# Police Officers' Chemical Exposures in a Drug Vault

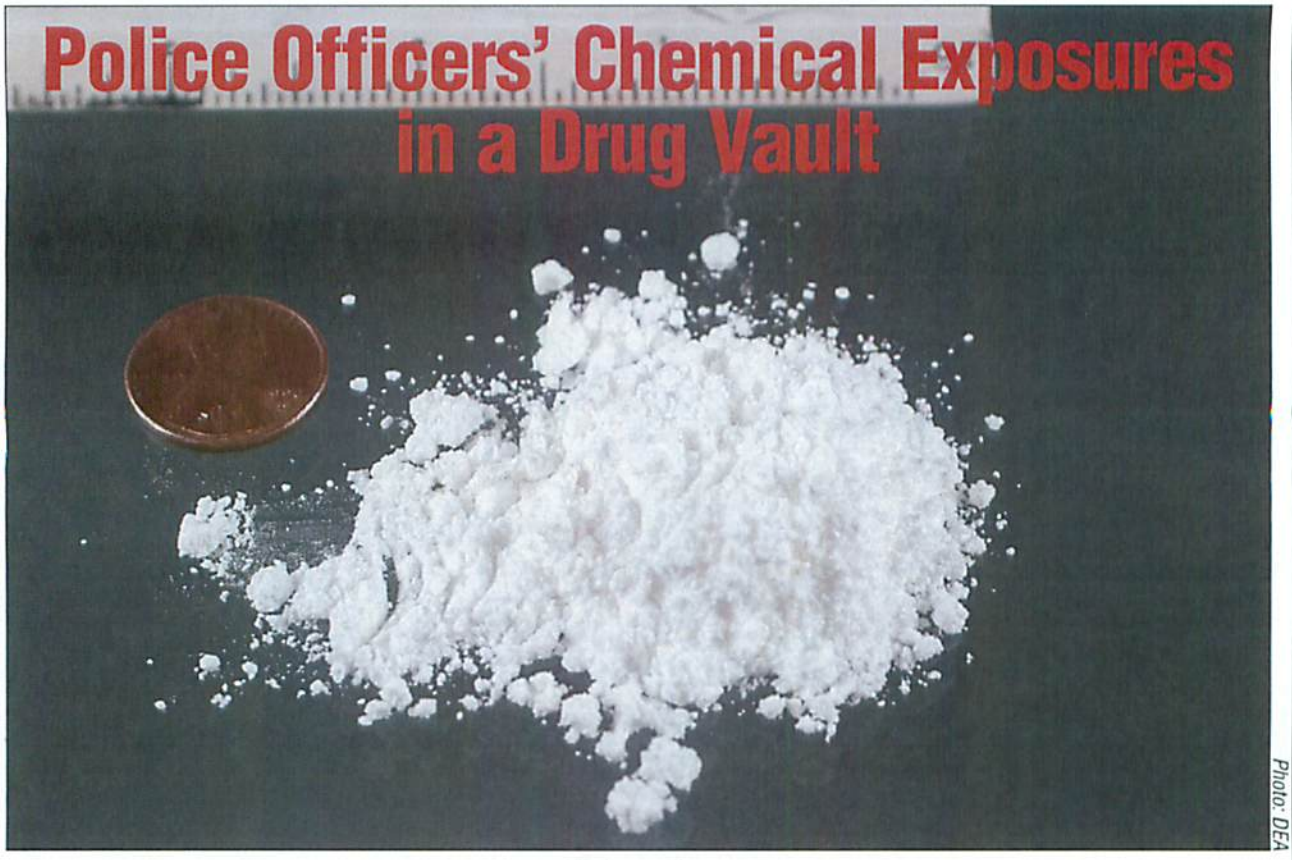

Photo: DEA

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**WHEN THE EMPLOYEES** at a police department in Kentucky expressed concern about potential exposures and health effects when working in the vault used to store drug evidence, their agency contacted the National Institute for Occupational Safety and Health (NIOSH) to request a Health Hazard Evaluation (HHE). Two drug-vault employees (who were assigned to another department before the evaluation) reported experiencing symptoms they believed were related to their work in the vault. The symptoms reported by the employees included nose bleeds, respiratory problems, skin rashes, "memory fog", fatigue, anxiety, vision problems, burning eyes, and facial twitching.

Drug-vault employees' duties at the department included receiving, storing, and retrieving drug evidence; transporting drug evidence; maintaining inventory; and retrieving evidence for disposal. Prior to the NIOSH HHE, the employees inventoried evidence while inside the vault.

However, at the time of the evaluation, they began using carts to bring the evidence to the office area for inventory (to limit their time in the vault). Employees could spend several hours in the vault each day, and were potentially exposed to drug particles, mold from marijuana plants, volatile chemicals used in the manufacture of the drugs, and volatile chemicals used to mask the odor of the drugs. Drugs in the vault included marijuana, cocaine, methamphetamine, heroin, and oxycodone.

The drug vault was constructed with concrete blocks inside a warehouse. Employees accessed the vault through locked doors from a storage room or from the office area (where the drug-vault employees had their workstations). Marijuana plants were typically stored in ventilated cardboard boxes, and dried marijuana leaves and other drugs were typically sealed in plastic bags within evidence envelopes or cardboard boxes. Boxes containing drugs were stacked up to the ceiling at the time of the evaluation (*see Figure 1 on Page 18*).

NIOSH experts conducted two visits to the facility, approximately seven months apart. During both of the visits, NIOSH representatives interviewed 14 employees who worked in the drug vault or storage room and asked them about their job tasks, procedures for handling drug evidence, health symptoms they were

having that could be associated with exposure to drugs, personal protective equipment (PPE) use, and workplace health and safety training. The experts also reviewed the facility's Occupational Safety and Health Administration (OSHA) Form 300 Log of Work-Related Injuries and Illnesses.

During their first visit, NIOSH experts collected personal breathing zone (PBZ) air samples on one drug-vault employee and area air samples in the drug vault and office and near the heating, ventilating, and air-conditioning (HVAC) outdoor air intake. They analyzed the samples for volatile organic compounds (VOCs) and inorganic acids. Sampling for VOCs was carried out because of the strong odor in the drug vault. They also checked for inorganic acids because a NIOSH evaluation at another facility had detected them in an evidence room containing drugs (*Burton, 1999*). Finally, the evaluation included the measurement of the temperature and relative humidity in the drug vault and office.

Drug-vault employees were required by management to wear NIOSH-approved elastomeric half-mask air-purifying respirators with organic vapor cartridges when working in the drug vault. There was no formal written respiratory protection program at the time of the evaluation. However, employees were fit tested, trained on respirator maintenance and storage, and included in a medical surveillance program.

**Two employees reported experiencing nose bleeds, respiratory problems, skin rashes, "memory fog", fatigue, anxiety, vision problems, burning eyes, and facial twitching. They suspected their health issues were related to their work handing, transporting, and maintaining drug evidence in the law enforcement agency's drug vault.**

During their second visit, NIOSH representatives collected PBZ air samples from three drug-vault employees and area air samples in the drug vault and office. Samples were analyzed for the presence of methamphetamine, cocaine, oxycodone, and tetrahydrocannabinol (THC, the effective drug in marijuana). Additionally, surfaces such as door handles, carts, computer mice, and shelving were tested for the presence of drug particles. Final testing included an assessment of the supply and exhaust ventilation systems, as well as temperature and humidity readings in the drug vault and the adjacent office area.

Prior to the NIOSH HHE, police-department employees had filed a complaint with the Kentucky Labor Cabinet, Occupational Safety and Health Program. An industrial hygienist from this program performed air sampling for mold outdoors and indoors in the drug vault. Compared to the outdoor air sample, the indoor air sample had similar (or lower) levels of Aspergillus mold. However, the indoor air sample had much higher levels of Chaetomium mold that typically grows in soil or decaying plant matter (for example, on the roots of marijuana plants). The Kentucky Labor Cabinet investigator recommended that incoming plants be dehydrated in a "drying room" before packaging. NIOSH experts did not conduct air sampling for mold because it was visibly present on boxes containing marijuana plants, the Kentucky Labor Cabinet investigator had already detected it in the indoor air, and NIOSH recommendations would be the same regardless of the results of the air sampling.

## Some background about NIOSH and HHEs

*The National Institute for Occupational Safety and Health (NIOSH), part of the Centers for Disease Control and Prevention (CDC), conducts workplace evaluations and makes recommendations for the prevention of work-related injury and illness. The NIOSH Health Hazard Evaluation (HHE) program is available for employees, employers, or union representatives to ask our comprehensive team of experts for an investigation of their health and safety concerns. Our team contacts the requestor of the HHE and discusses the problems and how to solve them. This may result in sending the requestor information, referring them to a more appropriate agency, or making a site visit. On our site visits, we meet with employer and employee representatives to discuss pertinent issues, review records, interview or survey employees, and may do environmental sampling or medical testing. If we make a site visit, the result is a report of our investigation that includes recommendations on how to improve work conditions and minimize any health hazards.*

*For more information on the NIOSH HHE program, see "Resources and Links" at the end of this article. The entire report of the investigation detailed in this issue of the magazine may be found online at:*

***www.cdc.gov/niosh/hhe/reports/pdfs/2010-0017-3133.pdf***

***Figure 1***—*Interior of a drug vault showing boxes containing drugs stacked to the ceiling.*

### Results

Air concentrations of inorganic acids were well below applicable occupational exposure limits. The primary VOCs identified in the drug vault were terpenes—chemicals produced by plants such as marijuana that contribute to their taste and smell. The levels of terpenes were low and unlikely to cause health effects. However, some people are more sensitive to strong odors than others. Of the drugs evaluated, only methamphetamine particles were detected in the area air samples. However, all of the drugs (cocaine, methamphetamine, oxycodone, and THC) were detected in PBZ air and surface samples. Drug particles present a potential health risk to the employees because of their known physiological and neurological effects at high doses. We know less about the health effects from low-level exposures to illicit drugs over extended periods of time.

**Of the drugs evaluated, all were detected in PBZ air and surface samples.**

Employees reported nonspecific health symptoms, most commonly upper-respiratory symptoms, headaches, eye irritation, and skin rash. These symptoms could have been caused by a variety of occupational exposures (such as odors, mold, poor indoor environmental quality, and stress), as well as non-occupational factors. However, the drug exposures measured by NIOSH experts could have contributed to some of these symptoms. Although there is limited evidence linking low levels of indirect drug exposures to acute or chronic health effects, there are reports in the scientific literature of people experiencing skin rash from occupational exposure and handling of marijuana plants and materials, with symptoms increasing over time with ongoing exposure (*Majmudar et al., 2006; Williams et al., 2008*).

NIOSH experts concluded that the exhaust airflow rate in the drug vault was adequate. However, supply-air diffusers were located near the ceiling exhaust air grills, reducing the effectiveness of the ventilation (*see Figure 2*). The drug vault was under negative pressure relative to the adjacent rooms, and the office was under negative pressure relative to the adjacent hallway. Negative pressure allows air to be drawn into rooms and helps to prevent odors and contaminants from going to other areas. Temperature and relative humidity levels during the visits were acceptable for employee comfort. However, the relative humidity during the July visit was greater than 50%—conditions that promote mold growth.

***Figure 2**—Ceiling-mounted exhaust air grill (left) located near the supply air diffuser (right) inside the drug vault. This layout can result in ineffective ventilation because the supply air is immediately exhausted from the drug vault.*

## General Recommendations for Drug Evidence Rooms

As part of the evaluation, NIOSH provided a list of recommendations to the police department to improve the overall work conditions in the drug vault and adjacent areas. This list is summarized below and may be applicable to other police departments. These recommendations are based on the hierarchy of controls approach that groups actions by their likely effectiveness in reducing or removing hazards. Generally, elimination, substitution, and engineering controls are more effective than administrative controls and PPE. Often, a combination of different types of controls is necessary to fully protect employees.

### Recommendation #1: Elimination and Substitution

❑ Dispose of drugs frequently to reduce the amount of material in the drug vault that could off-gas and expose employees.

### Recommendation #2: Engineering Controls

❑ Dry marijuana and other plant-based drugs prior to storage to reduce odors and mold growth. Locating the drying chamber inside the drug vault will prevent odors and particles from entering the HVAC system.

❑ Replace the organic vapor and particulate filters in the drying chamber according to the manufacturer's guidelines, or more frequently if odors are detected in the drying chamber exhaust. If possible, connect the drying chamber's exhaust directly to the existing exhaust system for the drug vault to eliminate the need for filters.

❑ Consult a ventilation engineer to evaluate and improve the performance of the facility's ventilation system. In particular, the distance between supply-air diffusers and ceiling-exhaust air grills (*as seen in Figure 2*) in the drug vault should be increased to provide better mixing and removal of contaminated air.

❑ After drying plant-based drugs, store them in sealed plastic bags. If these drugs are stored in ventilated cardboard boxes, place them in an enclosed area of the drug vault and use exhaust ventilation to contain odors.

❑ Seal all other drugs in plastic. Seal and bubble-wrap glass containers to minimize breakage. Use durable plastic garbage bags that are unlikely to tear for collection of prescription medications. Seal packages that have drug contamination on them with another plastic bag.

Photo: DEA

❑ Maintain a relative humidity level of 30-50% to minimize mold growth.

❑ To reduce exposures to dusts or VOCs, use a truck with a lockable bed enclosure when transporting drugs to and from the police department.

### Recommendation #3: Administrative Controls

❑ Thoroughly clean surfaces where drug contamination was found (or is likely). Use a high-efficiency particulate air (HEPA) vacuum and environmentally friendly cleaners and disposable paper towels (*see "Resources and Links" for assistance in selecting cleaners*). Employees should wear nitrile gloves (or other suitable gloves as recommended by the manufacturers of the chosen cleaners). The HEPA filter in the vacuum should be replaced routinely, per the manufacturer's specifications.

❑ Improve housekeeping practices. Empty trash in the drug vault daily and vacuum the floors with a HEPA vacuum weekly. Surfaces in direct contact with packages of evidence (for example, carts, tables, etc.) should be cleaned weekly with an environmentally friendly cleaner to minimize exposures to drug particles, and to reduce allergens and nuisance odors.

❑ Improve organization to minimize chemical exposures or injuries when locating evidence. Boxes should be neatly stacked and accessible. Avoid stacking them up to the ceiling. Use easy-to-read labels with large print.

❑ Use a cart to transport evidence packages to the vault to reduce the possibility of dropping a package containing breakable items.

❑ Thoroughly wash hands after removing gloves and before eating, drinking, or smoking to prevent potential ingestion of drug particles.

❑ Avoid skin contact with marijuana plants and material. This reduces the potential for irritation and allergic reactions.

❑ Make sure employees receive all elements of a medical surveillance program. The program should include a general health questionnaire and follow-up for employees who have shown health changes. If respirators are worn, OSHA requires medical clearance (*see following section, "Personal Protective Equipment"*).

❑ Report adverse health symptoms to supervisors. Employees who continue to experience symptoms should be evaluated by a healthcare provider with experience in evaluating occupational health concerns, and referred to medical specialists if appropriate.

❑ Organize a health and safety committee consisting of management and employee representatives who meet regularly to address health and safety concerns.

❑ Develop written policies and standard operating procedures (SOPs), as well as required PPE to be worn, for work involving drug evidence. Conduct training on these policies and SOPs, and document the training.

### Recommendation #4: Personal Protective Equipment

❑ To prevent skin exposures, wear nitrile gloves when handling evidence.

❑ Respirators are not necessary if policies and procedures are in place to prevent the release of drug particles into the environment. If the use of respirators is mandatory for work in the drug vault, a comprehensive respiratory protection program must be implemented that meets the requirements of the OSHA regulations (*29 CFR 1910.134*). In other words, it must include training on the proper wear and maintenance of respirators, medical clearance, respirator fit testing, and other components. If respirator use is voluntary at your

*Note: Mention of company or product names does not imply endorsement by the National Institute for Occupational Safety and Health.*

facility, then a limited respiratory protection program must be in place that meets the requirements in paragraph (c) (2) of the OSHA regulations (*29 CFR 1910.134*). Note that particulate cartridges (not organic vapor cartridges) are protective against drug particles, and that having facial hair interferes with the proper seal of a respirator (reducing its effectiveness).

**About the Authors**

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## Resources and Links

NIOSH HHE program information
**www.cdc.gov/niosh/hhe/HHEprogram.html**

HHE report of this investigation
**www.cdc.gov/niosh/hhe/reports/pdfs/2010-0017-3133.pdf**

Environmentally Friendly Cleaners: National Institutes of Health database
**householdproducts.nlm.nih.gov/**

Greenguard Environmental Institute
**www.greenguard.org/en/index.aspx**

## Works Cited

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*Code of Federal Regulations* (*CFR*). Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

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