

Sniffing Out the Hazards

IMAGINE THIS GEM of a workplace: a laundry list of toxic chemicals, many in aerosol form, carelessly tossed about; flammable solvents, at times used over open flames; and little or no thought to proper ventilation or protective gear.

At best, it's an occupational hygiene nightmare; at worst, it's a recipe for disaster.

That may be because the operators of clandestine methamphetamine labs are unlikely to consult hygienists or other occupational health and safety professionals before getting their "workplaces" cooking. Plus, the potential for jail time hardly helps to advance the cause.

But the entrepreneurial types who are either supervising or cooking in these labs are not the only people who could be hurt. This toxic brew is just as dangerous for the police officers, firefighters, paramedics and hygienists who attend labs following a bust.

Every year, dozens of illicit labs, small and large, are broken up by police services across the country. Just shy of 30 labs were discovered in Canada in 2005, with the lion's share, 20 of these, located in British Columbia, notes a report from the Department of Justice Canada.

It's always best to remember that a lab is a lab, suggests Allan Johnson, a registered occupational hygienist and regional director for Work-SafeBC in British Columbia. "Everything that would apply from a chemical laboratory perspective would apply for a methamphetamine lab," Johnson says. "It just happens in a house, and it just happens that those safeguards that are in your typical hospital lab or university research lab aren't being followed here. They're cutting every corner," he says.

So, what hazards might first responders face at clandestine labs? And what can they do to avoid exposures?

Get cooking

The hazards presented by a clandestine lab will depend on what method is being used in the drug's creation. The two most commonly used methods in Canada are Phosphorous Acid (or Red-P), and Birch Reduction (or Nazi), notes the Justice Canada report.

Both methods use ephedrine or pseudoephedrine, which can be found in over-the-counter decongestants. Only the Phosphorous-Acid method uses red phosphorous with either hydrogen chloride or iodine, while the Birch method uses lithium and anhydrous ammonia.

These are chief among the many toxic chemicals of concern to John Martyny. The industrial hygienist with

the National Jewish Medical and Research Center in Denver was approached in 2002 by law enforcement officials who were worried about meth lab hazards and their potential impact on first responder health.

To get a handle on the variety and concentrations of chemicals, Martyny and his team entered condemned buildings and set up shop using the same methods as meth labs. After doing about a dozen "cooks" — the process used to create meth — they were able to draw solid conclusions about the exposure potential for first responders.

A host of contaminants may be present, but Martyny says the five most dangerous are the following:

- Phosphine — This gas is produced by both meth synthesis methods when ephedrine or pseudoephedrine is cooked at a high heat. It is highly irritating, and within hours of exposure, can cause pulmonary edema when inhaled. "You essentially start drowning in your own fluids," Martyny says. The concentration at which the Occupational Safety and Health Administration considers phosphine immediately dangerous to life and health (IDLH) is 50 parts per million (ppm). The study labs, however, showed levels as high as 258 ppm.

phosphine immediately dangerous to life and health (IDLH) is 50 parts per million (ppm). The study labs, however, showed levels as high as 258 ppm.

- Iodine — Found in vaporized form in Red-P cooks, this chemical becomes toxic when inhaled. It can cause severe irritation throughout the respiratory tract and on the skin. The IDLH is two ppm.

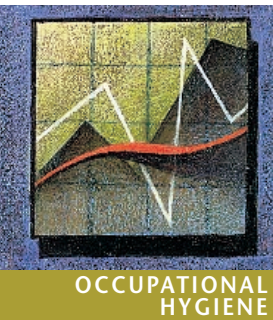
- Hydrogen chloride — Martyny pinpoints hydrogen chloride as likely the "biggest player" for first responders. One need only look at its history as a chemical weapon during the Great War to understand its potential for harm. Exposed workers, during either synthesis method, complain of a "very biting, burning feeling" in their throats. The IDLH is 50 ppm, but concentrations of as much as 150 ppm were found in the study labs.

- Anhydrous ammonia — This chemical, produced in Birch cooks, is commonly found in farm fertilizers. It has a pungent odour that will "push you back" when you get a whiff, says Martyny. Exposure can result in asthma, severe irritation of the eyes, throat damage and even corneal damage. The IDLH is 300 ppm, but observed levels in the labs were as high as 2,000 ppm.

- Finally, there is methamphetamine itself. Although vaporous levels of the drug are not high enough to stimulate a drug effect, it can still be a significant irritant to the skin, eyes and upper respiratory tract. Observed levels have reached 4,000 to 5,000 micrograms per cubic metre.

Martyny points to a study, appearing in the *Journal of Occupational and Environmental Medicine* (JOEM) in 2002, that examined the health records of 40 first responders, and included a survey. Common short-term symp-

This toxic brew is just as dangerous for the police officers, firefighters, paramedics and hygienists who attend labs following a bust.



BY ANDREW D'CRUZ

Andrew D'Cruz is editorial assistant of OHS CANADA.

toms reported were wheezing, breathlessness and persistent cough, as well as chest colds, bronchitis and pneumonia.

Research by Martyny, also published in the JOEM, showed responders who had been to 30 or more labs were 5.49 times more likely than those who had been to fewer than 30 to exhibit one or more of the symptoms.

As well, labs will often contain non-irritating concentrations of flammable solvents, such as camping fuel, that pose serious fire and explosion hazards. Martyny reports that 15 per cent of methamphetamine labs are found by local fire departments after a blaze has broken out.

Len Garis, fire chief of the Surrey Fire Service in British Columbia, agrees “fire or explosions” have revealed clandestine labs. But there are challenges, Garis says, because it may not be immediately clear to responders whether a given blaze is “a natural fire as opposed to an unnatural one.”

Necessary ingredients

In theory, occupational hygienists would prefer to eliminate the hazard outright. If that’s not possible, implementing engineering and administrative changes to prevent exposure becomes the top choice; the last is sole use of personal protective equipment (PPE).

But when raiding or dismantling meth labs, that last resort typically becomes the only option.

Garis suggests caution is paramount when entering drug labs, almost 10 of which have made Surrey their home over the last few years. Responders have found themselves “in too deep in certain circumstances, where, fortunately, there [have] been no immediate health risks that have occurred,” he says.

For confirmed meth labs, “the first rule of thumb is that if there’s not a life or a risk to life, then it is a ‘secure and defend’ operation,” says Garis. When his firefighters must enter the labs, they don full hazmat suits with self-contained breathing apparatuses (SCBA) to protect against surface and respiratory irritants.

Sergeant Brent Hill, commander of the Chemical Diversion Unit for the RCMP’s Toronto West detachment, ensures that his officers wear level-B hazmat gear, which includes a chemically resistant suit, boots, gloves and SCBA.

Hill knows of no officer injuries resulting from this decidedly risky “lab” work, but says that may be the result of teamwork, procedures and “pretty strict” rules around protective equipment. “We have a lot of redundant systems in place, and it’s all geared to officer safety and public safety,” he says.

But Martyny’s experience — at least before 2002 — was that

law enforcement members raiding labs often forego the chemical-resistant suits, which can crinkle and stand out, in favour of dark-coloured ballistic gear. Regardless of the outerwear, his view is the most important piece of PPE is the SCBA.

The equipment is critical, but so too is SCBA acceptance, something that Martyny is happy to report police seem to be warming to. “Most [officers] are learning how to become comfortable with doing their jobs wearing SCBAs,” he says.

Measures adopted in Surrey and at the RCMP square nicely with Martyny’s advice. “If you don’t know what’s there, and you’re going into the lab, we want everyone [wearing] level-B.”

Once indoor air conditions have been addressed, and major chemicals removed, Martyny says workers can downgrade to air-purifying respirators and Tyvek suits, gloves and boots — but they must also be sprayed down with a water solution afterward.

After all evidence has been carted away by the police, and the main components of the lab removed, the building remains far from habitable. “This is a toxic dump site,” Hill says. “There has to be some sort of remediation process before you can have any realistic expectation of human habitation.”

What happens next depends on the jurisdiction. “It’s either the municipality’s responsibility or the responsibility of an owner to get this thing back into shape,” says Johnson. And since no national or provincial standards for remediation exist, this is often where a hygienist will come in.

Follow the recipe

Last year, the American Industrial Hygiene Association released a 29-page booklet, “Clandestine Methamphetamine Laboratory Assessment and Remediation Guidance,” that offers hygienists valuable information.

Dealing with the chemical residues in meth labs can mean inspecting “everything from countertops and floors that are just corroded, to walls that have absorbed [vaporized chemicals], to ventilation systems that have residues of cooking chemicals caked on them,” says Johnson, who also serves as registrar of the Canadian Registration Board of Occupational Hygienists.

Because of the many agents involved, he insists that hygienists take a methodological approach: identify hazards, segregate them, dispose of them, and remediate whatever might remain.

While it is unlikely newly trained hygienists will ever get the opportunity to design the “ideal” clandestine methamphetamine workplace, it is hoped they can be counted on to remediate the mess that existing operations leave behind.

●HS

“There has to be some sort of remediation process before you can have any realistic expectation of human habitation.”