CLANDESTINE DRUG OPERATIONS

AWARENESS AND SAFETY

(REVISED MARCH 2007)
INTENTIONALLY BLANK
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REVISIONS & CHANGES

- Health Canada 24 hour response phone number changed, National Response line through Public Works Canada, page 78.
CONTRIBUTORS

This safety and awareness manual is a collaborative effort involving Alberta Municipal Affairs Fire Commissioner’s Office and the Calgary Fire Department. The project was endorsed and supported by the Alberta Fire Services Advisory Committee.

The scope of this manual is to provide a basic understanding of the potential hazards a first response crew may encounter at a clandestine drug operation. The scene is primarily a police investigation but when treated like a hazardous materials call from the outset, the fire department can be a valuable resource to the entry teams and investigators. A combined or joint services task force approach to mitigating a clandestine drug operation will ensure that appropriately trained personnel are there, with the ultimate goal of keeping everyone safe while performing their duties.

The information presented in this manual may also be of interest to law enforcement agencies, public health care workers, Children’s Services personnel, public works personnel and Social Services providers.

This second edition has been a work in progress since shortly after publishing version one in late 2003. Many photos and printed materials have been generously donated to further enhance the awareness training and education of our First Responder community. The authors extend many thanks to those individuals and agencies that provided training materials and photographs. Please review the credits at the back of the manual for specific references. Always be aware of your surroundings as things may not be as they seem. As always, stay healthy and safe – there’s life after work.

Thank you to the following contributors for their contributions, input and editing skills.

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PREFACE

A dramatic increase in the number of Marihuana Grow Operations and related Clandestine Drug Manufacturing Operations found within domestic dwellings throughout Western Canada - including Alberta - has identified an urgent need to better prepare firefighters and other first responders for the handling of such occurrences. This manual is intended to provide a basic level of awareness and safety for first-arriving fire crews at illegal Marihuana grow operations and/or clandestine drug manufacturing laboratory sites.

Today’s illicit drug manufacturing and processing operations pose serious hazards to emergency response personnel and residents in the community as well as the potential to cause significant environmental contamination. Any drug operation should be treated as a Hazardous Materials incident from discovery to conclusion. Appropriate precautions must be taken at all times to prevent serious injury or death.

This module is by no means all-inclusive. Its goal is to create awareness for the potential dangers encountered by first responders by discussing the more obvious physical aspects of:

- Marihuana grow and clandestine drug operation sites,
- Environmental hazards,
- Potential chemical injury,
- Chemical wastes in and around the premises; and
- Protective measures to prevent any unwanted chemical contamination.

Any person using this manual must remember that local standard operating guidelines and other legislated practices and requirements must be adhered to.
OBJECTIVES

After becoming thoroughly familiar with the contents of this manual, the first responder should be able to:

1. Recognize the dangers presented to first responders by domestic Marihuana grow operations, and identify the procedures necessary for personal protection.

2. Describe the basic definition of a Confined Space and recognize the possible relationship with regards to synthetic drug manufacturing operations.

3. Recognize and distinguish between the Basic Grow Operations:
   - Organic
   - Hydroponic
   - Weed Oil Extraction processes

4. Demonstrate and describe site safety measures to protect responders from exposure and prevent injury or death.

5. Describe and demonstrate necessary atmospheric monitoring.

6. Describe and identify dangers associated with clandestine drug operations.

7. Describe the personal decontamination process to be implemented following entry into a Marihuana grow operation.

8. Describe common exterior indicators of a clandestine drug manufacturing operation.


10. Describe the chemical exposure risks associated with synthetic drug manufacture.

11. Describe and demonstrate basic site safety management techniques to prevent cross or secondary contamination.

12. Describe the limitations of structural firefighting clothing in preventing chemical exposure.


15. Develop an appreciation for the gravity and severity of responding to clandestine drug operations.
MARIHUANA GROW OPERATIONS

BACKGROUND / WHAT IS MARIHUANA?

Marihuana is one of the most commonly used illicit drugs in Canada. The dry, shredded green/brown mix of flowers, stems, seeds, and leaves of the hemp plant Cannabis Sativa, is usually smoked as a cigarette (joint or nail), or in a pipe (bong). Often in combination with another drug, it also is smoked in blunts, which are cigars that have been emptied of tobacco and refilled with marihuana. It might also be mixed into food or brewed as a tea.

In its more concentrated “sap-like” form it is called hashish. Both hashish and marihuana smoke have a pungent and distinctive sweet-and-sour odour. Street terms for marihuana are endless, including pot, herb, weed, grass, widow, ganja, and hash. The main active chemical in marihuana is THC (Tetrahydrocannabinol). THC binds itself to nerve cells in the brain. Here it kicks off a series of cellular reactions that ultimately lead to the high that users experience when they smoke marihuana.

BASIC MARIHUANA GROW OPERATIONS

Organic Grow

An organic grow operation means the marihuana plants are grown in containers filled with a soil-based media. This can be a simple operation consisting of a few potted plants or a large-scale venture of hundreds of plants in various stages of growth tended throughout the residential dwelling under an arrangement of commercial grow lamps.

Components of the marihuana organic grow operation include:

- high intensity grow lamps and ballasts (fluorescent lamp systems)
- sophisticated wiring systems and timers
- watering systems, humidifiers and swamp coolers (large water baths)
- air handling systems, possibly with filters and scrubbers
- tanks containing chemical fertilizer blends, pumps and hoses
- pesticides and applicators
- carbon dioxide generator systems or furnace bypass systems
- fuel systems for carbon dioxide generators

[1a] Calgary Police Service
**Hydroponic Grow**

Hydroponic grow operations refer to plants rooted in some type of a non-soil inert media: like lava rock or sawdust.

The water, fertilizer and nutrients are cycled through a network of small diameter hoses from a central mix tank.

Components of the marihuana hydroponic grow operation include:

- high intensity grow lamps and ballasts
- sophisticated wiring systems and timers
- individual plant watering and drainage systems return lines to/from a mixing tank
- humidifiers and swamp coolers
- air handling systems, possibly with filters and scrubbers
- chemical fertilizer blends
- pesticides and applicators
- carbon dioxide generation systems or furnace bypass
- fuel systems for carbon dioxide generators

**Weed Oil Extraction**

The weed oil extraction procedure is utilized to remove the chemical THC (Tetrahydrocannabinol) from the Marihuana leaves using a common and easily obtained solvent and then concentrating the resulting mixture by evaporating off most of the initial solvent. This extraction procedure begins by transferring a quantity of Marihuana leaves and buds into a suitable container along with a common volatile solvent (butane, naphtha or ethanol). The plant matter is then soaked, filtered, pressed and concentrated through the evaporation process. The remaining dark oily liquid contains a high concentration of the chemical THC (Tetrahydrocannabinol).

Obvious dangers include the presence of a container of highly flammable solvent and an electrical unit that applies heat to drive off the volatile solvent. The weed oil extraction process may be completed in a matter of hours. Only very basic equipment is required and is easily portable.
FIRST RESPONDER AWARENESS & SAFETY PRECAUTIONS

DANGERS ASSOCIATED WITH GROW OPERATIONS

Reduced Oxygen Atmosphere and Restricted Access

There may be an occasion where the oxygen content is reduced below 19.5% and a restricted access to the grow area is encountered. A thorough site evaluation, including atmospheric monitoring, should be conducted by the police investigators and incident command to determine if the premises meets the definitions of a confined space. See O.H.&S. regulations on page 23.

Water Stains and Mold Spores

The extensive air handling systems often found inside grow rooms results in the accumulation of untreated moist air in the walls of the rooms and the attic. This is an ideal bed for the germination of harmful mold spores. The air is also laden with pollen from the mature plants. The presence of sprayed pesticide vapours could also be an issue. These factors pose a respiratory and skin absorption risk to unprotected persons and personal exposure symptoms may range from minor irritation to an anaphylactic-type allergic reaction.

Unusual watermarks and dark brown staining originate from under the eaves or soffits of this residence. These stains were present on all four sides of the premises indicating extreme moisture build-up in the attic space.

An example of extreme moisture on the interior walls of a house where a grow operation was discovered in the basement.

The ceiling in the kitchen is sagging from the moisture build-up. Notice the water in the light fixture.

This photo clearly shows extreme mould growth on the interior walls.

Look carefully in the corner just right of the drape; notice the cascade of mould moving outward along the carpet.
Closer inspection of the attic space of a home containing a domestic MGO reveals extensive mould spore growth on the sheathing and roof trusses.

Electrical Bypass, Power Lines, Secondary Distribution Panels and Transformers

In most situations the electrical feed is routed through an illegal and often dangerous bypass at the electrical junction within the house. The incoming current load is usually not protected by fuses or breakers. The lights, humidifiers, air conditioning and cooling systems require as much as three to ten times the electrical demands of an average home. Electrocutions of ‘growers’ and injuries to first responders are not uncommon. Often the substandard wiring creates an obvious fire hazard. Beside the main panel of circuit breakers, there may be additional panels hidden in the dwelling still feeding power to equipment.

Often the transformers used to power the grow lamps are placed on a wooden base, and the heat generated can cause the base to ignite – an obvious fire risk.

A concrete core cutter was used to gain access to the main domestic power into the home where the bypass wire can be seen in the left side. Shutting off the main power bar on the electrical panel will not stop electrical power to the other lighting, cool and fan circuits used in the operation.
Maze of 220VAC supply lines to the transformers used to power the high intensity grow lamps.

This mess of wires was perched on a makeshift shelf about 1 foot off the floor. An obvious electrocution hazard during a primary search in reduced visibility.

Secondary electrical panel running on the bypass and transformers on the lower shelving.

Note the fan used to cool the transformers that are sitting on the wooden shelves.
Another secondary electrical panel running from the bypass. (left)

Exposed wires in a narrow stairwell present an electrocution hazard.

Many of the domestic Marihuana grow operations have been disguised to appear that the homes are lived in and occupied by a traditional family unit. Children’s toys may be laying in the front yard and drawings taped on the windows, all with the intent to make the house blend into the neighbourhood.

Now imagine responding to a reported house fire in the early evening. On arrival there is smoke showing from the basement windows at the side and rear of the house. Based on initial occupancy observations, there is a good chance someone is home in the house. One of the firefighter’s primary goals will be to conduct a rapid primary search of the dwelling.

The smoke in the house has reduced visibility in the upper bedrooms to nearly zero. Our methods of searching the rooms will include crawling on the floors and feeling our way around.

At first, you don’t recognize the lack of furniture in the upper bedrooms.

Suddenly your hand brushes against the overheated ballasts and makes contact with the 220VAC supplying the transformers.
**Hanging Hazards and Entrapment**

In order to save time during the installation process the electrical power, gas, and water lines are often suspended together in the same bundle. In many cases this bundle of lines can be found almost anywhere:

- close to the floor,
- running across a hallway,
- in a staircase

This group of hanging wires (*left*) poses a severe entanglement and entrapment hazard.

Police investigators are not the only ones at risk. Fire suppression crews that may be responding to a house fire and conducting a primary search or suppression activities in reduced visibility are at extreme risk of entanglement.

This is a control panel for a generator unit (*right*) hidden in the basement and used to provide an independent electrical source to the grow rooms.

Be very careful when dealing with electricity. Always have the electrical utility send a response team to ensure there is no power to the grow rooms.
Hanging electrical hazards, 220VAC lines intermixed with water lines running to the swamp coolers. This bundle of wires is an obvious severe entrapment hazard in the event a pump crew had to execute a primary search in visibility-obscured conditions.

Common entrapment hazards include water lines on the floor or suspended from the ceiling, electrical lines suspended from the ceiling and strung along the walls. A propane fuel line is also suspended here and connected to a CO$_2$ generator hidden behind the swamp cooler.

**Disconnected Flues**

The furnace and hot water tank flues are often disconnected to allow the collection of the waste CO$_2$ to be absorbed by the plant. Unfortunately an additional hazard, carbon monoxide, also tends to build up in these closed spaces.

Carbon Monoxide concentrations of 75–100ppm have been measured where flues are disconnected. Depending on the air handling systems and seasonal conditions, CO may accumulate to very dangerous levels.

A common practice is to disconnect the furnace and hot water tank exhaust flue to allow combustion gases to free flow into the dwelling. This creates an obvious environmental hazard to unprepared first responders and investigators.
Propane and Natural Gas

Propane tanks may be concealed or stored inside the premises to fuel the CO₂ generators. Often, makeshift connections are made to the existing domestic natural gas supply creating another host of potential hazards and explosion risks.

Unsupported flexible gas lines are often used to fuel CO₂ generators in other areas of the house.

The thin flexible natural gas lines are designed for domestic appliance connections, not to be self supporting supply lines.

There is a risk of puncturing the thin walled tubing and creating a gas leak.

The black box is a Carbon dioxide generator hanging from the ceiling in a basement grow room.

This is simply a Natural gas or Propane fuelled burner enclosed in a protective housing. Note the flexible gas line running through the ceiling to the left.

The Calgary Fire Dept. Hazardous Materials Team measures and records the interior atmosphere. To April 2006, the average decrease is 0.6% O₂. At least three occasions have been at or near 18.0% O₂.

Elevated CO₂ and CO levels in the enclosed rooms are thought to contribute to the reduced Oxygen atmospheres which are commonplace.
A 30 lb propane cylinder lying on its side, found concealed underneath a bench seat in the kitchen. The gas line ran down through the floor to a CO\textsubscript{2} generator in the basement. See photo 14 previous page.

An obvious danger here is the placement of the Propane cylinder on its side. If filled greater than half full of liquid, the product valve will supply liquid instead of vapour. If activated, the burner would be overwhelmed with flame – creating an extreme fire risk.

**Booby traps and Weapons**

There is always a risk the first entry crews will encounter one or more anti-personnel devices. A booby trap may be set intentionally for police investigators or they may be attempts to deter crop theft.
Ultraviolet Light Hazards

The high voltage lamps suspended from the ceiling are designed to provide the ultraviolet (UV) energy needed by the plants. While it may appear to be ordinary visible light generated by the bulbs, there is a significant amount of high intensity UV energy present that can and has caused eye damage. Anyone working in the presence of the grow lights must have adequate eye protection to prevent serious eye damage. Some manufacturers offer a darkened visor option for the full-face respirator.

The best practice is to limit the exposure time in the presence of the grow lights. Never shut off the lights until after the Police investigators have determined it is safe and appropriate to do so. Use extreme caution working near any of the light switches, relays, timers and light ballasts. Most of this equipment will be running off an illegal electrical bypass. If available, have an electrical utility trouble team inspect and disconnect the power bypass – before conducting work in the grow areas.
Other Chemical Hazards

In many of the MGO’s our team has assisted with, the fertilizers and nutrients have been mixed in a large container. Garbage cans, 205 Litre drums, plastic tote bins (Intermediate bulk Containers), even large 1200 Litre home made containers have been observed. What chemical mixture is contained within? Are you prepared as a team or agency to deal with the liquid? Some jurisdictions are considering seizing the chemicals left behind, properly disposing of them and placing a lien on the property to recover the costs.

Once the MGO has been dismantled, and the plants and other evidence seized by the Police investigators, what happens to the chemicals left behind?

Do the growers return and contract the disposal to a certified hazardous waste handler?

Two home-made plywood boxes lined with plastic sheeting are used as mix tanks in a hydroponic distribution system.

At approximately 1.2m each side and 1.2m deep, these tanks each could hold 1700 Litres of hydroponic chemicals.

What would you do with 3400 Litres or more of an unknown chemical mixture in the basement of a house?
MARIHUANA PPE PROTOCOLS

Due to the potentially dangerous environment and the corresponding chemical hazards associated with grow operations, first responders must ensure that they are adequately equipped with the appropriate safety equipment to ensure personal protection throughout the incident duration.

In nearly every domestic MGO attended, there has been some form of visible mold growth on the interior walls, ceilings and attic spaces. The extent of hidden mold behind the wall board is unknown. Contamination has ranged from sporadic clusters of spores in closets and attics, to growth completely covering walls and ceilings with cascading “bundles” of mold growth extending 1m or more across the carpet from the wall. Spider mite clusters have been observed on several occasions covering the plants.

The Marihuana PPE Protocols were developed to provide a basic ensemble that will provide a reasonable level of protection to the expected hazards one may encounter in a domestic MGO.

The entire MGO PPE protocols are included in Appendix C.

The following safety equipment list is by no means all-inclusive, and does not supplant any requirements set forth by the authority having jurisdiction in any particular area. In all cases local guidelines and procedures, as well as Provincial and Federal regulations, should be consulted before procuring a stock of equipment. Appropriate training for any instrument or PPE ensemble must also be provided prior to placement in service.
Minimum Equipment (PPE) Required

1. Tyvek® style disposable protective outer garment with attached hood, elastic wrist and ankle cuffs. There are several manufacturers of disposable outer garments and several colours and fabrics are readily available.

2.a. Full-face respirator. May be an SCBA face piece with an approved adapter for use with air purifying cartridges. Note that some manufacturer’s face pieces are much better at reducing visor fogging than others. Always obtain one or more test samples to evaluate prior to purchase.

*Or where the use of eyeglasses is required,*

2.b. Half-face respirator designed for use with air purifying cartridges, and chemical protective goggles that can be effectively worn over the eyeglasses and still provide protection to the eyes from airborne mold spores and bacteria. All masks should be fit tested according to Provincial Occupational Health and Safety Regulations.

3. Air purifying respirator cartridge(s) rated to P-100 particulate filtration, combined with Organic Vapour protection. One complete set ready for service on the mask, and a second set of spares for field replacement. Note that once opened, the Organic vapour (OV) component has a limited service life. After approximately 8-hours or one shift, the OV cartridges should be discarded. Exposure to moisture and humidity will reduce the service life of the OV cartridges. Consult the application guidelines for the specific cartridge and be aware of the maximum use concentrations of airborne contaminants.

4. Nitrile rubber gloves or other chemical resistant approved gloves capable of protecting hands from chemical, pesticide and herbicide residues. An outer working glove should be used when handling equipment or dismantling operations.

5. Work boots designed to protect the feet from occasional chemical splash hazards and can be decontaminated with a hospital grade hard surface disinfectant. Water resistance should be included as a detergent boot wash may be required upon exit. The boots must meet CAN/CSA-Z195-M2 standard for protective footwear and have dielectric or electrical hazard protection rating.

6. A minimum three gas portable air monitor capable of measuring Oxygen content as a percent of atmosphere (%O₂), Carbon Monoxide concentration in ppm (ppmCO), and flammable vapour as a %LEL.
Outer Protective Garment

There have been so many instances of mold contamination in domestic MGO’s, that some form of mold contamination should be presumed present until proven otherwise. The goal of an outer protective garment is to prevent mold spores from contacting and adhering to clothing. The garment can be removed upon exit and discarded. Provided the proper decontamination procedures are followed upon exit, there should be no secondary contamination concerns.

**REMEMBER, IN MARIHUANA GROW OPERATIONS:**

1. Inadequate air circulation to handle the moisture load results in water accumulation in the attic and interior walls, causing long term damage and mold growth.

2. Mold spores are almost always present when the warm moist air is vented directly to the attic

There are several different manufacturers of PPE clothing, some styles are more suited to our requirements than others. The choice of suit should include some minimal chemical splash protection. Required components are an attached hood with an elastic seal, elastic cuffs on the wrists and ankles.

Gloves to prevent contamination of the hands should also be an integral component of the PPE ensemble. Medical nitrile rubber gloves may be worn underneath works gloves. Provisions must be made to launder or decontaminate the outer work glove.

The external and internal appearance of the dwelling may determine the choice of PPE. Look for obvious indicators such as staining, water marks under the eaves, dripping water from odd places and evidence of external and internal mold growth on the walls.

The Tyvek® style protective outer garments are designed to be disposable, single use only. There should be no attempts at cleaning or re-using this garment after use in a Marihuana Grow Operation.
Respiratory Protection

A full-face respirator will provide the necessary eye and respiratory protection with one convenient application. Several SCBA manufacturers offer an adapter that allows the mask to be worn while using air-purifying cartridges. The same mask can be worn as a standard SCBA when connected to a docking valve. Aside from the deployment flexibility, a great advantage is the mask can be fit-tested so the wearer is assured of getting a good seal regardless of the breathing air source. Note that some manufacturer’s face pieces are much better at reducing visor fogging than others. Always obtain one or more test samples to evaluate prior to purchase. The rapid adapter or APR conversion device must be specifically rated and approved for use by the SCBA manufacturer.

The P-100 cartridges are more efficient than the N95 and are the suggested level of airborne particulate filtration. These cartridges may be combined with general purpose Organic Vapour (OV) protection that may also remove pesticide or residual chemical vapours present in an enclosed area. **Note that OV/P100 cartridges provide no filtration or protection from Carbon monoxide.**

Where the use of eye-glasses is necessary, a half-face respirator designed for use with air purifying cartridges may be donned. Chemical protective goggles can be effectively worn over the eyeglasses and still provide protection to the eyes from airborne mold spores and bacteria. Persons with eyeglasses that will be frequently attending MGO’s may wish to consider getting eyeglass attachments to fit inside a full-face mask.

Avoid working in proximity to the grow lamps, as these are a source of damaging ultra-violet radiation.

All masks must be fit tested according to Provincial Occupational Health and Safety Regulations.

**Although a respirator offers increased manoeuvrability, an SCBA will provide the highest level of respiratory protection available. If in doubt, wear an SCBA.**

**Always consult with a local Health & Safety Advisor or Regional Health Authority before purchasing respirators.**
Respiratory Protection continued

In the event a decreased Oxygen environment ($\leq 19.5\%O_2$) is detected, then full SCBA is necessary – per O.H.&S. regulations. Review your Department’s Standard Operating Procedures (SOP’s) for when to wear SCBA.

Full-face respirator with P-100/organic vapour cartridges attached.

Full-face respirator, component view.

The SCBA face mask doubles as a full-face respirator when equipped with the cartridge adapter (centre) and the two P-100 organic vapour combination cartridges.
Respiratory Protection continued

Another version of an SCBA face piece with a single respirator cartridge adapter.

The adapter simply connects to the mask in place of the normal demand valve.

The dual purpose canister (P100/OV) and adapter are stored in a sealed plastic bag when not in use. OV cartridges have a limited service life once opened and placed in service on the mask.

As with all respirator cartridges, the user must be aware of the limitations for use in a concentrated environment and where Oxygen drops below 19.5% of atmosphere.

An overloaded cartridge may be just as ineffective as no protection at all.
Respiratory Protection continued

The fit test procedures for the full-face respirator will vary depending on the specific manufacturer. Always consult with a qualified technical representative for field fit test instructions.

The filter cartridge replacement schedule will vary widely depending on use, particulate load and relative chemical vapour exposure. At the time of writing (June 2005) there are no known visible indicators for the combined P-100/OV filter cartridge to alert the user that the end of service life has been reached. It is generally accepted that breathing will become laboured and/or increasingly difficult as the particulate filter portion becomes loaded or clogged. When the ability of the OV component is reduced, the user may begin to experience odours while using the mask. In the event either of these indications are experienced, the filter cartridges should be discarded immediately. Writing the date of installation of the cartridges on the mask may also help when deciding if its time to replace the cartridges. Exposure of the OV cartridge to humidity will reduce the service life. A practical service life for the combination OV cartridge is 8-hours or one shift. The cartridges are discarded after this time.

There are several manufacturers of OV/P100 cartridges. The cartridge must be rated for use with the mask and adapter. Note the maximum use concentrations of specific Organic compounds and established breakthrough times may vary.

An alternative to using the SCBA face piece as an APR (full-face respirator), is to simply use SCBA on air. Most fire apparatus already have SCBA readily available. Once the activities inside the premises are complete, the air cylinder is refilled and ready for service. The cost of using an SCBA may be considerably less than disposable respirator cartridges. There are also no immediate concerns for end of service life or adequacy of the device to filter the contaminants – as SCBA is the best level of respiratory protection available to us.

Maintain a stock of respirator cartridges for situations where the SCBA is too bulky, or the activities required at the call will be prolonged, as the use of cartridge respirators is less demanding on the body. An APR must only be used with proper and thorough atmospheric monitoring. If in doubt, use SCBA.
Basic Air Monitoring

First entry crews and anyone conducting operations inside a marihuana grow operation must be equipped with some basic ambient air monitoring equipment. The most basic is a three-gas handheld monitor that displays Oxygen (%O₂), Carbon Monoxide (ppmCO) and combustible gas sensor capabilities (%LEL). A four-gas detector usually incorporates the detection of Hydrogen sulphide (H₂S) as well. There are more complex versions that can be configured for five- and six-gas detection depending on the requirement. More details regarding gas monitoring can be found under the Methamphetamine section of this manual.

The decreased Oxygen atmosphere resulting from the on-site production of Carbon dioxide (CO₂) is of primary concern in a marihuana grow operation. If there are no CO₂ generators running in the premises, be aware of disconnected furnace or hot water tank flue stacks. If the flue is removed or otherwise redirected into the air handling system, then Carbon Monoxide (CO) is also a danger. The decreased Oxygen content will be a strong clue that high levels of CO₂ are present.

**NOTE: Most portable three/four gas detectors do not have CO₂ capability.**

Propane and/or natural gas can be used to fuel the CO₂ generators. It is not uncommon to find a concealed propane cylinder inside the dwelling. An unattended leaking cylinder is a potential risk for fire or an explosion. A combustible gas detector is absolutely essential for the initial environmental assessment. Many other manufacturers and configurations of portable monitors are available. Always consult with a reputable dealer and chose an instrument with a good service history.

SCBA must be used in combination with full bunker gear until atmospheric monitoring has been completed.
Examples of Three* and Four Gas Handheld Detectors.

*top left; Industrial Scientific Instruments, LTX-310 (CO, O₂, LEL)

top right; Industrial Scientific Instruments, TMX-412 (CO, O₂, LEL, H₂S)

bottom left; Industrial Scientific Instruments ITX (CO, O₂, H₂S, LEL)

bottom right; B.W. Technologies, Gas Alert Micro (CO, O₂, H₂S, LEL)

While the LTX-310 and TMX-412 are dated, they are still robust and reliable instruments. The ITX is a newer addition to the ISC fleet and allows data-logging and a variety of other user configured settings.

These monitors may be configured with three sensors (CO, O₂, LEL) if a fourth gas sensor is not desired.

The portable air monitoring instrument should be kept in a case for ease of handling and maintaining cleanliness. The kit should contain a cylinder of appropriate calibration gas, spare batteries and 12VDC adapter/charger. Some instrument companies manufacture a complete kit designed for this application.

Prior to entry, the portable air monitor must be zeroed in a clean atmosphere away from vehicle exhaust. Prior to entry, a “bump” test must be performed to verify correct operation and response. The “peaks” should then be cleared.

Depending on the specific portable monitor selected including the sensor configuration, it may be required to be plugged in (powered) at all times when not in use, either to a 12VDC vehicle connection or 120VAC adapter.

Note: The photographs of various portable gas detection instruments and personal protective equipment included in this section are included as an illustration and for reference only. They are not an endorsement of any specific manufacturer.
SUGGESTED DECONTAMINATION PROCEDURES (MGO’S)

Each responder working in the grow operation will require proper and thorough decontamination after exiting the premises. A minimum procedure would include the removal and placement of the protective suit, gloves and boot covers into a sealed bag for disposal.

Upon final exit from the premises, the external PPE should be removed in the following fashion. Where possible, a clean person (in PPE) should assist with the PPE removal.

The hands/gloves and footwear should be sprayed with an approved hospital grade disinfectant to neutralize any bacteria and mold spores that may have contaminated the surfaces.

Carefully remove the hood, peeling it back and avoid touching the skin.

Open the front zipper closure and peel the suit back over the shoulders.

The clean person grasps the gloves and the wrist cuff of the dirty person, the dirty person pulls gently as the glove is removed from the hand, the exposed hand is tucked up inside the arm of the suit. This is repeated on the other arm/hand. The key here is to avoid touching the outside of the suit with the exposed hand.

Then the suit is completely removed from the torso and legs of the contaminated person.

Gloves and suit can be placed in a garbage bag for disposal.

The face-mask/respirator can now be removed and should be cleaned with an approved cleaner as per existing guidelines.

The uniform or clothing worn by anyone entering the premises should be laundered separately from other domestic or family clothing to prevent any cross contamination.

If the footwear was contaminated by walking through spilled chemicals in the grow areas, a boot wash should be performed as follows.

- A 30-Litre tub is filled with 4-6 inches of warm water (as available), and a concentrated solution of alkaline detergent (granular laundry soap, Spic-n-Span, etc.) is prepared.

- The contaminated person steps into the tub while another person gently scrubs the sides and soles of the boots with a brush.

- A clean water rinse completes the process (another tub with clean water, garden hose, etc.)
DECON PROCEDURES CONTINUED

In the event a more substantial chemical contamination has occurred, the local Fire Department Hazardous Materials team should be requested for assistance with decontamination. Medical assessment/evaluation should also be considered.

If applicable, the respirator or SCBA is the last item removed. The mask must be cleaned with a suitable hard surface disinfectant-style cleaner. The work boots should be cleaned even when worn with disposable boot covers. A boot tray with cleaning/disinfecting solution will function nicely.

The goal is to reduce the transmission of the mold spores from the contaminated premises to the fire pump, fire station and ultimately home at the end of the shift. A clean uniform should be donned afterwards. **In all cases, clothing worn under the protective suit should be changed before returning home at the end of the work day.**
Canine Decontamination

There are often circumstances where a Canine Unit is called to assist with the search and clearing of a MGO, potentially exposing the dog to chemicals, fertilizer mixtures and powdered pesticides.

Depending on the personal hygiene of persons found in the premises, Bio-Hazards may also be present. Without a thorough decontamination upon exit, secondary contamination will spread the chemicals to the Police vehicle, district office and likely to the Officer’s family at the end of the shift.

Some basic decontamination can easily be performed at the scene by a prepared crew with simple equipment.

As with any chemical decontamination procedure, the method is dependant on the chemical hazard present. As soon as determined the service dog has become contaminated, immediately request the assistance of a Hazardous Materials Unit.

Any agency choosing to adopt these procedures as a protocol should consult with their local or regional Police Canine Unit before implementation. As well, crews will require training in these practices.
Dry Decontamination

Where the dog has been in contact with plants or surfaces contaminated by a powdered chemical such as a pesticide, herbicide or otherwise, dry decontamination may be effective in the short term.

Using a small shop vacuum equipped with a suitable combination HEPA filter, carefully vacuum the dog’s coat. Start at the head and work along the top of the back down to each foot. Avoid working the chemical into the hair even further. If there are any obvious locations of gross contamination, then vacuum that area first.

Inspect the hair thoroughly for residual chemical. Depending on the coat, you may have to look very carefully and methodically.

A more thorough decontamination wash may be required.

Wet Decontamination

Upon exit from the premises, proceed directly to the decontamination area.

Disinfection stage.

If required (based on an interior assessment of the premises), the dog’s feet may be washed with a disinfectant soap such as Hibitane®.

Avoid getting the soap in the eyes, ears and mouth.

Rinse thoroughly with clean water before proceeding to the full decontamination wash.
Decontamination wash

If the coat is grossly contaminated, apply a gentle water wash to remove the bulk of the contamination. Using a gentle shampoo, or other supplied canine shampoo, wash the coat thoroughly working from the head along the back and down the legs to the feet. Avoid getting soap into the eyes, ears and mouth.

The person washing should be wearing suitable gloves and splash protection as necessary. A 30 litre storage bin works well as a wash tub.

Rinse the coat thoroughly and towel dry.

Inspect the coat for residual chemicals.

Inspect the skin for chemical burns or signs of irritation.

Be observant for any changes to the dog’s behaviour. Animals exposed to toxic amounts may experience tongue and lip numbness, nausea and diarrhoea.

Other symptoms of chemical exposure may include loss of coordination, tremors, convulsions, paralysis and respiratory failure resulting in death.

Depending on the frequency of the full body washings administered at MGO’s, a canine hair conditioner should be applied to the coat to prevent drying the hair and skin.

As soon as practical, the service dog should be assessed by the Department’s contract veterinarian.
MINIMUM SUGGESTED PROTOCOLS FOR MARIHUANA GROW OPERATION SUPPORT

The following is a suggested starting point for operational protocols when assisting the Police with Marihuana grow operation investigation. In no way should these suggested protocols supersede or replace existing procedures without a thorough evaluation. All local, regional and provincial Occupational Health & Safety protocols and regulations must be maintained.

- Police agency serves a search warrant, secures the scene and deals with persons present in the premises.

- If possible, provide a portable air monitor to the first entry team to alert them of dangerous atmospheres. Observe and record ‘peaks’ upon exit.

- Don protective clothing and equipment as necessary.

- Establish a personnel accountability system as required.

- Proceed to monitor the interior atmosphere. Note changes in oxygen concentration between the ambient air outside and the interior.

- Never touch any equipment, light switches, or move objects until the scene is completely secured by police investigators.

- Observe for running CO₂ generators and furnace/hot water tank flue disconnects and fuel sources, investigate fuel source and consult with police investigators before shutting anything off.

- Observe for air handling systems, moisture build-up in walls and attic spaces and mold growth on interior walls and attic surfaces.

- Provide an assessment of the air quality inside the structure to the police investigators. Advise if ventilation is required before work inside may begin.

- Advise the police investigators of the necessary PPE (clothing and respiratory) required to safely conduct operations inside the premises.

- Complete Decontamination procedures on all personnel exiting the premises as necessary.

- Decontaminate all equipment, shower and change to a clean uniform back at the station as required.
SYNTHETIC DRUG MANUFACTURING OPERATIONS

(CLAN LABS)
SYNTHETIC DRUG MANUFACTURING OPERATIONS

BACKGROUND

There are literally hundreds of synthetic drugs on the market that are either locally made or imported from the USA and Mexico. The manufacture of illicit chemical or designer drugs, specifically methamphetamine, has extended well beyond the realms of well-funded organized criminal organizations into the local community through unorganized drug manufacturing labs. The dramatic increase of such labs in the U.S.A. has spilled over into Canada especially into the lower mainland of British Columbia and now South, Central and Northern Alberta. The latest trend at the time of publication is the movement of clan labs out of the cities and into more rural regions.

In 2002, there were 80,000 drug labs discovered in the United States. Washington State alone accounted for 1,470 drug labs, a huge increase from the 50 that were found in 1997. The Vancouver Sun newspaper published an article reporting 40 clan labs were discovered in the Greater Vancouver area in 2002, while there were no known sites just four years prior! [3]

This manual will focus primarily on the drug called methamphetamine, also known as meth, speed, crank, chalk, or zip. The process of manufacturing this drug is now easier and more accessible than ever and can be easily ‘cooked-up’ by anyone in a makeshift hidden lab virtually anywhere. There are literally thousands of recipes available over the Internet.

It is important to remember that in many labs, particularly those in residences, children reside on the premises. Although the scene is a crime scene and the children will be under the authority of the police, there are things that must be done by first responders. These children require special care and consideration. Please refer to Appendix B, at the rear of this package for Alberta Children’s Services recommended procedures.

The drug can be made with inexpensive over the counter medications and chemicals to produce thousands of dollars worth of methamphetamine. Over the counter cold and asthma medications, ephedrine or pseudoephedrine, red phosphorous, hydrochloric acid, drain cleaner, battery acid, lantern fuel and antifreeze are the most commonly used chemicals to produce it. The drug is most commonly used by:

- teenagers and young people in their 20’s-30’s,
- individuals with either blue or white collared backgrounds, and
- the unemployed.
Numerous additional drugs can also be synthesized. Some examples include:

- Cocaine base (Crack, rock)
- Crystal methamphetamine or Ice (a central nervous system stimulant chemically processed from methamphetamine). [4]
- Ecstasy or MDMA (Methylenedioxymethamphetamine), a hallucinogen class drug, more toxic than Amphetamines. [5]
- GHB (Gamma-hydroxybutyrate) a central nervous system depressant. [4]
- MPPP (synthetic Heroin), an opiate class drug that may contain a toxic impurity

**DEFINITION**

The very nature of clandestine synthetic drug manufacturing operations should lead the incident commander to determine that the incident be treated as a significant hazardous materials event. The on-scene incident commander must conduct a thorough size-up to determine if the scene also meets the criteria defining a confined space. The *Alberta Occupational Health and Safety Act*, Occupational Health and Safety Code, Part 5, Confined Spaces, carefully outlines the requirements that must be followed if the incident meets the definition of a confined space.

“Confined space” means an enclosed or partially enclosed space that is not designed or intended for continuous human occupancy with a restricted means of entry or exit and may become hazardous to a worker entering it because

(a) of its design, construction, location or atmosphere,
(b) of the work activities, materials or substances in it,
(c) the provision of first aid, evacuation, rescue or other emergency response service is compromised, or
(d) of other hazards relating to it;

ASSOCIATED REQUIREMENTS

1. Occupational Health and Safety (OH&S) Regulations pertaining to a confined space incident require the incident Commander to prepare an emergency evacuation and response plan including steps to potentially rescue a worker inside the confined space.

2. OH&S Regulations also require the testing of the atmosphere prior to entering the confined space:

   “Before entering a confined space that may contain a hazardous atmosphere e.g. Oxygen deficient or containing toxic or explosive substances, pre-entry atmospheric testing must be done to ensure that levels of oxygen are adequate and that any hazardous substance is identified... Competent workers must conduct the testing with suitable test equipment that has been properly calibrated and is used in accordance with the manufacturer's specifications.”

Information regarding the use of on-site multi-gas, hand-held monitors has been provided in the Air Monitoring sections of this manual (pages 30 & 61).

Current Alberta regulations require the implementation of a site safety permit to track persons entering the confined space. The permit is to be completed by a Company Officer at the scene and a copy of the record maintained on file. A sample of a 'confined space entry permit' follows in appendix A.

In the event a member is exposed to a chemical, injured or contaminated during the course of duties, the Department’s administration must ensure all applicable regulations as set forth by the codes are followed.

For more detailed analysis of what a confined space may be and the considerations that must be followed, as well as other OH&S requirements, please refer to the Alberta Human Resources and Employment website at http://www3.gov.ab.ca/hre/index.asp.
PHYSIOLOGICAL EFFECTS OF METHAMPHETAMINE

Methamphetamine is a very addictive stimulant drug that works directly on the brain and spinal cord (central nervous system) by interfering with normal nerve transmission.

It can be taken orally, snorted, smoked or injected. Users experience an intense sensation called a ‘rush’ or a ‘flash’ lasting several minutes that can be described as extremely pleasurable. An increase in energy and alertness, heart rate, blood pressure, body temperature and rate of breathing may persist for over six hours. Pupils may become dilated and frequently users experience hyperactivity, euphoria, tremors, and violent behaviour. [5]

Chronic abuse leads to anxiety, insomnia, hallucinations, schizophrenia characterized as paranoia and delusions. The methamphetamine affects the release of Dopamine in the brain and its effects may last twelve hours or more. Complications of use may include convulsions, stroke, cardiac arrhythmia (irregular heart rhythms), stomach cramps and shaking. [6]

Chronic users are often characterized as having poor hygiene, a pale complexion, and often exhibit open sores from scratching at “crank bugs”.

A frequent delusion is that bugs are crawling under the surface of the skin.
The drug Methamphetamine has often been described as very addictive. Many documents refer to a study conducted in the early 1990’s that places Methamphetamine near the top of the list, as compared to other available street drugs [10]. The study asked drug use experts to rank on a scale of 0-100 (100 is most addictive), how addictive they felt each drug was compared to the other. It’s interesting to see Nicotine at the top of the list.

<table>
<thead>
<tr>
<th>Drug (intake method)</th>
<th>Ranking out of 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine</td>
<td>100</td>
</tr>
<tr>
<td>Ice*, (Methamphetamine smoked)</td>
<td>99</td>
</tr>
<tr>
<td>Crack Cocaine</td>
<td>98</td>
</tr>
<tr>
<td>Crystal Meth*, (Methamphetamine injected)</td>
<td>93</td>
</tr>
<tr>
<td>Valium (Diazepam)</td>
<td>85</td>
</tr>
<tr>
<td>Alcohol</td>
<td>81</td>
</tr>
<tr>
<td>Heroin</td>
<td>80</td>
</tr>
<tr>
<td>Crank*, (Methamphetamine taken nasally)</td>
<td>78</td>
</tr>
<tr>
<td>Cocaine</td>
<td>72</td>
</tr>
<tr>
<td>Caffeine</td>
<td>68</td>
</tr>
<tr>
<td>PCP, Phencyclidine</td>
<td>57</td>
</tr>
<tr>
<td>Marijuana</td>
<td>21</td>
</tr>
<tr>
<td>Ecstasy (MDMA)</td>
<td>20</td>
</tr>
<tr>
<td>LSD</td>
<td>18</td>
</tr>
</tbody>
</table>

* Note there are regional variations in the names for Methamphetamine and the method of intake or application.

An example of addiction.

Someone’s curio cabinet or end table displaying religious ornaments and clearly sentimental objects of perhaps their child, a heart shaped keepsake container, and right in the middle – a Meth pipe.
EXTERNAL INDICATORS OF A CLANDESTINE DRUG LAB

The presence of a clandestine drug lab can quickly be identified by the presence of strong chemical odours like ether, vinegar, urine and ammonia, or the presence of laboratory equipment (beakers, flasks, funnels), makeshift ventilation pipes protruding from the structure, fortification bars and discarded and usually improperly labelled chemical containers.

**Ammonia-like Odour**
A sharp irritating odour associated with glass cleaners, cattle feed lots and fertilizers. Eye and nasal irritation may result.

**Ether-like Odour**
Aromatic sweet odour often accompanied by a sweet taste, often described as a “hospital” type of odour. Nasal irritation may result.

**Solvent-like Odour**
Sweet odour from common solvents like paint thinner, paint strippers, adhesives, and cleaning fluids; type of odour found in an auto body or furniture finishing shop.

**Vinegar-like Odour**
Typically pungent, acrid, or sour odour associated with vinegar. Eye irritation may result.

**Coffee Filters**
The presence of coffee filters with a purple or burgundy stain is a strong indicator of a lab site. These may have enough Red Phosphorous trapped in the filter media that slight friction will ignite the material.

**Plastic Garbage Bags Piled Around the House And On The Premises**
Most “cooks” do not want to dispose of the chemical wastes in the regular domestic garbage pick-up system for fear of being discovered.

**Chemicals and Waste**
 Dumped in back alleys, dumpsters, parks and ravines. Plastic garbage bags full of lab manufacturing waste are called “death bags” in the US. Be aware of plastic 2 Litre soda bottles filled with manufacturing waste being dumped into the normal household trash, or discarded in an unusual manner. A civic sanitation worker picking up domestic trash may easily be exposed when the hopper of the truck is cycled. The hidden containers are crushed, spraying or dousing the operator with potentially toxic liquid.
COMMON LAB SET-UPS FOR METHAMPHETAMINE MANUFACTURE

While there are numerous methods used to produce Methamphetamine, only two of the more common processes will be briefly examined.

**Anhydrous Ammonia Lab**

An Ammonia method lab, also known as the “Nazi”, “Sodium”, or “Birch Reduction” method, utilizes a reaction of ephedrine (an over-the-counter medicine) with lithium or sodium metals and anhydrous Ammonia. This method has some unique associated hazards.

The extraction and electroplating of either of these two metals in the caustic solution of anhydrous ammonia *creates extreme chemical hazards*. Lithium and sodium metals react violently with water and form explosive hydrogen gas.

Additionally, the anhydrous ammonia used in this process has been found to be stored in just about any kind of vessel capable of holding a pressurized liquid. These include but are not limited to propane cylinders, butane torch bottles, oxygen, acetylene, nitrogen and any other pressurized gas cylinder. The anhydrous ammonia corrodes the brass valves and fittings and will eventually cause the product to release through container failure. The presence of bluish green corrosion on the brass fittings is a strong indication of incorrect container usage. Do not attempt to move or otherwise deal with the container until a thorough assessment of the vessel has been completed.

Heavy build-up of blue green corrosion on the brass valve of a propane cylinder. This is an obvious indication of incorrect storage of materials in the cylinder.

The corrosion will damage the internal mechanism on the valve, such that if you opened the valve, you may not get it closed again.
The brass valve has failed at the threaded connection to the top of the cylinder, likely from corrosion caused by the storage of anhydrous ammonia in this propane cylinder.

The Ammonia corrodes the internal threads weakening the valve body to the point of failure.

The following photos illustrate examples of makeshift valves and adapters threaded into the top of ordinary 20 pound BBQ Propane cylinders.

This should be a ‘red flag’ for any first responder.

The makeshift valve, threaded pipe and duct tape attached to this 20-lb. Propane cylinder indicates this is used for something other than a barbeque.

If you decide to open the valve “just to see what’s inside”, be prepared to deal with the entire contents. The corroded valve may not close once you open it. Even worse, the valve may come off in your hand.
Another close-up photo of a makeshift valve on the top of a Propane cylinder.

The brass valve on the top of this industrial gas cylinder (left) clearly shows the characteristic blue-green corrosion from the anhydrous Ammonia.

Nearly any kind of container capable of holding a liquid under pressure has been used to transport and store anhydrous Ammonia. Be very careful if you suspect Ammonia under pressure.
Other containers

This 2½ gallon stored pressure fire extinguisher was found to contain Anhydrous Ammonia.

Note the blue-green salt formation around the neck of the cylinder, caused by the corrosive action of the Ammonia reacting with the stainless steel alloy.

Here’s a closer view of the valve and pressure gauge. Initially the face of the gauge was clear and legible, then over a period of time, became faded and turned black.
**Red Phosphorous Lab**

The “Red Phosphorous” lab, also called the Red P, tweaker or Mexican National lab, utilizes a reaction of ephedrine in hydriotic acid and red phosphorous.

*Note: Red phosphorus is easily ignited by friction, such as moving furniture across a carpet or a door slamming open.*

The main reaction involves cooking (refluxing) the ephedrine in hydriotic acid with the addition of red phosphorous usually in either:
- a large round bottom glass flask on a heating mantle; or
- in a triangular shaped Erlenmeyer flask on a heating element or stove.

*Bold Note*

*See further dangers of red phosphorous in the Chemical Precursor section following.*
What appears to be a messy kitchen is really a meth lab that caused a small fire. [41]

A round bottom flask sitting on a single burner hotplate. Note the hose fastened to the top used for vapour extraction/exhaust. [42]

Mason jars on a camp stove have also been found. Devices utilized are limited only by the imagination or desperation of the cook/user. There is usually a vent line or tube leading from the top of the reaction vessel allowing the toxic fumes to be exhausted outside. Along with the production of toxic hydrogen iodide acid vapour, the deadly pulmonary irritant phosphine gas is also a by-product of the reaction.

NOTE: Because of the deadly nature of Phosphine gas, it will be discussed in more detail in another section of this manual (page 66).

Further to this, when the reaction vessel overheats, red phosphorous may be converted to either the yellow or white elemental form of phosphorous. This creates an extreme or
highly flammable fire hazard.

In a closed space, an **oxygen deficient atmosphere** may also result from the reaction. Depending on the stage of decomposition in the reaction vessel, a highly toxic irritating and corrosive phosgene gas will also be produced.

**Do not attempt to stop or neutralize the reaction without consulting a qualified chemist, trained police investigator or qualified hazardous materials technician or specialist.**

Large round bottom flask sitting in a heating mantle. Note the very small vapour extraction hose protruding from the side of the flask. There appears to be duct tape sealing the open necks of the flask in the photo. [43]
Several large round bottom flasks sitting on heating elements.

The red phosphorous solution is clearly visible boiling inside.

Note the group of round bottom flasks sitting in heating mantles. The vapour exhaust hoses are clearly visible extending from the top of the vessels.

Note what appear to be half face cartridge respirators on the top of the heater/air conditioner in the rear of the patio.
A basement converted to a methamphetamine production lab.

Note the air extraction duct suspended from the ceiling.

Use caution when moving kitchen appliances during overhaul operations after a fire. The top freezer portion of this refrigerator was filled with various chemicals and mixtures – presumably related to drug manufacturing.
Common Production Equipment

The type of equipment used to synthesize the desired products is limited only by the availability and the imagination of the ‘cook’. It is important to remember that much of the “clan lab” equipment first responders will encounter will consist of cooking pans, pie plates, food containers, glass jars and bits of plastic tubing all held together with duct tape. Some samples follow.

Glass jars with precipitate in the bottom may be a common indication of a solvent extraction process.

A jar with two phase liquids – looks like cooking oil and water – may also indicate an extraction process.

Any type of container with a makeshift plastic tube fixed to the top is usually an acid gas generating device.

Immediate dangers to first responders investigating this device are any liquid acids remaining in the container, and residual acid gas that may escape from the contraption.
Common Lab Equipment and Glassware Examples

Manufacturing and production equipment encountered may also include more sophisticated laboratory equipment. The following are some of the more common items required in the synthesis of designer drugs.

**Heating Mantle**
Designed to hold a round bottom flask and heat it to a desired temperature.

**Round Bottom Flask**
Typically a clear glass vessel with a round bottom. Various sizes. Requires a stand or base to sit in.

**Separatory Funnel**
May be glass or plastic. Used to separate liquids of different density and/or precipitate crystals.
Beakers ⇒
Glass or plastic, used to hold liquids, may also be used for a reaction vessel of sorts.

Buchner or Filter Funnels
Used to hold a filter paper to collect crystals or other material when a liquid slurry or solution is poured through the device.

Filter Flask ⇒
An Erlenmeyer flask with a hose barb or tube attachment to the side. When the tube is hooked up to a water faucet attachment, a vacuum is created inside the flask – used with a filter funnel to clean crystals.
Rotary Vacuum Evaporator
This device allows solvents to be heated, evaporated, then condensed and collected in a sealed system. The bottom unit is a water bath heater. The evaporating solvent is recovered in the condenser column above it and routed to an attached container for collection and re-use.

Attached glassware may be under vacuum.

Crystallized product may be present in and on the equipment. There will usually be a cooling liquid such as tap water, plumbed to the condensing unit.
Other Sources of Chemical Contamination

Chemical Wastes from a clandestine manufacturing operation may end up in the most unlikely places. Dumped in a rear alley, public parks and open spaces are common spots for illegal disposal.

Do you have a place where the public can drop off unwanted household chemicals for proper disposal?

Do you assist with the sorting or unloading of these products? What happens when someone moves out of a rental property and leaves behind all the residual and chemical waste? A person cleaning up the property may bring the products to the public chemical drop-off.

Check-out the brown glass 1-gal bottle. Some photography buff getting rid of old developer? What’s in the paint thinner bottle? Is there blue-green corrosion on the brass valve of the Propane tank?
SUGGESTED MINIMUM EQUIPMENT REQUIRED
FOR CLAN LAB SUPPORT

The following equipment list is by no means all-inclusive, and does not replace any requirements set forth by the local jurisdictional authority. In all cases local guidelines and procedures addressing Provincial and Federal regulations should be consulted before procuring a stock of equipment. Appropriate training for any instrument should also be considered prior to its placement into service.

- Confined space entry permit and personnel control systems as required.
- Basic air monitoring instrument, four-gas (or more) detector capable of displaying carbon monoxide, oxygen, combustible gas and phosphine concentrations, ammonia and acid gas are also advisable. Consult your instrument manufacturer.
- SCBA for all persons working in the premises.
- Chemical protective suits, ‘Level A’ required until a thorough assessment of the atmosphere and chemical contamination has been performed. Be aware of the potential flammability hazard as well.
- Suitable over-gloves for external hand protection.
- Chemical resistant high-top rubber boots.
- Plastic bag for containment and disposal of PPE after leaving the premises.
- Complete decontamination team and all necessary equipment and supplies.
- Fire suppression and rescue capability on scene.
BASIC AIR MONITORING INSTRUMENTS

First responder crews and any crew conducting operations inside either a methamphetamine or other clandestine drug manufacturing operation must be equipped with a basic air-monitoring instrument. If the production process is for methamphetamine, then a primary concern will be the potential for toxic phosphine gas from a red phosphorous cooker.

An ammonia detection-capable monitor will be an advantage in the event the anhydrous ammonia method is the reaction process encountered. Other acids may also be present in the atmosphere and some method for measuring acid gases should be considered. There is also the ever-present danger of flammable vapours, thereby requiring a monitor with combustible gas indicator capabilities or Lower Explosive Limit (LEL) sensors. Since the manufacturing premises may be enclosed and have poor ventilation, an oxygen sensor should also be standard on the monitor.

The most basic atmospheric monitoring equipment is a three-gas handheld detector with oxygen, carbon monoxide and an LEL sensor. Anyone conducting a basic air quality survey in the presence of a clandestine drug manufacturing operation should be equipped with some of the more specific gas sensors such as, Ammonia, Phosphine and Hydrogen chloride. There are more complex instrument versions that can be configured for five- and six-gas detection depending on the specific requirement.

The Industrial Scientific Instruments ITX (far left) can be configured to detect up to six gases. The model shown has five sensors in operation: phosphine (PH₃), ammonia (NH₃), hydrogen chloride (HCL), oxygen (O₂) and a combustible gas sensor (LEL).

B.W. Technologies Inc. manufactures a four-gas monitor incorporating CO, H₂S, LEL and O₂ (left). Other sensors may be added depending on requirements.

In the event a fire crew is asked by a police unit to provide some air monitoring investigation prior to actually opening the door, there must be capability to actively draw an air sample from the interior. The addition of an air pump and sensor cover attached to a portable detector will provide the ability to sample from behind a closed door. A small diameter flexible hose is passed around the perimeter of the doorframe and can be inserted through a crack or mail slot to access the interior airspace.
On the right is an example of a remote sampling air pump from B.W. Technologies Inc.

A small battery powered unit connects in-line with the detector or monitor.

Another example is the Industrial Scientific ITX that fits directly into a receiver on the air sample pump and becomes one unit. The pump operates from the monitor’s onboard power supply.

Remember, after completion of air monitoring survey, always follow the manufacturer’s maintenance instructions for the particular instrument. If the detector has been exposed in a toxic or corrosive environment, bump test or calibrate the instrument to ensure proper function. Proper maintenance is critical for the safety of future operations.
ASSOCIATED DANGERS WITH METHAMPHETAMINE LABS

AWARENESS OF THE HAZARDS AS A FIRST RESPONDER

A chemical manufacturing lab represents several immediate threats to the personal safety of the on-site firefighter because of the toxic atmosphere that may be present. While full PPE and SCBA may provide some protection, it is limited. Structural firefighting gear is not designed to provide protection for chemical exposures, liquid or vapour. Some chemicals present in chemical manufacturing labs may rapidly degrade the PBI/Kevlar® synthetic fibres used in fire fighter gear. [9]

Clan labs are usually either neat and organized or messy. In the tidy lab, the chemist is manufacturing the product for others. The setup will include laboratory style glassware, beakers, condensers and tidy chemical storage. The final product will be nicely pressed into pills and neatly packaged for distribution.

The other and more predominant style will be messy and potentially create obvious hazards. Chemical waste will be stored in soda pop bottles, food containers, mason jars or other container. There will be discarded chemical storage containers, dirty glassware and residue everywhere. Once the cook becomes addicted to the drug the only thing that matters is the final product. Over time the chemical induced paranoia becomes worse and literally nothing will get thrown out.

Crews attending a structural fire or medical call at such a facility must use extreme caution and wear full personal protective equipment (PPE) including SCBA. First responding units need to be observant and cautious of any smoke or flame with different colours or density than “typical” fires. Upon discovery that a fire is the result of a drug-manufacturing lab, the Incident Commander must consider defensive actions to reduce or minimize the dangers to firefighters. If not already on scene, the Police should be notified right away.

Crews fighting a fire in a suspected lab will require thorough decontamination before returning to the pumper. If the incident involves an active manufacturing lab, then additionally any medical patient either found at the scene or requiring assistance should be decontaminated prior to being transported in an ambulance.

Caution must be taken to ensure chemical contamination is not taken back to either the station or to the homes of responders at the end of the shift. The pump crew is an essential component of the control and clean-up process that will follow. The risk of fire and chemical exposure will remain very high throughout the incident, including through the crime scene investigation and subsequent dismantling of the lab.
DANGEROUS CHEMICAL PRECURSORS AND WASTE PRODUCTS

There are more than two hundred individual chemical compounds that can be used to manufacture methamphetamine and other synthetic drugs. Some of these are listed below and grouped according to their function in the reaction process.

For every kilogram of methamphetamine produced, 11 to 13 kilograms of toxic chemical waste is created. *(Amounts vary depending on method of synthesis).*

**Precursors (basic compounds used to make methamphetamine)**
- Cold or nasal decongestant tablets containing amphetamines
- Ephedrine – white crystals
- Pseudoephedrine – white crystalline material
- Phenyl-2-propanone, clear, moderately viscous liquid

**Acids**
- Acetic acid – colourless, corrosive clear liquid, pungent vinegar like odour, flammable
- Hydriotic acid – colourless corrosive liquid
- Hydrochloric acid – clear corrosive liquid, may be yellowish in colour.
- Sulphuric acid – clear, colourless, corrosive liquid, very heavy, may be present in a hydrogen chloride gas generator (container with a short hose fastened to the top).

**Other Reagents**
- Anhydrous Ammonia – Caution: may be in unusual container, such as a 20 lb propane barbeque cylinder, oxygen tanks, welding gas tanks, air compressor tanks. Obvious clue will be a greenish blue corrosion on any exposed brass valve or fitting. *Use extreme caution.*
- Red Phosphorous – red/burgundy fine powder. Produces lethal phosphine gas on heating. May be recovered from road flares, matchbook covers, or other pyrotechnics. *Use extreme caution.* When heated, red phosphorous converts to the yellow and/or white elemental form of phosphorous, which are self-igniting in air. Red phosphorous is *very unstable* and the slightest amount of friction (boots walking on carpet) *will ignite the material.* This may result in a fire you are unable to fully extinguish. On combustion, red phosphorous produces large volumes of dense white smoke, comprised mainly of phosphorous pentoxide – which creates phosphoric acid on contact with water. Since the human respiratory passages are lined with a moist membrane – inhalation causes respiratory edema. *This is fatal without rapid medical intervention*
- Lithium, Magnesium and Sodium Metals – extremely reactive with water, spontaneous violent reaction when exposed to moisture in air
- Iodine – irritant, acrid purple crystals
- Methylamine – corrosive liquid, flammable under pressure, strong ammonia odour
- Phenyl Acetic Acid – white powder, very unpleasant odour
**Bases**
- **Sodium Hydroxide** – solid white beads or pre-mixed solution. Extremely corrosive. May also be used in the form of strong bases like drain cleaner granules

**Solvents**
- **Acetone** – volatile flammable clear liquid
- **Benzene** – clear, colourless liquid, volatile, flammable/explosive, carcinogenic
- **Chloroform** – clear volatile liquid
- **Camp fuel** – Naphtha, white gas
- **Ethanol (denatured alcohol)** – flammable liquid
- **Ethyl Ether** – volatile flammable liquid
- **Hexane** – clear, colourless flammable liquid
- **Isopropyl Alcohol** (rubbing alcohol)
- **Lacquer thinner** – clear volatile, flammable liquid
- **Nitroethane** – oily liquid, pleasant odour
- **Tetrahydrofuran** – toxic, flammable solvent

**By-Products of the Reaction And Processes**
- **Phosphine** - toxic gas, heavier than air
- **Phosgene** - toxic gas, heavier than air
- **Ammonium Acetate** – crystals are explosive, solution is toxic and flammable
Phosphine Gas - Chemical and Physical Properties

Note: Often, when a ‘meth cook’ is found dead next to his chemistry set, the death is found to be the result of phosphine exposure

Chemical formula: \( \text{PH}_3 \)

Synonyms: There is no ISO common name for Phosphine.
C.A.S. No. 7803-51-2

Toxicology data [8]

- OSHA PEL 0.3 ppm 8 hour TWA
- STEL (15 minutes) 1 ppm
- IDLH 50ppm

Phosphine gas causes olfactory fatigue, which is the inability to detect an odour following exposure (similar to \( \text{H}_2\text{S}, \) hydrogen sulphide) [7]. The more that is inhaled, the less it is smelled. Exposure to intermittent low concentrations of 0.08 – 0.3ppm have been associated with headaches. Higher exposure concentrations of 0.4 – 35ppm have been linked to the following symptoms: diarrhea, nausea, tightness of the chest and associated breathing difficulty, headaches, dizziness, skin irritation,

**Phosphine is actually odourless in its purest form, at least up to a concentration of approximately 200 ppm, a highly toxic level.** At elevated concentrations phosphine gas has a garlic-like odour, is highly flammable and toxic by inhalation. When inhaled, phosphine reacts to form phosphoric acid, which will cause blistering and edema of the lung tissue. The onset of serious symptoms may take several hours but is expected to be debilitating or **fatal without rapid medical intervention.**

If it does have an odour at lower concentrations, it is because of the presence of odouriferous impurities in varying concentrations. The odour threshold is usually in the range 0.14 to 7.0 ppm. [8]

Pure Phosphine has an auto-ignition temperature of 38°C. However, in the **presence of other derivatives**: phosphorus hydrides, particularly diphosphine (\( \text{P}_2\text{H}_4 \)) - as impurities, it **will often ignite spontaneously at room temperature.** [8]

Phosphine forms explosive mixtures with air at concentrations greater than 1.8%. [8]
BOOBY TRAPS & ANTI-THEFT DEVICES

The nature of a drug operation often triggers desperate measures by its members. As the chemically induced paranoia increases in those running the illicit operation, so too does the likelihood of first responders encountering antipersonnel devices or booby traps. These may include trip wires connected to alarms, explosive devices or other toxic chemicals.

The goal of this section of the manual is to increase personal awareness of emerging trends in encountering antipersonnel devices. If during the initial assessment of the building suspicions are aroused regarding any possibility of a clandestine drug lab behind closed-doors, call for assistance before opening the door. Some examples as to why are given below.

During 2002 in the British Columbia lower mainland, a pump crew was asked to attend a clan lab scene with the local Police Emergency Response Team. Their function was to provide fire safety, back-up and decontamination. After the scene was considered secure, a small object was observed protruding from the wall behind the entry door in an unnatural fashion. Further investigation revealed a military hand grenade with a crude trip wire. The device was armed and live, but luckily failed to explode on opening the door.

Other examples encountered include:

- Light switches, refrigerators, VCRs or other electrical appliances wired to explosive devices.
- Buried wooden planks with nails or spikes protruding upwards.
- Light bulbs partially filled with gasoline or other flammable liquid.

Never turn on or off a light switch, appliance or other electrical device in the premises.

There has been some anecdotal information about small improvised explosive devices designed to maim and injure investigators. The following reference describes these devices.

“The Arizona Dept. of Public Safety reported that aluminium foil-wrapped “mini-bombs” were discovered during several drug seizures. The foil was wrapped tightly around a mixture of chemicals, which were extremely sensitive to heat, shock, and friction. The round balls or ‘droppers’ ranged in size from a marble to a baseball and resemble foil-wrapped drugs. The Department of Public Safety reported that attempts to unwrap the foil resulted in explosions blowing off fingertips, and dropping the bombs caused detonation.” [9]
The type of equipment used to synthesize the desired products is limited only by the availability and the imagination of the ‘cook’. Some examples of confiscated equipment follow.

Materials required for manufacturing methamphetamine can be easily stored in a small back-pack or picnic cooler.

This was possibly a “conversion” process to change methamphetamine into “Crystal Meth”

An investigator carefully inspects an assortment of glassware and chemicals easily concealed in a back-pack.
A larger red phosphorous cook in progress. The acid solution with “Red P” and precursors is slowly refluxing in the round bottom flasks. The silver container they sit in the heating mantle.

Note the hoses used for toxic vapour extrication taped to the top of the flasks.

A small pill box with what appears to be completed methamphetamine crystals in plastic bags. This was found in the backpack in photo 61 on the previous page.

Investigators prepare to open a van where glassware and chemical containers were visible on the front seat. The chemical protective clothing, over-gloves, and full SCBA are mandatory as there is no way to thoroughly assess the air quality or chemical contamination that may be present inside the vehicle.
The van's interior was a mess of clothing, blankets, chemicals, sharps, and broken glassware creating serious risks to investigators. Precursors and completed product were found inside.

The assortment of chemicals, glassware and finished product found in the van's interior.

From the van's interior, an open top Erlenmeyer flask with what appears to be finished methamphetamine crystals.

Anyone that may have come into contact with the product during the course of routine duties was at serious risk of chemical/drug exposure if not properly protected.
The surface contamination inside a drug manufacturing lab has been studied in detail by Dr. J. Martyny of the National Jewish Medical and Research Center. Using similar techniques often encountered in a clandestine Meth lab, Dr. Martyny’s group “cooked” Methamphetamine in buildings condemned for destruction. Atmospheric monitoring was performed during the cook, and surfaces were swabbed and tested afterwards for chemical contamination [11].

1 microgram (µg) is equal to one millionth of a gram

\[1 \mu g = 0.000,001 g\]

In the controlled labs, chemical contamination evident throughout the premises included Phosphine, Iodine, hydrochloric acid and Ammonia, and was somewhat dependant on the production method and specific precursors used. Methamphetamine contamination was determined as high as 5,000µg/100cm². Methamphetamine contamination was also found in forced air ventilation ducts, suggesting Meth can become airborne [11]. This was later confirmed by the analysis of a simulated Methamphetamine smoke session [12]. The contamination was evident on both walls and floors. Simply entering a clandestine drug lab – “just to have a look around” – will contaminate footwear and create a secondary contamination problem through product transfer.

Several US states have enacted legislation establishing contamination standards to which a property previously used as a Methamphetamine drug lab must meet upon rehabilitation. For example, Montana [13] and Washington state [14] have set a standard of \(\leq 0.1 \mu g/100cm^2\). That means less than 0.1 microgram per 100 square centimetres test area.

At one of the clandestine drug lab scenes studied by Dr. Martyny’s research group, a teddy bear (right) was observed. The outer layer of clothing was found to have Methamphetamine contamination of 3100µg/100cm². The inner layer of the teddy bear had 2100µg/100cm² of Methamphetamine.

Given these determinations, it is not possible to allow a young child to take their favourite teddy bear or toy with them upon removal from the premises.

These findings support the concept that anyone removed from a clandestine drug manufacturing lab, should be decontaminated prior to transport from the scene.
DECONTAMINATION

Any operation into or in support of a suspected drug manufacturing operation must have several key components in place prior to conducting the investigation. In the event the operation is found by chance or during other routine duties, the same key components must be brought into place as soon as practical. In most situations the fire service is requested by the local Police investigation unit to provide back-up, air monitoring, decontamination and fire suppression stand-by services to the members conducting the operation.

Entry teams should be wearing full SCBA, chemical protective clothing, gloves, boots and have a decontamination system in place. After atmospheric monitoring has determined the working environment safe, then SCBA may be downgraded to appropriate full-face respirators with appropriate filters for the potential toxic chemicals present. There should be back-up personnel ready to effect a rescue if necessary. A fire suppression team should be standing-by in the event a fire erupts or other rescue is required.

A decontamination team with associated equipment should be available to remove any possible chemical contamination prior to anyone returning to a vehicle or place of employment. This can be as sophisticated as a dedicated mobile self-contained decontamination trailer/unit, or as simple as a two-person team with a hose from a fire pump, scrub brushes, appropriate decontamination or cleaning products, and an inflatable 'kiddie pool' for run-off containment. A Hazardous Materials Technician, Specialist or other chemistry resource should be consulted for appropriate decontamination solutions and procedures. Wastewater from the decontamination process must be disposed of appropriately as per local and provincial procedures/guidelines.

All gear should be thoroughly cleaned and inspected prior to return to service. At all costs, avoid cross contamination to other vehicles and the station.

Rapid Decontamination by a Pump Crew

If a Hazardous Materials Response team attends a “Clan Lab” incident, they will almost always have the necessary equipment for a thorough decontamination line. There may be times when a pump crew is first on scene and someone at the incident requires decontamination. A simple kit (photo next page) can be assembled and stored on the fire pump that can be rapidly deployed at the incident. This is not to be mistaken as a rapidly deployed, low budget Hazmat team in a bucket.

The pump crew opens the kit, someone inflates the pool (truck’s air supply or SCBA cylinder adapter). The pump operator engages the fire pump and connects the forestry hose to a discharge using the required adapters. The contaminated person stands in the inflated pool to contain the run-off and the garden wand spray applicator is used to apply a soft yet copious flow of water. As necessary, use the scrub brush and soap to remove the chemicals as thoroughly as possible. Avoid scrubbing directly on skin. Ensure the person assisting with the washing is wearing adequate personal protective equipment. Follow with a clean water rinse.
Remove clothing from the top down as necessary. Make sure the person does not touch any part of the body until thoroughly washed. If applicable, the SCBA face-piece is the last item removed. A medical assessment may be necessary following any chemical contact and subsequent decontamination.

**Compact Decon Kit**

1. 20 Litre plastic pail with removable lid
2. 15m length of 25mm forestry hose
3. 38mm female to 25mm male adapter
65mm female to 38mm male adapter
4. garden wand/spray head water applicator (disassembled to fit in the pail)
5. small inflatable kiddie pool (five or six feet diameter)
6. length coiled air line with hand valve and quick connect to fit truck’s air supply (used to inflate the kiddie pool quickly)
7. Pressure regulator to connect air hose to SCBA cylinder
8. Soap for washing, (small box of powdered laundry detergent)
9. long handle scrub brush, or similar item
SUGGESTED PROTOCOLS FOR CLAN LAB SUPPORT OPERATIONS

The need for full co-operation between all authorities is critical for a successful operation. The following is a suggested starting point for operational protocols when assisting the police with a clandestine drug operation investigation. In no way should the protocols provided here replace existing procedures without a thorough evaluation. All regional and provincial regulations must be maintained.

- The incident is a crime scene and falls under the jurisdiction of the local police authority.
- **Coordinate with the police** agency prior to conducting support operations. Discuss levels of respiratory protection, chemical protective clothing, decontamination, fire suppression and environmental monitoring required.
- Have all sectors in place and ready for deployment prior to operations.
- If possible, provide a monitor to the police entry team. Observe and record peaks on exit.
- Support the police investigators as necessary.
- Provide **air quality monitoring** of the premises and report observations to the investigators.
- **Never shut down a chemical reaction in progress.** If a qualified offensive-trained Haz-Mat Specialist is not available, and a trained chemist is not able to attend the scene in a timely manner, then consult with another specialist over the telephone. Describe clearly the nature of the reaction, vessel shapes, sizes, fluid colour, vapour present, heating underway, cooling hoses and any other equipment in the process. Also record the air monitoring results observed during the initial environmental survey. The police agency on scene should have a knowledgeable chemical contact.
- Provide **emergency back-up and rescue support** to the investigators during the initial phases of the operation.
- Provide **decontamination** to persons leaving the premises. Avoid cross contamination to any vehicles or equipment.
- Fire suppression may be necessary during the clean-up and dismantle phases of the operation.
- In all cases, **follow good Haz-Mat management principles** to avoid personal injury, identify and secure product containment, and prevent cross contamination.
Quick Reference Sheet

The following two pages are intended as a stand-alone quick reference sheet for use at a Clandestine Drug Lab Operation. The information was adapted from the Edmonton Emergency Response Department (Fire Department Hazardous Materials Unit) for general use.

This is a suggested starting point and you must adapt the information to suite your specific needs - including after-hours emergency contact phone numbers.

Note that many of the tasks described on the following pages are intended for trained Hazardous Materials Technicians and Specialists. Do not exceed your specific level of Hazmat response capability by trying to implement any or all of these procedures without the proper training and background.

Photo copy the two pages back to back for a single quick reference sheet. The page can be laminated for durability. *Put the originals back in the manual when you're done.*
HAZARDOUS GASES – COMMON TO METHAMPHETAMINE PRODUCTION

**Phosphine (PH$_3$)** – during the Red P cook, poor warning properties

**Iodine (I$_2$)** – used in the cooking stages, Red p method, poor warning

**Hydrogen Chloride (HCl)** – formed in a gas generator during the salting out or final stage of the Red P and Ammonia method.

**Ammonia (NH$_3$)** – Anhydrous Ammonia is used in the cold method, or Birch reduction along with Lithium and/or Sodium metal.

**DRUG LAB CHEMICAL USE**

- **Pseudoephedrine** – household cold medicines
- **Red Phosphorous** – match/flare striker plates, substitute with white phosphorous or hypophosphorous acid
- **Iodine** – may be extracted from tincture of iodine, or substituted with Hydriotic acid.
- **Hydrogen Peroxide** – to precipitate out Iodine in tincture
- **Hydrochloric acid** – Muriatic or pool acid, may be used with aluminum foil as HCl generator
- **Sulphuric acid** – drain cleaner, used with rock salt in HCl generator
- **Ammonia** – may be stored in Propane tanks, fire extinguishers, observe bluish-green corrosion on brass fittings.
- **Lithium** – stripped from batteries – water reactive metal, used in Ammonia lab.
- **Sodium** – separated from sodium hydroxide (lye) using electroplating apparatus.
- **Sodium hydroxide** – lye or drain cleaners.
- **Mercuric chloride** – fungicide, used with P2P to make Ecstasy and Meth.
- **Gammabutyrolactone (GBL)** – industrial strength cleaner & wax stripper, used in GHB production.

**ORGANIC SOLVENTS**

- **Isopropyl alcohol** (rubbing alcohol)
- **Camp fuel** (Hexanes)
- **Ether** (starting fluids)
- **Methanol** (gas line anti-freeze)
- **Acetone** (nail polish remover)
- **Ethanol** (denatured alcohol)
- **Trichloroethylene** (brake cleaner)
- **Paint thinners & mineral spirits**

**COMMON DETECTORS & INSTRUMENTATION**

<table>
<thead>
<tr>
<th>Device</th>
<th>Indicator &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH paper</td>
<td>acid/base indicator</td>
</tr>
<tr>
<td>Ammonia paper</td>
<td>presence of Ammonia</td>
</tr>
<tr>
<td>Spillfyter® strips</td>
<td>pH, hydrocarbon, Oxidizer</td>
</tr>
<tr>
<td>ITX (four gas)</td>
<td>Oxygen, LEL, CO, H$_2$S</td>
</tr>
<tr>
<td>ITX Clan Lab (five gas)</td>
<td>Oxygen, LEL, Ammonia, Phosphine, Hydrogen Chloride</td>
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<tr>
<td>Sapphire-IR</td>
<td>Volatile Organics &amp; Inorganics</td>
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<tr>
<td>PID</td>
<td>Volatile Organics, flammables</td>
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**EXPOSURE LIMITS**

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<tr>
<th>Chemical</th>
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<th>IDLH ppm</th>
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<tr>
<td>Acetic Acid</td>
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<td>50</td>
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<tr>
<td>Acetone</td>
<td>250</td>
<td>2,500</td>
</tr>
<tr>
<td>Ammonia</td>
<td>25</td>
<td>300</td>
</tr>
<tr>
<td>Chloroform</td>
<td>10</td>
<td>500</td>
</tr>
<tr>
<td>Ethanol</td>
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<td>3,300</td>
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<tr>
<td>Ethyl ether</td>
<td>400</td>
<td>1,900</td>
</tr>
<tr>
<td>Freon-13</td>
<td>1,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Hexane</td>
<td>50 skin</td>
<td>1,100</td>
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<tr>
<td>Hydrochloric acid</td>
<td>5 max.</td>
<td>50</td>
</tr>
<tr>
<td>Iodine</td>
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<tr>
<td>Isopropyl alcohol</td>
<td>400</td>
<td>2,000</td>
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<tr>
<td>Methanol</td>
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<td>6,000</td>
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<tr>
<td>Methylamine</td>
<td>5</td>
<td>100</td>
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<tr>
<td>Methyl ethyl ketone</td>
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<td>n/a</td>
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<tr>
<td>Nitroethane</td>
<td>100</td>
<td>1,000</td>
</tr>
<tr>
<td>Phosphine</td>
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<td>50</td>
</tr>
<tr>
<td>Thionyl chloride</td>
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<td>n/a</td>
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<tr>
<td>Toluene</td>
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<td>500</td>
</tr>
<tr>
<td>Xylene</td>
<td>100</td>
<td>900</td>
</tr>
</tbody>
</table>

**EXTREMELY CORROSIVE VAPOURS**:

- Red phosphorous, Hydrogen chloride
- Sodium hydroxide, Sulphuric acid
SUGGESTED GUIDELINES

- Note to pump crew, potential flammable and/or explosive atmosphere. Limited or restricted access, bunker gear will not provide adequate protection from chemical vapour hazards. Establish zones.
- In the initial size-up from recon crew, did we get a description of clan lab materials found? Examples; solvents, filter media stained red/purple, discoloured valve on Propane cylinder, fire extinguisher, discarded battery cases (AAA, AA, C, D), other indicators found?
- Consider exposures when ventilating, nearby residents may have to be evacuated due to toxic chemical hazard present
- Pump and crew standing by for fire suppression/rescue/decontamination.
- Wear full bunker gear until atmosphere safe from fire hazard – exterior only.
- Interior operations Level-B (atmosphere safe) chemical protective gloves, seams taped.
- Interior operations Level-C only when minimal hazards present – Police scene processing only.
- Hazardous Materials team on standby; two inside, two outside ready as back-up.
- Reinforce established scene zoning, exclusion, decontamination, support (uphill, up wind)
- Do not immediately disconnect electrical power, reactions in progress may require for stability.
- Consider anti-personnel devices or booby-traps, consider which doorway the residents used.
- Relay information to EMS regarding patient exposure, chemicals, etc.
- Consider starting the decontamination trailer as part of the initial response.

IMMEDIATE HAZARDS
- Flammable atmosphere
- Corrosive atmosphere
- Oxygen deficiency
- Toxic/IDLH atmospheres
- Water reactive materials
- Unstable/damaged containers
- Compressed gas cylinders
- Anti-personnel devices
- Incompatible chemicals
- Reactions in progress
- Hostile & irrational people

DECONTAMINATION PROCEDURES

Any patient or persons removed from a confirmed drug manufacturing lab are expected to be contaminated with either pre-cursor chemicals and/or completed product – treat accordingly.

Prior to transport in a Police car/van, all persons removed should have a warm decontamination shower at the scene to remove the contamination. Their clothing and personal effects should be sealed in a plastic bag and transported along with them.

Suitable clothing or disposable coveralls and booties must be provided. Depending on regional protocols, a uniformed Police Officer should escort them through the shower process to maintain continuity.

Children should be treated with extreme care and a Children’s’ Protective Services agency should be contacted immediately to deal with minors removed from the premises.

EMERGENCY CONTACT NUMBERS

Health Canada Clan Lab Response Team 1-800-463-1850 (24 hr. Answering Service)
Alberta Fire Commissioner’s Office 24 hour Emergency 1-877-427-8393

ADDITIONAL RESOURCE AGENCIES AVAILABLE
• Fire Department Hazardous Materials Decontamination Unit
• Health Canada, for chemical analysis and investigation services
• R.C.M.P. or authority having police jurisdiction in your area.
• Regional Health Authority, Environmental Health Division or authority having jurisdiction for Regional Health Administration.
• Family and Children’s Services
• Alberta Environment, 1-800-222-6514
• Alberta Fire Commissioner’s Office, 24-hour emergency 1-877-427-8393

OTHER RESOURCES

• Health Canada Clan Lab Response Team
  Public Works 24 hour answering service
  1-800-463-1850
SUMMARY

When investigating nuisance odour complaints, consider the telltale odours and other external indicators described previously in this manual. There may be nothing that can be done immediately other than a phone call to the local police department or Drug Investigation Unit to initiate a more detailed investigation. The situation may be completely innocent; however, in the event there is an illicit drug lab or grow operation a pump crew or Haz-Mat unit may not be fully equipped to deal with the situation. This task requires specialized training.

If you do enter the premises and further assessment confirms suspicions, use the information contained in this manual to ensure that first responder functions and protocols are completed in a thorough and safe manner.

Be aware; be observant; be careful; and above all else be safe. In all cases, consult with a qualified specialist, chemist, or member of a regional Hazardous Materials Response team. This is a resource you should become familiar with now, rather than when you come upon a lab by accident.
TERMINOLOGY AND DEFINITIONS

ug/100cm² – microgram per 100 square centimetres. A microgram is one-millionth (1/1,000,000) of a gram.

Anaphylactic ‘shock’ - a sometimes severe and often fatal body reaction to an antigen (i.e. a wasp sting or penicillin) after previous sensitization.

APR – Air Purifying Respirator, A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Auto-ignition temperature - the temperature at which a material begins to burn without an external ignition source.

Carbon Dioxide Generator - basically an open burner bar enclosed in a protective housing. Most commonly uses propane or natural gas as a fuel source. The unit provides carbon dioxide to the atmosphere for increased plant growth. It may produce some carbon monoxide if poorly maintained or if there is an inadequate oxygen supply to support clean combustion.

Carcinogens - chemical or other substances that cause or initiate cancer cells; examples include formaldehyde and benzene.

Catalyst - An agent bringing about changes but which itself is not changed during the process.

Corrosives - Chemical compounds, often toxic, that causes irreversible tissue damage. Chemical groups include acid and bases.

Distillation - heating of a liquid to produce vapours, and then condensing the vapours to produce a more pure or refined substance.

Heating mantle - an electric heater shaped to securely hold a round bottom flask. A rheostat usually controls the temperature.

I.D.L.H. (Immediately Dangerous to Life and Health) - refers to an atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

OV – Organic Vapour, volatile vapours produced when an organic liquid evaporates. Organic liquids include Toluene, Isopropyl alcohol, Methanol, Gasoline, etc.
**P-100 High-Efficiency Particulate Air (HEPA) Filter**, A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

**PPE**- Personal Protective Equipment, includes chemical protective clothing.

**ppm (Parts Per Million)**- A method of expressing the concentration of a chemical compound. Parts of contaminant per one million equal parts of air (or liquid).

**Precursor**- A raw material or controlled substance that becomes part of the finished drug when it is used in a chemical reaction.

**Reagent**- A substance that reacts chemically with one or more precursors but is not part of the finished product.

**Reflux**- A method of heating liquid so that the evaporated vapours condense and are returned to the liquid to be reheated.

**Solvent**- A liquid that is used to dissolve a substance. Typically a hydrocarbon liquid, or an alcohol or ether.

**SCBA**- self-contained breathing apparatus.

**S.T.E.L. (Short Term Exposure Limit)**- According to the American Conference of Governmental Hygienists, this is the time weighted average (TWA) maximum airborne concentration to which workers may be exposed for periods up to 15 minutes. No more than four (4) such exposures per day should take place, with at least 60 minutes time between exposures.

**Swamp Cooler**- An arrangement where cool water is trickled over the surface of a radiator and air forced through the radiator by a fan. If not properly cleaned or maintained, a swamp cooler can be a source of airborne mould contamination.

**Synthesis**- The process of creating a new or target chemical compound through various chemical reactions and physical conversions.

**THC** (Tetrahydrocannabinol)- usually refers to the naturally occurring isomer of delta-9-THC; found in Marihuana weed oil extraction. This is the desired or target component in Marihuana.
INFORMATION SOURCES/BIBLIOGRAPHY

REFERENCED


(3a) NIDA; National Institute on Drug Abuse – info sheet on the Internet


REFERENCED continued


[12] “Methamphetamine Contamination on Environmental Surfaces Caused by Simulated Smoking of Methamphetamine”, J. Martyny, S. Arbuckle, C. McCammon & N.Erb,


NON-REFERENCED


Tacoma-Pierce County Health Department, Clandestine Drug Lab webpage http://www.tpchd.org/eh/CDL/

Response to Clandestine Drug Labs, Minnesota Department of Health, Environmental Health Division, Site Assessment and Consultation Unit, Available on-line: http://www.health.state.mn.us/divs/eh/meth/fullmanual.pdf

PHOTOGRAPH CREDITS

City of Calgary, Fire Department, Hazardous Materials Division 4124 – 11th Street S.E. Calgary, AB, T2G 3H2, www.calgaryfire.ca Photos 1, 5, 6, 19, 20, 21, 22, 23, 24, 24a, 25, 56b, 57, 58, 59, 64, 67, 69 used with permission.

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444 Cedar Street, Suite 145

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2805 Alvarado Lane, Plymouth, MN 55447, http://www.streetdrugs.org
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Riverside County, California,
Drug Endangered Children Program
P.O. Box 1267
Riverside, CA 92502-1267
http://dec.co.riverside.ca.us/agency.htm
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Alberta Municipal Affairs, Fire Commissioner’s Office
16th Floor, Commerce Place, 10155 – 102 Street
Edmonton, AB, T5J 4L4
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United States Dept. Of Justice, Drug Enforcement Administration
Community Partnership Program of the Ozarks Inc.
http://www.nometh.org
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Calgary Police Service, Support Section, Calgary, AB.
www.calgarypolice.ca
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APPENDIX A

CONFINED SPACE ENTRY PERMIT

If your jurisdiction decides to declare a clandestine drug lab as a confined space, there are a number of methods for managing the site.

The following is an example of a Confined Space Entry Permit taken directly from the Alberta Occupational Health and Safety Code Explanation Guide.

“As defined in section 1 of the OH&S Code, a confined space is an enclosed or partially enclosed space that is not designed or intended for continuous human occupancy with a restricted means of entry or exit and may become hazardous to a worker entering it because

(a) of its design, construction, location or atmosphere,
(b) of the work activities, materials or substances in it,
(c) the provision of first aid, evacuation, rescue or other emergency response service is compromised, or
(d) of other hazards relating to it.” [1]

Please click on or go to the link below to view a sample of a Confined Space Entry Permit.


Part 5, Confined Space, figure 5.2, Example of a typical confined space entry permit, page 5-10.

Example, Confined Space Entry Permit →
Figure 5.2  Example of typical confined space entry permit

<table>
<thead>
<tr>
<th>CONFINED SPACE ENTRY PERMIT</th>
<th>Permit number</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and Description of Confined Spaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose of Entry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Scheduled Start</th>
<th>a.m.</th>
<th>Finished Day</th>
<th>Date</th>
<th>Time</th>
<th>a.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>Date</td>
<td>Time</td>
<td>Day</td>
<td>Date</td>
<td>Time</td>
</tr>
</tbody>
</table>

Worker(s) in charge of entry:

<table>
<thead>
<tr>
<th>Entrants</th>
<th>Attendants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pre-Entry Authorization (Check those items below which are applicable to your confined space entry permit)

- Oxygen-Deficient Atmosphere
- Oxygen-Enriched Atmosphere
- Welding/cutting
- Engulfment
- Toxic Atmosphere
- Flammable Atmosphere
- Energized Electric Equipment
- Entrapment
- Hazardous Chemical

SAFETY PRECAUTIONS

- Self-Contained Breathing Apparatus
- Air-Line Respirator
- Flame Resistant Clothing
- Ventilation
- Protective Gloves
- Linelines
- Respirators
- Lockout/Tagout
- Fire Extinguishers
- Barricade Job Area
- Signs Posted
- Clearance Secured
- Lighting
- Ground Fault Interrupter

ENVIRONMENTAL CONDITIONS

<table>
<thead>
<tr>
<th>Tests to be taken</th>
<th>Date/Time</th>
<th>Re-Testing</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Explosive Limit %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxic Atmosphere Instruments Used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Worker conducting safety checks signature

Remarks on the overall condition of the confined space:

ENTRY AUTHORIZATION – All actions and/or conditions for safe entry have been performed

Person in charge of entry

ENTRY CANCELLATION – Entry has been completed and all entrants have left the space

Person in charge of entry

Example of a typical confined space entry permit, page 5-10. Part 5, Confined Space, figure 5.2, Alberta Occupational Health and Safety Code
APPENDIX B

CHILD PROTECTION

- When local law enforcement personnel receive a report of a suspected meth lab, they will first determine through a thorough investigation if a meth lab is likely operating. If children are present, their safety is a primary concern. The appropriate investigators, including drug investigator, child crimes investigator, and CPS are notified and respond.

- CPS work jointly with other officials at the scene to ensure that the child is protected from further chemical exposure and that information necessary for both the drug investigation and the potential child abuse case is collected.

- An interview of the child can take place at the scene, but generally occurs in a more child friendly environment, such as a Child and Family Service Authority office (CFSA).

- Law enforcement, fire and hazardous material investigators, and CPS Investigators share information with each other to facilitate their collaborative, multidisciplinary effort.

SAFEGUARDING CHILDREN

- The local CFSA ensures that children receive an immediate and appropriate medical exam, including a test for exposure to toxic chemicals and developmental screening. Upon being removed from the crime scene, the children are showered or bathed according to safe and recommended procedures in order to reduce chemical exposure and they are provided with new clothing, food, and, if needed, crisis counselling. A forensic interview will be conducted with the child, most often in a child friendly environment. The medical exam and interview provide important evidence to be used in the drug prosecution and child welfare court application.

(Note: Child welfare protocol based on the Arizona State Drug Endangered Children Protocol)
APPENDIX C

NATIONAL MARIHUANA GROW OPERATION PERSONAL PROTECTIVE EQUIPMENT PROTOCOLS

Background

Beginning in 2003 the Calgary Fire Department Hazardous Materials Division conducted a fundamental air quality survey inside all Marihuana Grow Operations (MGO) attended. Reduced Oxygen content inside the premises was very common, with an average 0.6% O₂ decrease observed. An Oxygen concentration below 19.5% has been recorded on more than three occasions, with the lowest to date at 18.0% O₂. The Alberta Occupational Health & Safety code mandates SCBA be donned when the Oxygen concentration drops to 19.5% O₂ and lower. A typical Carbon monoxide concentration of 75 – 100ppm was observed. Some volatile organic compounds (VOC’s) were also recorded with an average concentration of 13ppm and a maximum of 54ppm. It is thought this may be the solvent carrier remaining after a pesticide application. Carbon dioxide concentrations were measured using Infrared technology and found to be 1500 – 3000 ppm above ambient, with a peak of 15,000 ppm CO₂ above ambient.

The RCMP hosted a National symposium on MGO’s in November 2004. A working group was formed and built upon already existing protocols to develop the Canadian Marihuana Grow Operations PPE Ensemble Protocols. Introduced in September 2005, these are guidelines designed to protect anyone entering an MGO and prevent contamination from spreading to vehicles, offices, fire stations and eventually your home.

The MGO PPE Protocols are available on-line from the Canadian Association of Fire Chiefs at; www.cafc.ca. The document will also be available in French and Spanish.

The following document is reproduced in its entire context.
Marihuana Grow Operations
Personal Protective Equipment
Ensemble Protocols

RCMP National MGO Symposium (Nov./04)

10 January 2006
Marihuana Grow Operations
Personal Protective Equipment
Ensemble Protocols

RCMP National MGO Symposium
November 2004, Ottawa ON.

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Calgary, Alberta T2P 2M5
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Calgary Fire Department
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Calgary Police Service, Drug Unit

Calgary Police Service, Tactical Support Section

R.C.M.P. National Headquarters, Drug Branch
Sgt. Denis Pelletier (current)
Cpl/Cap Richard D Baylin (previous)
National Coordinator, Marihuana Grow Ops
Coordonnateur National des installations de culture de Marihuana
Federal and International Operations Opérations Fédérales et internationales Drug Branch
Sous-direction de la police des drogues
HQ - DG Ottawa
Amendments & Revisions

10 January 2006 edition

A rapid adapter used to convert a SCBA face-piece to a cartridge respirator must be from the same manufacturer and fully compatible and approved for use.

Organic vapour respirator cartridges have a finite lifespan and should remain sealed until ready for service. Length of service will depend on time and specific exposure.

Page 11, “…ready for service on the mask…”

Page 12, “and a cartridge adapter converts the face mask to a full-face air purifying respirator (APR) for use where atmosphere is known. The SCBA to APR adapter must be approved for use by the manufacturer.”

Page 16, “It is generally accepted once opened and in service, OV/P100 cartridges have a lifespan of about eight hours. Users should consult with Occupational Health & Safety advisors about specific practices.”
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Scope

The following PPE protocols are designed to provide a protective ensemble for someone making a Tactical Entry and all other investigating Officers and persons that must enter a Marihuana Grow Operation (M.G.O.) or otherwise dismantle or handle evidence seized from these operations.

The intent is to have one complete PPE ensemble that will adequately protect against most known and expected hazards in a domestic M.G.O. This is designed to eliminate on scene decisions regarding the level of protection, extent of contamination and level of respiratory protection required for entry.

If one treats all molds as hazardous until proven otherwise, then we will all certainly benefit from this approach.

Acknowledgements

The authors would like to thank the Calgary Police Service, Drug Unit and Tactical Support Unit for their patience and cooperation with field testing different types of PPE, portable instruments and methods of decontamination.
Background

In 2003 & 2004 the Calgary Police Service Drug Unit, Tactical Unit and Calgary Fire Dept. Hazardous Materials Division, conducted an informal study of the atmospheric contaminants present at a “typical” clandestine domestic Marihuana grow operation.

After reviewing the results of this analysis, both the Drug Unit and Tactical Unit began experimenting with a variety of personal protective equipment pieces. The main purpose of the PPE was to protect persons that had to enter the grow operation, investigate the premises, handle the evidence and dismantle the clandestine grow operation.

The fundamental air analysis study (April 2004) identified several areas of concern. There is a possibility the Oxygen content inside the premises may be less than 19.5%. Carbon Monoxide (CO) concentrations may be expected to reach 100ppm or more. Flammable vapours may be present from a number of sources, including solvents used during weed oil production and pesticide application.

When using a respirator, the Oxygen content must be known during entry. Most Provincial Occupational Health and Safety standards prohibit working in less than 19.5% Oxygen without a supply of breathing air. These same standards also prohibit entering a flammable atmosphere greater than 10% of the Lower Explosive Limit (LEL). This might be a nice to know as one knocks over the table lamp, or prior to the discharge of a weapon. The current Occupational Health & Safety 8-hour standard for CO exposure is 25ppm.

In nearly every domestic Marihuana grow operation attended, there has been some form of visible mold growth on the interior walls, ceilings and attic spaces. The extent of hidden mold behind the wall board is unknown. Contamination has ranged from sporadic clusters of spores in closets and attics, to growth completely covering walls and ceilings with cascading “bundles” of mold growth extending 1m or more across the carpet from the wall. Spider mite clusters have been observed on several occasions covering the plants.

The documents referenced regarding mold exposure and PPE are designed as an occupational guideline for a worker conducting remediation activity where it is known mold spores will become mobile (airborne). We believe that the aggressive tactics of a search team clearing a house of hidden suspects may cause mold spores and powdered pesticides to become airborne as well. Thus the same level of protection required of someone working in a potentially contaminated environment should also be required of persons entering a Marihuana grow operation.
Background continued

At Ottawa in November 2004, the R.C.M.P. hosted the first National Conference on illegal Marihuana grow operations. A working committee of stakeholders was established to develop a PPE protocol based on the equipment trials already underway in Calgary. This document and protocol represents the work of the committee.
Development Notes

At least one instrument manufacturer will provide qualified users with the capability to silence the audible alarms allowing a stealth mode of operation as may be required during Tactical entry. Contact your local Fire Department Hazardous Materials Division for assistance with instrument selection, calibration and maintenance routines.

The Tyvek® style protective outer garment is not designed to, nor will it provide prolonged protection from direct chemical exposure – such as a liquid splash. Any person coming into direct contact with organic solvents, pesticides or any other chemical that may be found in a Marihuana grow operation, should immediately seek emergency decontamination. The Tyvek® style suit is also not designed to protect against chemical vapour penetration. This protective outer garment is designed to provide limited protection from minimal concentrations of organic vapour, minor solids exposure such as brushing against a plant with pesticide powder on the leaves, accumulations of airborne mold spores and an occasional contact with spores as may be experienced while crawling through an attic space.

The equipment described here will not provide adequate protection to enter a synthetic drug manufacturing operation, aka: Clan Lab or Meth Lab.

This protocol does not make specific recommendations regarding manufacturer or model specifics as far as instrumentation, garments, gloves and respirator choices. However, the authors of this document will consult with any agency and assist with protective gear selection and instrument set-up procedures upon request. The trade name Tyvek® is used for illustrative purposes only and is not an endorsement for a brand of protective outer garment.

Police units require clear identification on PPE. Until production numbers make factory labeling feasible, an inexpensive roll of adhesive “POLICE” labels could be stored on the apparatus along with the suits, and a decal applied when donning the PPE.
Development Notes continued

There is a concept that must be addressed here regarding the PPE and potential endangerment to one by wearing the items.

There must be no restrictions of visibility or mobility that would interfere with one’s ability to perform occupational tasks – such as Police Tactical entry teams searching for booby traps or other potential threats.

Provincial Occupational Health & Safety (OH&S) regulations may vary from one region to another, but the underlying principle is the same – not to endanger the worker through poor fit or poor function.

In Alberta the OH&S regulation contains the following clause;

**Part 18, Personal Protective Equipment**

Duty to use personal protective equipment

228(3) An employer must ensure that the use of the personal protective equipment does not itself endanger the worker.

*Province of Alberta, Occupational Health & safety Act  
Occupational Health & Safety Code, October 2003*

It is imperative that the choices of PPE and related equipment be fully investigated and tested thoroughly for functionality prior to full implementation.

For a more comprehensive document on PPE requirements at a MGO as well as a discussion of the more common atmospheric hazards, please refer to the “Clandestine Drug Operations Awareness and Safety Manual” available from the Alberta Fire Commissioners' Office. This 62 page document currently may be downloaded from the internet site;


- Menu on the left, select: Fire Dept. Operations
- Center menu select: Clan Lab Awareness Package
- Select: Clan Lab 6.1
- An Adobe® PDF file should open
Minimum Equipment Required

1. Tyvek® style disposable protective outer garment with attached hood, elastic wrist and ankle cuffs.

2.a. Full-face respirator. May be an SCBA face piece with an approved adapter for use with air purifying cartridges. Note that some manufacturer’s face pieces are much better at reducing visor fogging than others. Always obtain one or more test samples to evaluate prior to purchase.

*Or where the use of eyeglasses is required,*

2.b. Half-face respirator designed for use with air purifying cartridges, and chemical protective goggles that can be effectively worn over the eyeglasses and still provide protection to the eyes from airborne mold spores and bacteria. All masks should be fit tested according to local guidelines or Provincial Occupational Health and Safety Regulations.

3. Air purifying respirator cartridge(s) rated to P-100 particulate filtration, combined with Organic Vapour protection. One complete set ready for service on the mask, and a second set of spares for field replacement.

4. Nitrile rubber gloves or other chemical resistant approved gloves capable of protecting hands from chemical, pesticide and herbicide residues. An outer working glove should be used when handling equipment or dismantling operations.

5. Work boots designed to protect the feet from occasional chemical splash hazards and can be decontaminated with a hospital grade hard surface disinfectant. Water resistance should be included as a detergent boot wash may be required upon exit. The boots must meet CAN/CSA-Z195-M2 standard for protective footwear and have electrical hazard protection rating.

6. A minimum three gas portable air monitor capable of measuring Oxygen content as a percent of atmosphere, Carbon Monoxide as ppm concentration, and flammable vapour as a %LEL.
Minimum Equipment Upgrades (*Nice to Have*)

A five or six gas portable air monitor that can be used for clandestine drug manufacturing or “Clan Lab” investigations as well. Other gases necessary to monitor include Ammonia (NH$_3$), Hydrogen Chloride (HCl) and Phosphine (PH$_3$). The authors are aware of at least one instrument manufacturer that currently offers an instrument designed for this application and is capable of five and six gas configuration.

Although these protocols are not designed to address the synthetic drug manufacturing problem, the purchase of an instrument upgrade is a nice to have where teams may be called to investigate a suspected Clan Lab.

The full-face respirator is actually an SCBA face piece. The upgrade here is the SCBA. The user now has the choice and flexibility. The SCBA is donned for entry to untenable atmospheres and a cartridge adapter converts the face mask to a full-face air purifying respirator (APR) for use where atmosphere is known. The SCBA to APR adapter must be approved for use by the manufacturer.
Donning Procedure Prior to Entry

The protective outer garment – Tyvek® like – should have the hood pulled up to cover the head. This is designed to protect the person from mold spore contamination on the hair and clothing.

For Tactical Officers, the Nitrile or other chemical protective gloves, may be worn under the Kevlar working gloves to protect the skin from accidental chemical exposures. The Kevlar gloves can be laundered as required or as determined by existing departmental guidelines.

For all other applications, the Nitrile or other chemical protective gloves, may be worn under a dedicated leather work glove. More robust and substantial chemical protective gloves are also available in a variety of styles – consult a Safety Supply dealer.

The respiratory and eye protection must be donned prior to entry. If a full-face respirator is used, the nose-cup should be retained in place to prevent the inside of the mask from fogging up.

Prior to entry, the portable air monitor must be zeroed in a clean atmosphere away from vehicle exhaust. An instrument “bump” test should be performed to verify correct operation. The recorded “peaks” should then be cleared. The instrument is now ready for service. An instrument specific operation manual should be available, as well as a trained operator capable of performing these functions.
Decontamination and PPE Removal upon Exit

Upon final exit from the premises, the external PPE should be removed in the following fashion. Where possible, a clean person should assist with the PPE removal.

The hands/gloves and footwear should be sprayed with an approved hospital grade hard surface disinfectant to neutralize any bacteria and mold spores that may have contaminated the surfaces.

If the footwear was contaminated by walking through spilled chemicals in the grow areas, a boot wash should be performed as follows.

- A 30-Litre tub is filled with 4-6 inches of warm water (as available), and a concentrated solution of alkaline detergent (granular laundry soap, Spic-n-Span, etc.) is prepared.

- The contaminated person steps into the tub while another person gently scrubs the sides and soles of the boots with a brush.

- A clean water rinse completes the process (another tub with clean water, garden hose, etc.)

In the event a more substantial chemical contamination has occurred, the local Fire Department should be requested for assistance with decontamination. Medical assessment/evaluation should also be considered.

External gear carriers and gun belts should be removed and placed in a secure location under observation of a dedicated Officer. If these items contacted a contaminated surface inside the premises, they should be wiped clean using the hospital grade hard surface disinfectant. Depending on the extent of contamination, a thorough cleaning of the weapon may be required as per existing department guidelines or procedures.

Carefully remove the hood, peeling it back and avoid touching the skin.

Open the front zipper closure and peel the suit back over the shoulders.

The clean person grasps the gloves and the wrist cuff of the dirty person, the dirty person pulls gently as the glove is removed from the hand, the exposed hand is tucked up inside the arm of the suit. This is repeated on the other arm/hand. The key here is to avoid touching the outside of the suit with the exposed hand.

Decontamination and PPE Removal - continued
Then the suit is completely removed from the torso and legs of the dirty person.

Gloves and suit can be placed in a garbage bag for disposal.

The face-mask/respirator can now be removed and should be cleaned with an approved cleaner as per existing guidelines.

The uniform or clothing worn by anyone entering the premises should be laundered separately from other domestic or family clothing to prevent any cross contamination.
Equipment Test Procedures

The Tyvek® style protective outer garments are designed to be disposable, single use only. There should be no attempts at cleaning or re-using this garment after use in a Marihuana Grow Operation.

The fit test procedures for the full-face respirator will vary depending on the specific manufacturer. Always consult with a qualified technical representative for field fit test instructions.

The filter cartridge replacement schedule will vary widely depending on use, particulate load and relative chemical vapour exposure. At the time of writing (June 2005) there are no known visible indicators for the combined P-100/OV filter cartridge lifespan. It is generally accepted that breathing will become laboured and/or increasingly difficult as the particulate filter portion becomes clogged. When the chemical vapour component loses effectiveness, the user may begin to experience odours while using the mask. In the event either of these indications are experienced, the filter cartridges should be discarded immediately. Writing the date of installation of the cartridges on the mask may also help when deciding if its time to replace the cartridges. Always consult with the manufacturer’s technical representative for correct life-cycle and storage requirements of respirator cartridges. It is generally accepted once opened and in service, OV/P100 cartridges have a lifespan of about eight hours. Users should consult with Occupational Health & Safety advisors about specific practices.

The portable air monitoring instrument should be kept in a case for ease of handling and maintaining cleanliness. The kit should contain a cylinder of appropriate calibration gas, spare batteries and 12VDC adapter/charger. Some instrument companies manufacture a complete kit designed for this application.

Prior to entry, the portable air monitor must be zeroed in a clean atmosphere away from vehicle exhaust. Prior to entry, a “bump” test should be performed to verify correct operation. The “peaks” should then be cleared.

Depending on the specific portable monitor selected including the sensor configuration, it may be required to be plugged in (powered) at all times, either to a 12VDC vehicle connection or 120VAC adapter.
Rapid Decontamination by a Fire Pump Crew

In the event one of the entry or investigating Officers becomes contaminated from a chemical spill or other mishap, the Fire Department and EMS should be requested to respond immediately to the scene. If a Hazardous Materials unit is not readily available, a simple kit can be assembled and stored on the fire pump, or other support vehicle, that can be rapidly deployed at the incident. (*This kit is intended for emergency decontamination only.*)

The pump crew opens the kit, someone inflates the pool (truck’s air supply or SCBA cylinder adapter). The pump operator engages the fire pump and connects the forestry hose to a discharge using the necessary adapters.

When possible, the contaminated person stands in the inflated pool to contain the run-off. The garden wand spray applicator is used to apply a soft yet copious flow of water.

Use the scrub brush and soap to remove the chemicals as thoroughly as possible. The empty pail is used to mix up a soap solution.

Ensure the person assisting with the washing is wearing adequate personal protective equipment. Follow with a clean water rinse. Remove clothing from the top down as necessary. Make sure the contaminated person does not touch any part of the body until thoroughly washed.

The face mask/respirator is the last item removed. A medical assessment may be necessary following any chemical contact and subsequent decontamination.

**Compact Emergency Decontamination Kit**

- 20 Litre plastic pail with removable lid
- 1 - 15m length of 25mm forestry hose, rolled
- 1 - 38mm female to 25mm male adapter
- 1 - garden wand/spray head water applicator, with hand valve
- 1 - small inflatable kiddie pool (five or six feet diameter)
- 1 - length flexible coiled air line with hand valve, nozzle and quick connect to fit truck’s air supply (used to inflate the kiddie pool quickly), or an adapter to fit an SCBA air cylinder.
- 1 - long handle scrub brush
- Soap for washing (alkaline detergent, granular/powdered laundry soap)
Canine Decontamination

There are often circumstances where a Canine Unit is called to assist with the search and clearing of a MGO, potentially exposing the dog to chemicals, fertilizer mixtures and powdered pesticides. Depending on the personal hygiene of persons found in the premises, Bio-Hazards may also be present. Without a thorough decontamination upon exit, secondary contamination will spread the chemicals to the Police vehicle, district office and likely to the Officer’s family at the end of the shift.

Some basic decontamination can easily be performed at the scene by a prepared unit crew with simple equipment.

As with any chemical decontamination procedure, the method is dependant on the chemical hazard present. As soon as determined the service dog has become contaminated, immediately request the assistance of a Hazardous Materials Unit. Immediately establish communication between someone at the scene and the responding HazMat team to provide an initial consultation.

*Any agency choosing to adopt these procedures as a protocol should consult with their local or regional Police Canine Unit and/or veterinarian before implementation. As well, crews will require training in these practices.*
Canine Decontamination continued

Dry decontamination

Where the dog has been in contact with plants or surfaces contaminated by a powdered chemical such as a pesticide, herbicide or otherwise, dry decontamination may be effective in the short term.

Using a small shop vacuum equipped with a suitable combination HEPA filter, carefully vacuum the dog’s coat. Start at the head and work along the top of the back down to each foot. Avoid working the chemical into the hair even further. If there are any obvious locations of gross contamination, then vacuum that area first.

Inspect the hair thoroughly for residual chemical. Depending on the coat, you may have to look very carefully and methodically.

A more thorough decontamination wash may be required.

Note; CFD Hazardous Materials Response Units carry a small disposable shop vacuum equipped with a standard pleated cartridge filter as well as a HEPA filter.
Canine Decontamination continued

**Wet Decontamination**

Upon exit from the premises, proceed directly to the decontamination area.

**Disinfection stage.**

If required (based on an interior assessment of the premises), the dog’s feet may be washed with a disinfectant soap such as Hibitane®.

Avoid getting the soap in the eyes, ears and mouth.

Rinse thoroughly with clean water before proceeding to the full decontamination wash.

**Decontamination wash**

If the coat is grossly contaminated, apply a gentle water wash to remove the bulk of the contamination.

Using a gentle shampoo, or other supplied canine shampoo, wash the coat thoroughly working from the head along the back and down the legs to the feet. Avoid getting soap into the eyes, ears and mouth. The person washing should be wearing suitable gloves and splash protection as necessary.

Rinse thoroughly and towel dry.

Inspect the coat for residual chemicals.

Inspect the skin for chemical burns or irritation.

Depending on the frequency of the full body washings administered at MGO’s, a canine hair conditioner should be applied to the coat to prevent drying the hair and skin.

As soon as practical, the service dog should be assessed by the Department’s contract veterinarian.
Other Support Agencies

There are many other agencies and support services that must enter a Marihuana grow operation after the scene has been released by the Police Investigators.

Depending on the local authority and the services provided, these agencies include, but are not limited to;

- Police Evidence Handlers
- Electrical utility emergency service crew
- Natural Gas utility emergency service crew
- Water service utility service crew
- Public Health Inspector
- Municipal Electrical service inspector
- Municipal Gas utility inspector
- Municipal Water utility inspector

In the event the utility service crew must enter the premises to effect a safe electrical or Natural Gas disconnect, they should be appropriately protected in the same level of PPE as is required for minimum entry. This includes appropriate footwear, a protective outer garment, gloves and a full-face respirator with P-100 filtration and Organic Vapour.

Until the premises has been thoroughly inspected and remediated to a standard satisfactory to the Public Health Inspection Agency having jurisdiction. Anyone entering the premises should consider the atmosphere contaminated until proven otherwise.
Related References

The authors are not aware of an existing standard or guideline that specifically addresses the PPE requirements of Police investigations and Emergency response to Marihuana grow operations. The following documents are designed more for an occupational role during investigation and remediation, but at least illustrate the basic principles of PPE.


“Any procedures involving direct handling and manipulating of potentially contaminated materials should be assigned only to trained personnel…” “They must also be reminded to wear appropriate personal protective equipment prior to entering contaminated areas.”

“It should be noted that half-face respirators and gloves are strongly recommended for remediation at any scale if the presence of toxigenic fungi is known or suspected.”


“Investigating hidden mold problems may be difficult and will require caution when the investigation involves disturbing potential sites of mold growth – make sure to use personal protective equipment (PPE).”

“Gloves are required to protect the skin from contact with mold allergens (and in some cases mold toxins) and from potentially irritating cleaning solutions.”

“Disposable clothing is recommended during a medium or large remediation project to prevent the transfer and spread of mold to clothing and to eliminate skin contact with mold.”

Footnotes, 2. “Molds are known allergens and may be toxic. You may wish to use Personal Protective Equipment (PPE) while investigating a mold problem… The minimum PPE includes an N-95 respirator, gloves, and eye protection.”
Related References

“Bioaerosols: Assessment and Control”, Macher, J. (Editor), American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, OH. 1999.

Appendix D, SELF-TEST QUESTIONS

Please complete the following quiz as a crew exercise.

1. List three possible clues to the presence of a clan lab.
   __________________________________________
   __________________________________________
   __________________________________________

2. Why is structural firefighting PPE not suitable for entering a suspected clan lab?

3. Upon entering a suspected clan lab, should you turn on the nearest light switch because it’s dark in the room?

4. True or False: Is it not advisable to unplug the hotplate under the round bottom flask?

5. True or False: It’s okay for me to have a quick peek inside the premises without SCBA, besides the “cook” just walked outside.

6. There’s a strong chemical smell coming from behind a closed door. List three potential dangers that await you behind this closed door:
   __________________________________________
   __________________________________________
   __________________________________________
7. Phosphine gas has an IDLH of _______ ppm?

8. The BBQ propane cylinder located at a response site has blue fuzz around the hose connection. Possible reason?

9. During the course of fire suppression, your crew has discovered what appears to be marihuana grow operation in the basement of a house. It’s very bright in there with the grow lamps on. Is it okay to turn them off?

10. True or False: After extinguishing a fire in a suspected clan lab, crews must be decontaminated on-scene before returning to the station in service.
Self-Test Answers with Narrative/Discussion

1. **List three possible clues to the presence of a clan lab.**
   - Neighbours complaining of unusual odours coming from the premises at odd hours, sometimes described as solvent-like.
   - Discarded garbage around the building including purple stained coffee filters, cold medication blister packs or chemical containers.
   - The Propane cylinder left on the back porch has a build-up of blue green corrosion on the brass valve.

2. **Why is structural firefighting PPE not suitable for entering a suspected clan lab?**
   - If you suspect there is chemical manufacturing operation in the premises, then this type of an entry requires chemical protective clothing and more detailed training in tactical hazmat operations. Firefighter’s bunker gear provides little or no protection from chemical vapour exposure.

3. **Upon entering a suspected clan lab, should you turn on the nearest light switch because it’s dark in the room?**
   - It is always a good idea not to touch anything in a suspected clandestine lab until the Police investigators have cleared the premises of ‘booby traps’. Bring a flashlight.

4. **True or False: Is it not advisable to unplug the hotplate under the round bottom flask?**
   - True - Sometimes incorrectly shutting down a chemical process may make matters worse. Always consult with someone trained in offensive Hazardous Materials Operations, especially Clan Lab Operations. Use extreme caution when operating in the presence of a chemical reaction process.

5. **True or False: It’s okay for me to have a quick peek inside the premises without SCBA, besides the “cook” just walked outside.**
   - False. Entry teams must wear appropriate chemical protective clothing including SCBA when investigating any type of unusual chemical manufacturing processes. The ‘cook’ may have emerged, but do they look healthy?
6. There’s a strong chemical smell coming from behind a closed door. List three potential dangers that await you behind this closed door:
   • Possible IDLH atmosphere of some unknown toxic vapour.
   • Flammable or explosive atmosphere from evaporating solvents.
   • “Booby trap” or other device designed to protect the premises from product theft.

7. Phosphine gas has an IDLH of _________ ppm?
   • IDLH is 50ppm.

8. The BBQ propane cylinder located at a response site has blue fuzz around the hose connection. Possible reason?
   • Possible corrosion from the improper storage of Anhydrous Ammonia in the cylinder. Use extreme caution if you must handle this cylinder.

9. During the course of fire suppression, your crew has discovered what appears to be marihuana grow operation in the basement of a house. It’s very bright in there with the grow lamps on. Is it okay to turn them off?
   • If there is no need to be in the grow rooms, avoid all exposure to the intense grow lamps. The other danger is the potential for electrocution when trying to shut off the lights. It is best to have the electrical utility response crew disconnect the power to the grow-op in consultation with the Drug Unit Investigator on scene.

10. True or False: After extinguishing a fire in a suspected clan lab, crews must be decontaminated on-scene before returning to the station in service.
    • True. It is very likely there will be some chemical contamination on the gear of anyone working in the area of a synthetic drug manufacturing operation or clan lab. Remember that Methamphetamine contamination has been found on both vertical and horizontal surfaces inside the dwellings studied.