

This article was downloaded by: [CDC Public Health Library & Information Center]

On: 15 May 2014, At: 12:56

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Applied Occupational and Environmental Hygiene

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/uaoh20>

### Assessment of a Sheriff's Office Evidence Drying Room

Nancy Clark Burton & Yvonne Boudreau

Published online: 30 Nov 2010.

To cite this article: Nancy Clark Burton & Yvonne Boudreau (2000) Assessment of a Sheriff's Office Evidence Drying Room, Applied Occupational and Environmental Hygiene, 15:4, 321-323

To link to this article: <http://dx.doi.org/10.1080/104732200301412>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

## Case Studies

# Assessment of a Sheriff's Office Evidence Drying Room

*Dawn Tharr, Column Editor*

Reported by Nancy Clark Burton and Yvonne Boudreau

## Introduction

The National Institute for Occupational Safety and Health (NIOSH) received a request from employees at a sheriff's office in Arizona for a health hazard evaluation (HHE) of the evidence drying room. The HHE requesters expressed concern over employees' exposures to potential biological health hazards, including bloodborne pathogens, and odors related to the storage and handling of evidence for criminal investigations. In response, a walk-through evaluation of the evidence drying room was conducted, the ventilation system was evaluated, and confidential interviews were conducted with detectives.

## Background

The evidence drying room was used by about 70 employees, including approximately 60 detectives from departments such as homicide, traffic accident, and general crime, and 10 evidence/laboratory technicians. Evidence placed in this room included blood and body fluid soaked articles of clothing, objects found in sewers, and items used to cover decedents (such as blankets or sleeping bags). Each detective was responsible for the collection of evidence in cases for which they were the lead investigators. The evidence was packaged in paper or plastic and transported, at room temperature, to the evidence drying room from the field. Occasionally, the detectives would examine the evidence in a building adjacent to their offices before taking it to the evidence drying room. Detectives reported that personal protec-

tive equipment (PPE), including paper masks, goggles, Tyvek suits, and vinyl and latex gloves, was available outside the entrance to the evidence drying room, and that most employees donned this equipment prior to entering the room and handling the evidence. Employees also carried PPE in their vehicles and used it in the field while collecting evidence. This PPE included NIOSH-approved disposable High-Efficiency Particulate Air (HEPA) respirators to protect against particulates. Employees who worked in the evidence drying room reportedly received training on precautions against bloodborne pathogen exposure. Immunization with Hepatitis B vaccine was offered to employees who have the potential for work-related exposure to blood or other body fluids. After drying, which varied from about one week to several months, the evidence was placed in plastic bags and stored in a freezer. The evidence/laboratory technicians used laboratory hoods when examining this evidence closely.

The evidence drying room was steel-lined with two exhaust vents which were connected to a dedicated fan that exhausts air directly to the outside at ground level under a stairwell that leads into the building. The evidence was placed on metal racks and on the floor.

other solid secured doors—one of which lead into the parking garage and the other into the property room. There was a floor drain that reportedly lead into the sewer drainage system. There was no schedule for preventive maintenance of the ventilation system or cleaning of the evidence room. According to maintenance staff, there should be three fiberglass filters containing charcoal in the duct work in front of the fan to remove odors.

## Methods

### *Ventilation Assessment*

A walk-through evaluation of the evidence drying room was conducted. Ventilation measurements were made in the evidence drying room using a TSI VelociCalc Plus Model 8360 (TSI Inc., St. Paul, MN) thermoanemometer. This instrument measures air velocity by detecting the cooling effect of air as it passes over a heated (hot-wire) filament at the end of the probe. The airflow was determined by multiplying the average air velocity by the surface area of the exhaust. Airflow patterns were visualized using smoke. The ventilation plans were not available at the time of the site visit.

Air changes per hour were calculated for the evidence drying room using the following formula:

$$\text{Air Changes per Hour (ACH)} = \frac{\text{Air Flow Rate (cubic feet per meter [CFM])} \times 60 \text{ minutes per hour}^{(1)}}{\text{Room Volume (cubic feet [ft}^3\text{])}.}$$

Make-up air was provided through a grille in the wooden door which opened into the small room where the PPE was kept. The small room had no mechanical ventilation system and contained two

### *Confidential Interviews*

At the time of the NIOSH site visit, the detectives were informed by their sergeant that NIOSH representatives were available for private interviews.

Three detectives volunteered to be interviewed at length, and other detectives participated in brief, informal interviews.

### Literature Review

There are no specific guidelines which address the handling of evidence that has been contaminated by blood and other body fluids.<sup>(2)</sup> Potential infectious hazards associated with the handling of human cadavers include tuberculosis, Group A streptococcal infection, gastrointestinal organisms, Hepatitis B and C viruses (HBV and HBC), human immunodeficiency virus (HIV), and possibly septicaemia and meningitis (especially meningococcal).<sup>(3-7)</sup> Of these potential infectious hazards, criminal justice personnel would be most likely exposed to the bloodborne viruses HBV or HIV during searches and evidence handling. Laboratory studies have shown that drying HIV reduces the viral amounts by 90 to 99 percent.<sup>(4)</sup> HBV may survive for an extended period of time in dried blood. However, when in a dried state, the virus is not readily transmissible.<sup>(8)</sup>

Decaying bodies and the articles surrounding them (clothing, blankets, etc.) would most likely contain organisms which are part of the body flora and from the surrounding environment.<sup>(7)</sup> Adipocere is a waxy or greasy decomposition product formed from the hydrolysis and hydrogenation of tissue fats. It is stable and will adhere to clothing and other items that the decomposing body contacts.<sup>(9)</sup> Adipocere may be responsible for the articles that "do not dry" in the evidence drying room.

There are currently no ventilation specifications that address evidence drying rooms. However, the American Society for Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) has developed recommendations for nonrefrigerated body holding rooms and soiled workrooms/holding rooms for diagnostic/treatment areas which are similar in application to the evidence drying room. These holding rooms should have

at least 10 or 12 ACH, respectively; all air should be exhausted to the outside; there should be no recirculation of air within the rooms; and the rooms should be at negative pressure to the adjacent areas (air flows into the room).<sup>(10)</sup>

### Results

#### *Ventilation Assessment*

Airflow through the exhaust vents was initially evaluated under existing ventilation conditions with the door to the evidence drying room closed. The exhaust vent closest to the door had an airflow rate of about 60 CFM. The other vent did not have any measurable air velocity—this was confirmed using smoke. Assuming a room volume of 1120 ft<sup>3</sup> (10 ft by 14 ft by 8 ft), approximately 3 ACH would be expected. After the maintenance staff removed the charcoal and fiberglass filters, which were heavily soiled and not replaced for the measurements, and increased the fan speed to the maximum level, the exhaust vent next to the door had an airflow rate of approximately 431 CFM and the other vent had 404 CFM, with the door closed. This resulted in approximately 45 ACH and a reduction in the foul odor. Both sets of measurements were made with the security door to the parking garage open, allowing replacement air to enter the evidence drying room.

#### *Observations*

During a walk-through inspection of the evidence drying room, a strong odor of decaying organic animal matter was noted. The evidence was located on metal racks and on the floor of the room. Remnants of maggot larvae and soil were visible on the floor. PPE was located in the small room outside of the evidence room where detectives don and remove their PPE. There was no respiratory protection program in place at the time of the site visit. Detective representatives also reported that some pieces of evidence take several months to dry under current environmental conditions. The maintenance staff reported that there have been complaints of foul odors in other sections

of the court house complex, including judges' chambers.

#### *Confidential Interviews*

None of those interviewed reported any specific health problems, but all reported being concerned about exposure to any unknown pathogens in the evidence drying room.

### Discussion/Conclusions

Employees at this facility are concerned about potential hazards associated with handling evidence that has been contaminated with blood and other body fluids, and the foul odor associated with the evidence drying room. The evidence drying room ventilation system showed low ventilation rates when initially evaluated and there was minimal replacement air. There were reports of foul odors in other parts of the criminal court system complex. At the time of the site visit, the evidence drying room was crowded with contaminated evidence which prevented air from circulating in the room and increased the evidence drying time. There are potential risks of exposure to blood-borne pathogens such as HIV and HBV, especially in the field. Precautions, including the use of PPE, should be taken to prevent contact with the contaminated materials. The disposable HEPA respirators that are used are effective for filtering particulate matter but not for odorous gases and vapors.

### Recommendations

1. If the current evidence drying room is used, a routine preventive maintenance program for the ventilation system should be established to keep the exhaust system working as designed. The room needs to be under negative pressure and additional replacement air should be introduced. The evidence room should be cleaned with a biocide on a routine basis to prevent the build-up of contaminants and debris.

Another option would be to build a new evidence drying room

in a separate location which is larger and more convenient. This would eliminate the need to carry contaminated evidence into an occupied building. In accordance with recommendations for rooms with similar uses, such as non-refrigerated body holding rooms, this new installation should have a dedicated non-recirculating ventilation system which maintains the room at negative pressure, provides at least 10 ACH, and exhausts filtered air directly to the outside, away from occupied areas.<sup>(11)</sup> There should be separate rooms for the donning and removal/disposal of PPE. The rooms should be designed for easy cleaning and disinfection.

2. The sheriff's office should provide periodic training and education on how to prevent exposures to bloodborne-pathogens to all employees who have the potential to come into contact with blood or body fluid soaked items during the course of their work. The need for wearing personal protective equipment whenever handling items contaminated with blood and/or body fluids should be stressed.<sup>(11)</sup> Tyvek aprons could be used for protection in hot weather. If respirators are used, they must be supported by a respiratory protection program, including required elements such as training, selection of the appropriate respirator, and medical determination that the employee is fit to wear a respirator,

as mandated by the Occupational Safety and Health Administration (OSHA) in 29 CFR 1910.134 (Respiratory Protection).<sup>(12)</sup> Information on respirators and respiratory protection programs can also be found in the NIOSH respiratory protection guides.<sup>(13,14)</sup>

3. Any employee experiencing an occupational exposure to blood or body fluids should be referred to a health care provider trained to deal with such exposures. All information regarding this exposure and the health care provided for it should remain confidential.

## REFERENCES

1. American Conference of Governmental Industrial Hygienists: *Industrial Ventilation: A Manual of Recommended Practice*, 21st ed. ACGIH, Cincinnati, OH (1992).
2. CDC: Guidelines for Prevention of Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-care and Public Safety Workers. *Morbidity and Mortality Weekly Report*; June 23, 1989; Vol. 38, No. S-6, pp. 1-37 (1989).
3. Henry, K.; Dexter, D.; Sannerud, K.; et al.: Recovery of HIV at Autopsy. *The New England Journal of Medicine* 321(26):1833-1834 (1989).
4. Resnick, L.; Veren, K.; Salahuddin, S.Z.; et al.: Stability and Inactivation of HTLV-III/LAV Under Clinical and Laboratory Environments. *JAMA* 255(14):1887-1891 (1986).
5. Douceron, H.; Deforges, L.; Gherardi, R.; et al.: Long-Lasting Postmortem Viability of Human Immunodeficiency Virus: A Potential Risk for Forensic Medicine Practice. *Forensic Science International* 60:61-66 (1993).
6. Healing, T.D.; Hoffman, P.N.; Young, S.E.J.: CDR Review: The Infection Hazards of Human Cadavers. *Communicable Disease Report* 5 (rev. 5):R61-R68 (1995).
7. Young, S.E.J.; Healing, T.D.: The Infection Hazards of Human Cadavers. *Communicable Disease Report* 5 (rev. 5): R69-R73 (1995).
8. Bond, W.W.; Favero, M.S.; Petersen, N.J.; et al.: Survival of Hepatitis B Virus After Drying and Storage for One Week. *Lancet* II 550-551 (1981).
9. Mellon, P.F.M.; Lowry, M.A.; Micozzi, M.S.: Experimental Observations on Adipocere Formation. *Journal of Forensic Sciences* 38:91-93 (1993).
10. American Society for Heating, Refrigerating, and Air Conditioning Engineers: *Health Facilities*. In: 1998. ASHRAE Applications Handbook, Chapter 7, 23rd edition. ASHRAE: Atlanta, GA (1991).
11. Code of Federal Regulations: 29 CFR 1910.1030 (Bloodborne Pathogens). Federal Register, U.S. Government Printing Office, Washington, DC (1996).
12. Code of Federal Regulations: 29 CFR 1910.134 (Respiratory Protection). Federal Register, U.S. Government Printing Office, Washington, DC (1998).
13. National Institute for Occupational Safety and Health: *NIOSH Guide to Industrial Respiratory Protection*. DHHS (NIOSH) Publication No. 87-116. NIOSH, Cincinnati, OH (1987).
14. National Institute for Occupational Safety and Health: *NIOSH Guide to the Selection and Use of Particulate Respirators Certified Under 42 CFR 84*. DHHS (NIOSH) Publication No. 96-101. NIOSH, Cincinnati, OH (1996).