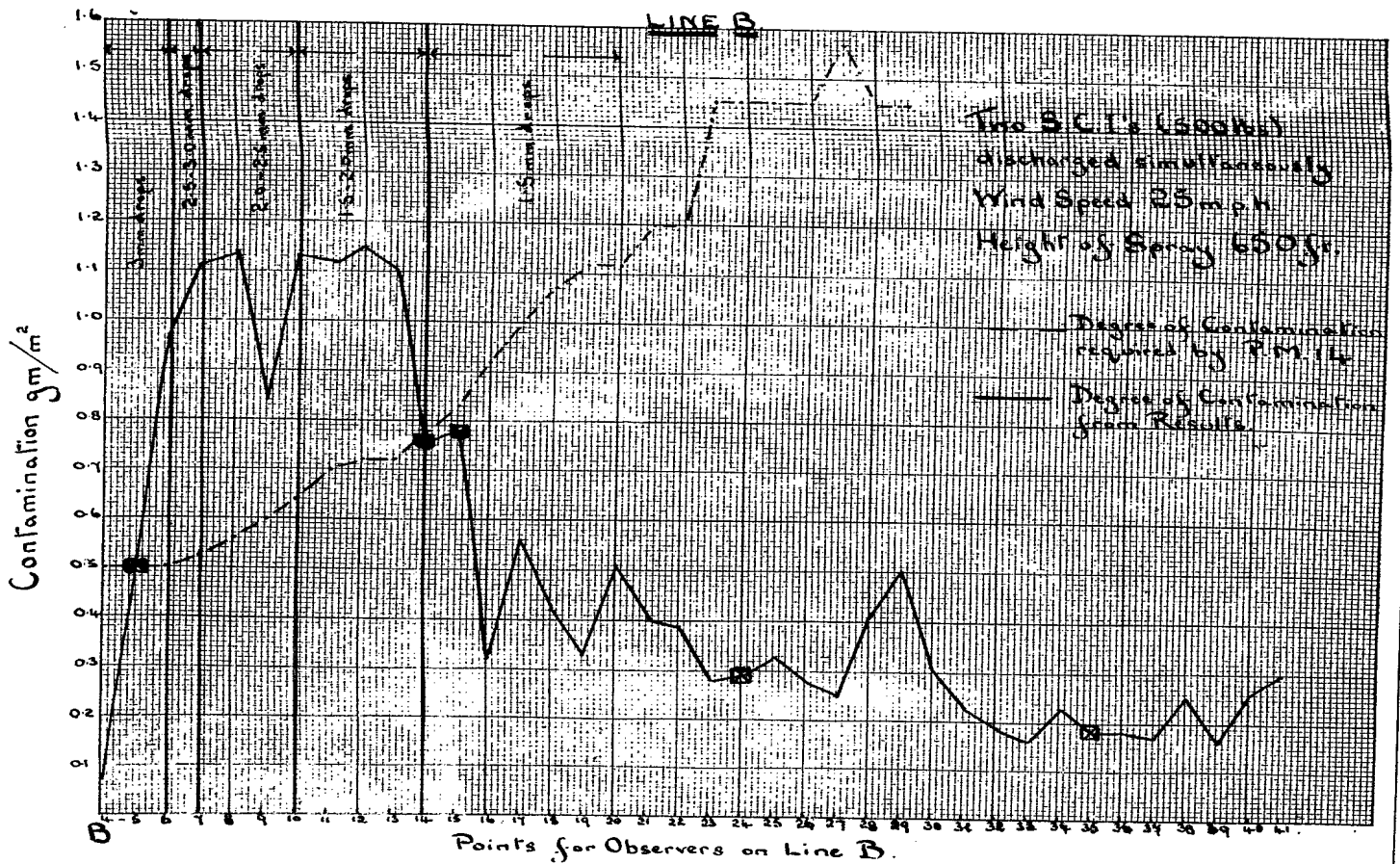
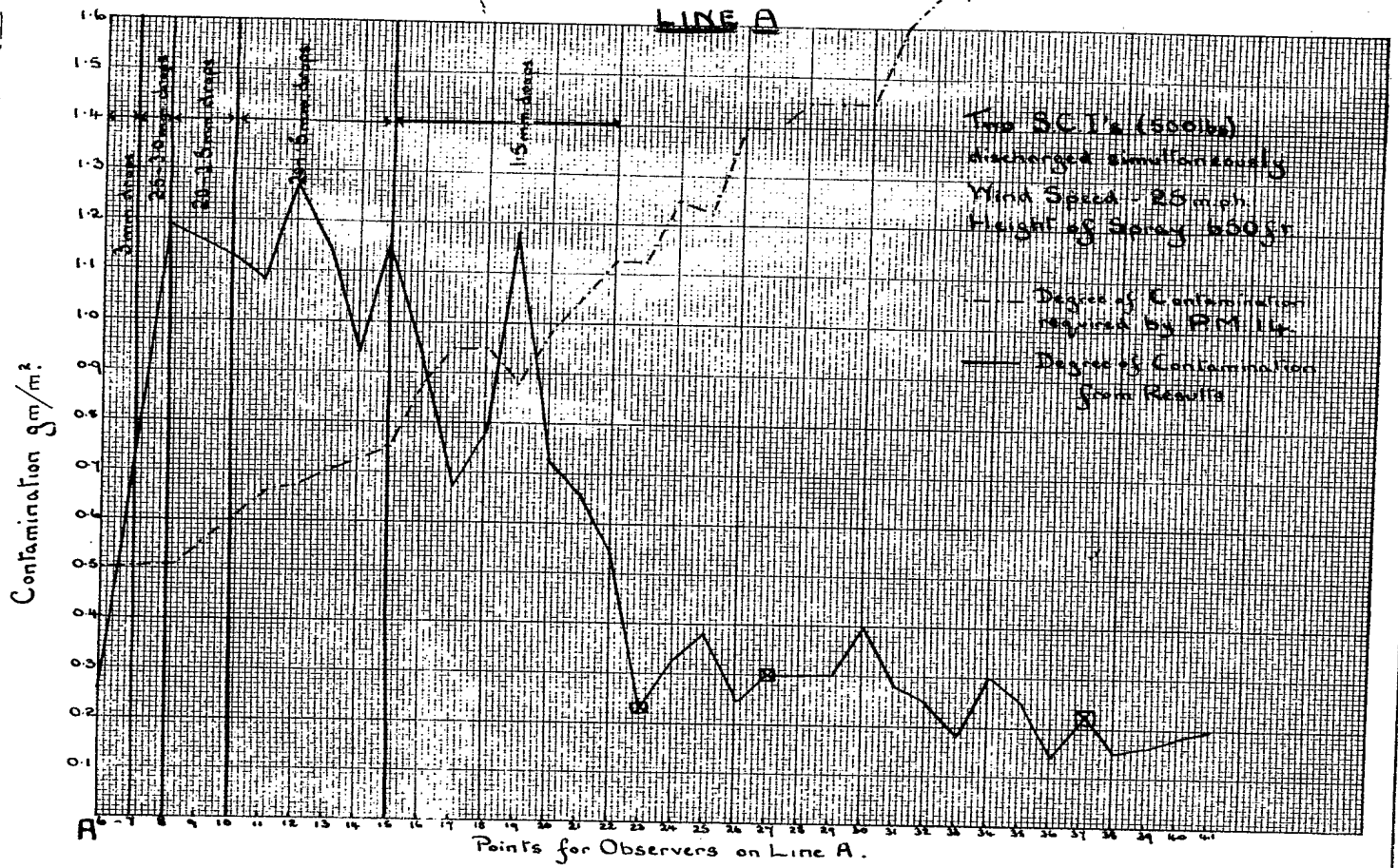


Diagram Showing the Comparison between Contamination Produced by One S.C.I. and Contamination Estimated as Necessary for Casualty Production (P.M. No. 14).

Fig. 2



#126805 H.K.

DIRECTORATE OF
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ROOM 4744, "A" BUILDING
OTTAWA 4, ONT., CANADA

Date: **OCT 15 1963**

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ABSTRACTED BY
G. K. D.

OCT 25 1963

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