REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	09 April 2001	Preliminary Study

4. TITLE AND SUBTITLE

Investigation on the Dispersal Patterns of Contaminants in Letters

5. FUNDING NUMBERS

6. AUTHOR(S)

Callaghan, M; Raymond, D.; McLennan, S.; Best, M.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Ottawa First Responder Group
Ottawa, Canada

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Defence Research and Development Canada (DRDC)
Defence Canada
Ottawa, ON K1A OK2

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES.

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Public Release. Distribution unlimited.

12b. DISTRIBUTION CODE

A

13. ABSTRACT (Maximum 200 words)

Referenced in DRES-TR-2001-048, Risk Assessment of Anthrax Letter. This preliminary study which used informal testing methods was conducted by the Ottawa First Responder Group. This group consists of a team of researchers from Ottawa Police Forensic Section, Ottawa Fire Department and Health Canada.

14. SUBJECT TERMS Terrorism; Anthrax; Biological agents; Unconventional warfare; Aerosols; Antipersonnel agents; Procedures; Safety; Threat evaluation; Sampling; Biological agent detection ;Simulation; Biological agent simulants; Biological warfare; Hoax letter ;Air circulation; Mail processing centres; Mailrooms

15. NUMBER OF PAGES

5

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18
298-102

April 9, 2001

Investigation on the Dispersal Patterns of Contaminants in Letters

M. Callaghan and D. Raymond, Forensic Identification Section, Ottawa-Carleton Regional Police Services
S. McLennan, Hazardous Materials, Ottawa Fire Department
M. Best, Centre for Emergency Preparedness and Response, Health Canada

Introduction

The public health response to bioterrorism incidents involving possibly contaminated letters includes the identification of potentially exposed individuals and an assessment of the need for environmental decontamination.

How far could contaminants from handling and opening such letters spread? Should decontamination be limited to fomites in the immediate area (e.g. desks, chairs, floors, clothing, personal effects) or should it also encompass a much wider area within a common ventilation system? Can cross-contamination of remote areas occur through persons entering and exiting the immediately contaminated area?

The answers to the questions and the dispersion patterns of contaminants from handling and opening such letters is not known. Such information would enable responders to better define potentially contaminated areas and persons, and guide their decision-making in implementing an appropriate response. This report summarizes the findings of an investigation into the dispersion patterns from envelopes experimentally contaminated with a flourescent tracer powder.

Materials and Methods

Envelope testing was carried out at the Forensic Identification Laboratory, Ottawa-Carleton Regional Police Services (OCRPS) (see Figure 1). Directional airflow, temperature and humidity were measured in the room prior to and at the end of the experiment. The contaminant used was Redwop Fingerprint Powder (Brilliant Red).

Figure 1 - Diagram of Laboratory and Envelope Opening Work Area

(BLANK)

Six envelopes were pre-loaded with 3.4 g each of powder and opened either by hand or with a standard letter opener as described in Table 1. Contamination was measured in the immediate and surrounding area (ie. table, chair, floor), on the subject, and on the exhaust HVAC grilles using a UV light source.

Residual contamination was removed in-between each test and background contamination measured with UV light prior to the beginning of each test. Subjects donned clean coveralls, shoe covers, head covers, respiratory protection and safety glasses prior to the beginning of each test and their background contamination levels were measured as well.

Table 1 - Envelope Configuration and Method of Opening

Envelope	Size	Letter Present	Subject	Methodology
A	8½" x 11"	Yes	S. McLennan	By hand using right thumb, single letter removed and placed down on table; Subject stood up and backed away (filmed at table level)
B	8½" x 11"	Yes	M. Best	With letter opener towards body, letter not removed, envelope placed down on table; Subject stood up and backed away
C	8½" x 11"	Yes	S. McLennan	By hand using right thumb, letter removed and placed down on table; Subject stood up and backed away
D	9½" x 4"	Yes	S. McLennan	By hand using right thumb, letter removed and placed on table;

				Subject stood up and backed away
E	9½" x 4"	No	M. Best & S. McLennan	Envelope handled in the presence of other files and papers which were in turn passed to Subject #2; Subject #2 moved 4ft down to next work area on desk and opened file; envelope subsequently opened by Subject #1 and brought over to Subject #2 who looked inside the envelope without touching it
F	9½" x 4"	Yes	M. Best	With letter opener using right hand, letter not removed, envelope placed down on table; Subject stood and backed up

Results

The room temperature at the beginning and end of the experiment measured 22.3°C and 22.4°C, respectively. The relative humidity at the beginning and end of the experiment measured 15.7% and 17.9%, respectively. Directional airflow in the room was away from and to the left of the table area where the letters were opened.

Note: view accompanying video for more complete description and visual of contaminated areas

Letter A - Contamination was present on the subject's hands (heavy on thumb and fingers that opened envelope), arms, front chest area, back of shoulders, and feet. The table area (up to 8ft. to the left of the table), chair, floor, and table legs were all contaminated.

Letter B - Heavy contamination was present on the subject's front body, head, legs, back of the shoulders and arms. An area across the chest was free of contamination, consistent with the positioning of the subject's arms when the letter was opened. The desk, chair and floor were also contaminated.

Letter C - Contamination was present on the subject's hands, arms, front chest area, back of shoulders, and feet. The table area (over entire 16ft), chair, floor,

and table legs were all contaminated. Exhaust HVAC grille was also contaminated with powder.

Letter D - Contamination was present on the subject's hands (heavy on right thumb and finger), arms, front body, back of shoulders, head and legs. There was minor contamination on the chair and floor.

Letter E - Contamination was present on the desk, papers, file folders and pen prior to opening the envelope (contamination was concentrated at the corners of the envelope where it was leaking out). Some contamination was present on Subject #2's hands after receiving and opening the contaminated file folder and papers. After opening the envelope, Subject #1 and the desk were further contaminated; Subject #2 standing 4ft away was further cross-contaminated during this procedure. Subject #2 was subsequently heavily contaminated when the envelope was brought over and opened and closed by Subject #1 for Subject #2 to view inside.

Letter F - Gross contamination was present on the subject's right hand and desk below the area where the envelope was opened. Contamination was also present on the arms, front body, back of shoulders, legs, head and glasses. The letter opener and desk were contaminated. There was minor contamination on the floor.

Conclusions

These investigations clearly demonstrate that when letters containing powdery contaminants are opened, the contaminant can be dispersed both on the immediate and surrounding area, on the person, on fomites (letter openers, files, papers, pens) and into the exhaust HVAC grilles. The testing further indicates that such envelopes do not necessarily have to be physically opened to generate contamination of the immediate area.

Potentially contaminated persons are not limited to those in direct contact with the envelope and/or its contents. Cross-contamination of individuals can occur through contaminated fomites, being in close-proximity when such envelopes are opened, and viewing the contents of the envelope from a short distance.

The results presented give an indication of the dispersion patterns of contaminants from handling and opening letters. This preliminary study clearly demonstrates the need for further investigations and formal testing using representative contaminants is warranted.