Meth Labs

Understanding exposure hazards and associated problems

By Dan Hannan

ILLEGAL MANUFACTURING OF METHAMPHETAMINE at clandestine lab sites ("meth labs") has increased rapidly in many parts of the U.S. This trend brings with it social, economic, public health and environmental problems. In addition to the criminal activity involved, broken families and additional strain placed on the law enforcement system, meth labs leave behind many exposure hazards.

> In 2002, the National Clandestine Laboratory Database reported 8,911 clandestine laboratory seizures. More than 90 percent of these were methamphetamine production and more than 2,078 incidents involved children. First responders and children alike are exposed to toxic and hazardous chemical exposure. Many of the hazards of this illicit process and the type of exposure have not been studied extensively, and are therefore unknown. According to the El Paso Intelligence Center (EPIC), the increase of methamphetamine production resulted in at least one methamphetamine laboratory in every state in 2002 (Martyny).

Homes, apartments, motels and automobiles are all sites where methamphetamine can be made and where public health and environmental problems can be found. Those who live in a methamphetamine-contaminated house that has not been decontaminated are likely exposed to chemical and drug residues left behind by the manufacturing process. Acute or chronic exposure to these residues can result in respiratory illnesses and central nervous system disorders (Cal/EPA). Lack of federal regulations leaves cities, counties and states to manage this issue as they see fit. A meth lab property requires a thorough professional assessment to properly evaluate the extent of contamination. As this article describes, environmental and public health professionals engaged in these activities must protect themselves from various physical and chemical exposure hazards when involved in any portion of a meth lab response.

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What SH&E Professionals Should Do

The world of methamphetamine manufacturing is haphazard and dangerous. As a result, anyone completing field work at such a site should take appropriate precautions to protect him/herself from physical and chemical hazards that would not typically be expected in a nonindustrial setting. Because of these conditions, field investigations must be conducted in an organized and thorough manner. Field data will indicate the extent of the problem and sug-

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gest specific remediation activities to be proposed. Checklists, forms, sample collection, photo documentation and background information are all critical parts of an investigation assessment. SH&E professionals must be aware of and work with local and state agencies as they continue to develop guidelines and rules regulating methamphetamine assessment and decontamination activities.

History & Background

Methamphetamine is an addictive amphetamine or "upper." In the late 1800s and early 1900s, the drug was commonly prescribed as a weight loss remedy because it accelerates the body's metabolism. It was used in Germany during World War II to keep soldiers awake and able to fight for extended periods without breaks. (In fact, one current manufacturing method—the Nazi dope method—gets its name from the German-developed process.) Present-day abusers often go on binges and stay awake for days with uncontrolled energy.

About 25 years ago, methamphetamine reemerged on the West Coast and has been moving steadily across the country since. State and federal statistics show a continued annual increase of meth lab busts. In 1993, the Drug Enforcement Administration (DEA) estimated a total seizure of 218 meth labs. In 2003, federal, state and local law enforcement officers raided more than 10,000 labs and in 2004, almost 15,000 labs were seized (Gordon, et al).

Approximately one in four meth labs have children present in the home (Martyny, et al). The compact and mobile nature of most lab operations lends itself equally well to being set up in metropolitan and rural areas. All components for constructing a typical lab can fit into a small box and are transportable in a car trunk. A lab can also be set up in a hotel or motel, although this presents a greater risk of being discovered because of the production of chemical odors and smoke. Secluded locations are preferred, especially in agricultural areas where anhydrous ammonia is easily accessible.

Health Effects

Methamphetamine can be smoked, snorted, injected and ingested (NIDA). Dangerous chemical exposure comes from the use of raw materials or the byproducts generated during the cooking process. What are not well known are the associated health effects from exposure to the drug and chemical residues left behind once cooking activities have ended (Martyny, et al).

Acute effects—which result from exposure to vapors and fumes during the production of meth—can include irritation to the eyes, mucous membranes and upper respiratory tract. Acute intoxication can cause dizziness, headache, dry mouth, anorexia, insomnia, tremor, rash, chest pain, labored breathing, fainting, blurred vision, impotence, convulsions and coma. Chronic effects—which are the result of prolonged exposure to vapors or fumes during production—can include severe skin conditions, insomnia, irritability, poor concentration, hyperactivity, personality changes, weight loss, ulcers of the lips and tongue, anxiety, fear, hallucinations or psychotic schizophrenic-like conditions (Cal/EPA; NIDA).

A condition known as "bugs" or "creepy crawlies" occurs as a result of the body's capillary veins shriveling and atrophying. This causes a severe itchy sensation and simulates the sensation of insects crawling on the skin (which is called formication). As a result, many meth users have open sores on their arms as a result of continuous scratching (NIDA).

PHOTO COURTESY BROKEN ARROW (OK) POLICE DEPT. STREET CRIMES UNIT

The "Cook"

Methamphetamine is manufactured or cooked using common chemicals found in a hardware store and cold medication containing ephedrine (such as Sudafed). Several different manufacturing methods exist and information on them can be readily obtained on the Internet. The ease of obtaining the precursor chemicals, recipes and cooking equipment makes this an inexpensive alternative to other drugs.

Methamphetamine is manufactured or cooked using common chemicals found in a hardware store and cold medication containing ephedrine (such as nasal decongestants).

To make meth, various chemicals are combined and separated at various stages to chemically reduce the ephedrine-containing cold medication. One process known as Birch Reduction, uses anhydrous ammonia, lithium and hydrogen chloride gas to remove a hydroxyl group from the parent compound (methamphetamine base) to yield the usable form methamphetamine HCl. The two most popular manufacturing methods involve either iodine and red phosphorous (Red-P) or anhydrous ammonia (Nazi). An infrequently used production method known as P-2-P uses lead acetate and mercuric chloride as primary components (Minnesota Dept. of Health).

The type of labs found vary within a state and a region based on the availability of the chemical components. The Nazi method is more frequently found in areas where a supply of anhydrous ammonia is present—such as agricultural communities. As a result, some states have enacted laws that make it a felony to possess anhydrous ammonia in any container other than a regulatory-approved cylinder.

Production yields are often greater when a heat source such as a kitchen stove, electric hot plate or portable propane gas stove is used (Martyny, et al). Table 1 lists frequently used chemicals in the meth manufacturing process. Other hazards encountered at a lab site include sharps (bloodborne pathogens); slip, trip and fall hazards; confined space entry; and explosive "booby" traps. Thus, before a site is entered following a bust, it must be thoroughly inspected by local police and fire department HazMat personnel.

The Bust

First responders (police and fire department officials) most often face the greatest exposure hazards during a raid or a bust. As noted, smoke, gas and vapor are produced at various stages of the cooking process. Unless ventilated, the home/garage/car will hold airborne contaminants. Inhalation and contact are the primary exposure routes. Liquids, solids and gases can be present in an uncontrolled manner as well. In addition, leaking chemical containers and pressure cylinders, powders, puddles, gases and residues may be present.

Law enforcement officials are beginning to take adequate respiratory precautions by donning full-face respirators and self-contained breathing apparatuses (SCBA). A chemical-resistant suit may also be recommended as some officers have been doused with flammable or corrosive liquids upon entry to a lab site.

Gases typically encountered during cooking activities (depending on the manufacturing method) include hydrogen chloride, phosphine, iodine, hydroiodic acid, napthalene and anhydrous ammonia. Exposure to organic solvents used in the process has yet to be thoroughly evaluated primarily because of their ability to volatilize and dissipate quickly—thus presumably not causing a significant exposure hazard (Martyny, et al).

The primary goal after the occupants have been restrained is to ventilate the home and cautiously shut down the cooking process. Many law enforcement departments involve their local fire department HazMat team. Most county drug task forces, state police or federal DEA programs have highly trained drug lab personnel as well. A report published by the National Jewish Research Center in 2003 found that analysis of offgassing from three different manufacturing methods all yielded significant exposure levels (Table 2).

During the scientific laboratory portion, designed to examine "worst case" scenarios, occupational standards for hydrogen

Table 1

Frequently Used Chemicals in Methamphetamine Manufacturing Process

Chemical	Example of Source	Hazard Property (Hazard Class) per DOT Regulations
Petroleum solvent (toluene, xylene, ether)	•Toluol* •Xylol* •starting fluid (ether) •Coleman camping fuel (mixture of petroleum solvents)	Flammable liquid (3)
Sodium hydroxide	Red Devil lye	Corrosive base (8)
Sulfuric acid	Drano	Corrosive acid (8)
Hydrochloric acid	Muriatic—pool cleaner	Corrosive acid (8)
Lithium	Lithium batteries	Dangerous when wet (4.3)
Red phosphorus	Matchbook strike plates	Flammable solid (4.1)
Iodine	Pharmaceutical	Corrosive (8)
Anhydrous ammonia	Agricultural cooperative	Poison gas (2.3)

**product name*

chloride, iodine [and] phosphine were all exceeded at one point or another. Levels for hydrogen chloride acid were at and above the limits (threshold limit value or TLV). Phosphine measured up to three times the short-term exposure limit and 10 times over the recommended eight hour per day limit. Iodine and methamphetamine were up to 30 times over the limits. Most monitors measure an average measurement over a given time period, therefore, exact peaks are not recognized and could be reaching extremely dangerous levels (Martyny, et al).

The study also examined real-world situations by setting up a typical small meth lab in an actual home and hotel room and again found that levels of the above-mentioned gases exceeded occupational exposure limits both nearby and at a distance from the manufacturing source. In one real-time measurement, hydrogen chloride gas exceeded the immediately dangerous to life and health (IDLH) exposure value (Martyny, et al).

In addition, the study included statistical information regarding first responder awareness and safety.

In addition to the various lab studies, a questionnaire survey was also administered to first responders. In this study, 66 percent of respondents stated that they had detected odors associated with methamphetamine labs they had entered, suggesting the likelihood of some type of exposure. However, only 26 percent [of respondents] reported that they

Liquids, solids and gases can all be present in an uncontrolled manner at a meth lab, as can leaking chemical containers and pressure cylinders, powders, puddles, gases and residues.

Table 2

Maximum Air Concentrations Detected During Various Methamphetamine Manufacturing Processes

Study Segment	Phosphine TLV 0.4 mg/m³ (420 µg/m³ or 0.03 ppm) STEL 1 mg/m³ IDLH 50 ppm	Iodine TLV-C 1.0 mg/m³	Hydrogen Chloride TLV-C 3.0 mg/m³ STEL 3.0 mg/m³ IDLH 50 ppm	Methamphetamine 0.5 to 0.1 µg/100cm²
Criminology lab, street version Red-P method	433.6 to 489.4 µg/m³	2.3 mg/m³	2.36 to 16.9 mg/m³	54. to 16 µg
Criminology lab, hypophosphorus acid method	None detected		0.12 mg/m³	0.3 to 0.8 µg
DEA laboratory, Red-P method	4842 µg/m³	37 mg/m³	2.5 mg/m³	7 to 15 µg
Field labs with local taskforce	None detected	ND 0.015 mg/m³	0.007 to 0.2 mg/m³	0.4 to 1600 µg
Controlled cook, house Red-P method	0.2 to 1.32 mg/m³ Peak: 4.6 mg/m³	0.29 to 1.6 mg/m³	0.17 to 14.6 mg/m³ Peak: 56.2 mg/m³	1.5 to 87 µg
Contolled cook, house hypophosphorous method	0.2 to 0.5 mg/m³ Peak: 1.19 mg/m³	0.03 to 0.19 mg/m³	0.15 to 3.4 mg/m³ Peak: 9.9 mg/m³	ND 0.05 µg/100cm²
Controlled cook, house hypophosphosrous method, salting-out phase			1.2 to 228 mg/m³	
Controlled cook, hotel Red-P method cooking phase	None detected	0.008 to 0.029 mg/m³	0.01 to 0.43 mg/m³	
Controlled cook, hotel Red-P method, salting-out phase	None detected Peak: 0.15 to 55 ppm	0.001 to 0.025 mg/m³	0.22 to 7.2 mg/m³ Peak: 0.2 to 62.3 ppm	Total cook period ND 860 µg/100cm²

Source: Martyny, et al.

Components for constructing a typical meth lab can fit into a small box and are transportable in a car trunk.

wear respirators during investigations. Thirty-eight percent of those surveyed reported being sent through the decontamination process and over 50 percent of the respondents reported having at least one symptom associated with methamphetamine labs. The primary symptoms reported were eye irritation, sore throat, cough, dizziness and headaches (Martyny, et al).

Following the raid, a commercial contractor is usually called in to remove the gross chemicals from the property. Law enforcement officials should not attempt to handle or transport waste products unless trained and licensed to do so. To ensure that evidence is preserved, the criminal investigation should be completed before any assessment and decontamination work begins.

Chemicals are often found at clandestine labs in unlabeled jugs and containers, including canning jars, milk jugs, coolers and pop bottles. In the case of anhydrous ammonia, a dangerous situation arises when the poisonous gas (liquid under pressure) is placed in a steel 20-pound gas barbecue cylinder. The gas cylinder fittings are not compatible with the corrosive properties of anhydrous ammonia and quickly degrade the valve assembly, which causes the cylinder to leak (NPGA).

Environmental Concerns

The lab's size, productivity and location usually determine the extent and magnitude of the environmental and public-health-related impacts. The larger the lab and the longer it has been in operation, the greater the volume of waste produced. A typical small lab will produce one to two batches of drug (several ounces) per week and will generate two to four gallons of liquid hazardous waste.

Liquid wastes may be thrown out the window, poured down the toilet or sink drain, buried or burned. In rural areas, contamination to soil and groundwater can threaten private drinking water wells and septic tank systems. On larger pieces of land such as a farm, waste can be scattered throughout the property, which makes finding it a painstaking process.

Evidence of dumping, burning or burial is usually obvious. Dead patches of grass or staining in the soil reveal dumping areas while burn barrels or pits are often readily visible. In these areas, field screening of potentially contaminated soil can be performed using a photoionization detector (PID) and pH paper. Laboratory samples can be collected and analyzed for volatile organic chemicals (VOCs), pH and heavy metals.

Water samples can be collected from drinking water wells and septic tanks found on the property to determine whether impacts have occurred. If confirmed, it may be necessary to dispose of hazardous characteristic soil and wastewater. In cases where lab operations are large and have been operating for some time, a limited soil and groundwater site investigation may be necessary.

The Assessment

Before an assessment is conducted, one must receive permission from the applicable law enforcement agency. Typically, law enforcement officials will place a notice on the front door of a residence stating that a clandestine drug lab has been seized and that occupancy may result in exposure to hazardous chemicals. Currently, however, few states require that a property undergo an assessment of chemical hazards before allowing reoccupancy. Many states lack the resources to track or the laws to enforce any type of hazard evaluation. In many cases, the state or county will allow a property owner to voluntarily perform a cleanup—with the only form of assistance being a general guidance factsheet. Typically, no testing is performed nor is it required that an environmental or health professional be involved.

In states where a public health nuisance statute or formal drug lab cleanup ordinance has been developed, a comprehensive assessment by a professional provider is usually recommended or required. Before entering the property to complete an assessment, it is helpful to gather background information about the property and the drug-making activities that occurred at the site. This will prepare the technician and accompanying public health or environmental personnel for possible exposures and sampling needs.

Before entry, a site-specific health and safety plan (HASP) should be prepared based on information obtained in the police report and the disposal contractor paperwork (manifest and container packing slips). By understanding the manufacturing processes and methods used, generic HASPs can be developed as a checklist. Based on the method used and the chemicals reported or suspected, the HASP should identify all potential exposure hazards, air monitoring requirements and PPE needed for entry (see pg. 30).

Unless the home has been well ventilated or has been vacant for some time, those initially entering the dwelling should wear at least Level C PPE consisting of a full-face respirator that uses a combination organic vapor multigas and HEPA cartridge, liquid-chemical-resistant suit, boot covers, and inner and outer chemical-resistant gloves. Any volatile chemicals that remain in the air after the cooking process or that have been spilled on the floor typically evaporate and dissipate within several days. Active or passive air flow within a property will usually remove any remaining volatile chemicals. Air sampling monitoring instruments used for assessment activities should include a PID, combustible gas indicator (CGI) and gas-specific detector tubes for phosphine, hydrogen chloride and anhydrous ammonia.

If the home has detectable PID, CGI or detector tube levels, or noticeable odors, ventilation (opening doors and windows) should be used to reduce lingering inhalation hazards. High-volume ventilation fans can be used as well. While waiting for the property to be ventilated, an exterior survey of the property for signs of dumping, burial or burning should be completed. All information and findings should be documented in a field report accompanied by photographs. Air monitoring should be conducted throughout the entire assessment process. Requiring ventilation for any detectable level of suspected airborne contaminant is conservative and should not prevent the assessment from being completed as long as contaminant levels do not exceed the effective protective capability of a full-face respirator or 10 percent of the lower explosive limit.

While inside the home, a PID air monitoring survey should be completed in every room—including the basement. In addition, each sewer drain should be monitored to detect any volatile chemicals that may remain in the sewer trap. If waste is confirmed or suspected in these traps, they should be removed with the contents collected for proper disposal.

After inhalation, direct contact provides the greatest route of exposure. Methamphetamine and corrosive residues can exist on all surfaces throughout a home. Typically, preparation areas such as the kitchen, bathroom or laundry room should be checked for the presence of corrosive residues; deionized water and pH paper should be used in this process. The technician should complete a thorough visual survey of the entire property, noting all confirmed or suspected problems such as stains, residues, powders, wetness and puddles. As Table 3 shows, studies of indoor surfaces have found corrosive residues at various levels.

Finally, wipe samples can be collected from walls, floors, furniture and the ventilation system and analyzed for methamphetamine by a certified laboratory. Colorimetric sampling devices for methamphetamine are available in the form of sprays and ampoules. However, these often lack the quality control and quantitative level of detection necessary to yield information upon which conclusive decisions can be made. Often, methamphetamine is used as an indicator for the likely presence of other chemical residues. Therefore, exhaustive laboratory analysis is not typically completed due to the well-known manufacturing methods, chemical contaminants and cost factors.

Table 3

Corrosive Results of pH Samples*

Material	Unexposed Surface pH	Exposed Surface pH
Cedar wood	6	2-3
Drywall	7	3
Particle board and laminate	6	5
Linoleum	6-7	3
Brick	8	8
Sheet metal	6-7	3

**Taken before and after exposures to the cook stage of vapors from the red phosphorous (Red-P) method.*

Unless specified, the technician must use his/her professional judgment regarding the location and number of samples needed to adequately characterize the condition of the property. Although manufacturing may have occurred exclusively in a detached garage, high levels of methamphetamine residue may exist in a bedroom where drug use (smoking) occurred. Again, background information from law enforcement can be very useful.

Methamphetamine residues have been found to range from one to greater than 10,000 micrograms per square foot of surface area. The pharmaceutical dose of methamphetamine is 5 mg [therapeutic dose of methamphetamine (Desoxyn) that may be prescribed for a child suffering attention deficit hyperactivity disorder].

Law enforcement officials are beginning to take adequate respiratory precautions by donning full-face respirators and self-contained breathing apparatuses as well as chemical-resistant suits in some cases.

PHOTO (RIGHT) COURTESY DAN HANNAN

Decontamination

Information gathered from the assessment is used to support recommendations about how to return the house to a habitable condition. This is presented to the property owner in a summary report that often proposes necessary corrective actions as well. Presently no national exposure limit has been established for methamphetamine. In states where exposure limits for meth have been established (in the form of stan-

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Health & Safety Plan for Meth Lab Assessment & Decontamination Projects

These excerpts from a generic HASP highlight hazards that may be encountered at a clandestine methamphetamine lab, as well as safety precautions related to PPE and other protective measures.

Chemical Hazards

- Anhydrous ammonia
- Acetone
- n-Butane
- Ephedrine or pseudoephedrine
- Ethyl alcohol (denatured)
- Gasoline
- Iodine crystals
- Isopropyl alcohol
- Lead (e.g., lead acetate)
- Lithium metal (from batteries)
- Lye
- Mercuric chloride (as mercury)
- Methylsulfonylmethane (MSM)
- Muriatic acid
- Red phosphorus
- Methylamine
- Potassium cyanide (for potassium)
- Sodium chloride (as rock salt)
- Sodium thiosulfate (for sulfur)
- Sulfuric acid
- Toluene
- Trichoroethane

Physical Hazards

- Slip, trip and fall hazards
- Working on ladders or scaffolding
- Heavy lifting
- Use of power tools and equipment
- Electricity

PPE & Safety Equipment

Due to the low probability of significant and extended exposure to the chemicals likely to be found at a meth lab, coupled with the use of a PID for organic vapor concentration monitoring, the following Level C PPE is anticipated to adequately protect work crews:

- Full-face respirator with multigas/P100 (HEPA) cartridges
- Poly-coated Tyvek suits (or equivalent)
- Nitrile gloves
- Steel toe boots with latex covers or rubber boots

Safety and other equipment should include the following items:

- First-aid kit
- Eye wash (bottles)
- Fire extinguisher (20-pound) ABC
- Field telephone (unless direct access to telephone is provided)

Source: Assured Decontamination Services.

dards or guidelines), decontamination is often required.

Currently, seven states—Alaska, Arizona, Arkansas, Colorado, Minnesota, Tennessee and Washington—have established by statute, regulation or guideline a risk-based decontamination specific to methamphetamine. In these states, the acceptable levels of meth residue range from 0.5 to five micrograms per square foot of surface area.

It is not currently clearly understood what rationale is used to develop a methamphetamine exposure limit. The established limit is generally not a health- or risk-based value. In some cases, established cleanup limits have been based on laboratory detection limits. One can only presume that the existing limits are a function (percent reduction) of a therapeutic dose. State health officials tasked with addressing this problem generally agree that the Centers for Disease Control and Prevention (CDC), EPA or other federal organization should be charged with developing a nonworkplace methamphetamine exposure standard. [*Editor's Note: On Feb. 15, 2005, H.R. 798, The Methamphetamine Remediation Research Act of 2005, was introduced in the U.S. House of Representatives. Among other provisions, this bill would establish a federal research program to develop voluntary guidelines to help states clean up and address the environmental consequences of meth labs. The bill specifically would require EPA to work in partnership with National Institute for Standards and Technology to establish these voluntary guidelines, which would cover preliminary site assessments and remediation activities.*]

In preparing a decontamination work plan (visit www.doh.wa.gov/ehp/ts/CDL.htm for a plan template) and cost proposal for the affected property owner, consideration must be given to the value of personal effects—including the house itself. In extreme cases, the property may be determined to be a total loss if the cost of decontamination exceeds the home's value. This occurs most often with trailer homes. Unfortunately, since the damage in these cases is caused by a criminal act and involves hazardous materials, most homeowner's insurance policies exclude coverage. Again, largely because of costs involved, most states allow homeowners to self-perform decontamination.

Decontamination can become especial-

ly costly for commercial properties such as apartments or hotels that have adjoining living spaces or shared ventilation systems. Smoke or vapor is easily distributed by the HVAC system. Although cooking may have occurred exclusively in the basement laundry room, high levels of meth residue can be recorded on the second story of the building.

The decontamination work plan includes a hazard evaluation, which details the assessment findings and prescribes appropriate PPE. In most cases, all porous items that can readily absorb smoke and vapor are removed and disposed of; this includes linens, clothing, upholstered furniture, carpet and carpet pad. State-sponsored sampling studies have shown that carpet and pad are large sinks for meth residue—likely because of the settling nature of smoke and the large surface area carpet offers (Gaynor). Removal of these items can cause dust and particulates containing meth to be resuspended in the air. Therefore, respiratory protection with HEPA filters, protective suits, and suitable foot and hand protection to guard against corrosive residues and powders are recommended. Additionally, great variability of methamphetamine concentrations can exist both vertically and horizontally on any given wall in the home (Gaynor). Clearly, care must be taken when developing a sampling plan to ensure that the home is adequately characterized.

If saturated or stained areas of carpet or furniture are known to be impacted by a corrosive, flammable or other hazardous waste material, those items should be removed and containerized for proper disposal. Methamphetamine-contaminated items are typically managed as a nonregulated, nonhazardous waste. Therefore, items confirmed or believed to be contaminated with just methamphetamine residues are commonly disposed of as municipal solid waste. The appropriate local or state regulatory agency should be contacted regarding disposal options.

The approach and level of effort necessary to decontaminate a home varies significantly. Typical decontamination requirements include removal of porous items, multiple detergent washing and rinsing events followed by encapsulation via painting with a coat of polyurethane on woodwork. Where allowed to self-perform the decontamination, the author is aware of cases in which homeowners have hosted a "cleaning party" with family and friends—an unregulated activity that presents potential hazards to those not trained to identify and protect themselves from chemical and drug residue exposure.

Post-decontamination wipe samples are most often collected for methamphetamine analysis to confirm successful efforts. These are often required to be collected by a third-party entity to ensure the integrity of the work performed.

Unsuspecting Victims

Clandestine labs pose potential exposure to the unsuspecting—in particular tenants and buyers of apartments and homes. As noted, in states where regulations are lacking, assessment and decontamination activities are not required—they are voluntary. In addition, law enforcement, public health and environmental regulatory communication and tracking systems can be inadequate.

Disclosure upon the rental/sale of a methamphetamine-contaminated home can be overlooked as well. In one case in Minnesota, a mother with two children unknowingly moved into a trailer home that previously housed a meth lab. Park management was aware of this fact. Learning about this issue, a local news agency offered assistance and contracted to test the home. They found levels of methamphetamine greater than 11,000 micrograms per square foot in the bedroom carpeting on which her children and cat played. The news agency producing the segment confronted the trailer park owner, who then offered to pay for costs associated with decontaminating and refurnishing the home.

Conclusion

Is a methamphetamine-contaminated home an uncontrolled hazardous waste site? Should OSHA's HazWOPER requirements apply? There are no definitive answers to these questions yet. However, the public health exposure hazards and environmental problems associated with methamphetamine drug labs are now being realized.

Short- and long-term exposure concerns for individuals living in contaminated houses have yet to be fully examined. A national exposure standard for methamphetamine needs to be developed so state and county regulatory programs can evoke comprehensive assessment and decontamination requirements. Without adequately addressing this issue, the number of properties contaminated by—and people exposed to—methamphetamine labs will only continue to increase. ■

Data Wanted
Researchers with data on meth residue distribution or cleaning studies are encouraged to share those data with Kate Gaynor of the Minnesota Pollution Control Agency. She can be contacted at kathleen.gaynor@state.mn.us.

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