



October 28, 2009

***Recommendations for the Assessment and Remediation of
Properties Used as Illegal Drug Operations***

Commissioned by the Alberta Real Estate Association

The lack of consistent remediation standards for mould or air quality in properties previously used as illegal drug operations leaves property owners, tenants, and prospective buyers vulnerable to the adverse health effects of indoor contaminants.

Recognizing the need for provincial guidelines, the Alberta Real Estate Association (AREA) commissioned indoor air quality experts Professor Tang G. Lee and Karen Rollins to develop remediation standards for Alberta REALTORS® to present to the Alberta Government. The recommendations outlined in this report are intended to help government establish provincial standards for assessing and remediating illegal drug operations in the province of Alberta.

AREA would like to thank Professor Lee and Ms. Rollins for their dedication to this study, as well as the various health authorities, law enforcement agencies, safety code officers, environmental consultants, government staff, REALTORS® and more, who also contributed to the report.

We look forward to partnering with government and other industry groups to achieve consistent remediation standards in the province of Alberta and hope you'll take the time to review this report and provide us with your feedback. Comments or questions regarding the report should be directed to Bill Fowler, Director of Industry and Government Relations at (403) 209-3606 or email bfowler@areahub.ca. The report is also available in the [Newsroom section \(AREA in the News\)](#) at www.AREAhub.ca.

Sincerely

Lyle Magnuson
Chair, Government Relations Committee
Alberta Real Estate Association



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RECOMMENDATIONS FOR THE ASSESSMENT AND REMEDIATION OF PROPERTIES USED AS ILLEGAL DRUG OPERATIONS

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EXECUTIVE SUMMARY

The Alberta Real Estate Association (AREA) commissioned this report. Recommendations presented in this report may contribute to developing a consistent standard for assessing and remediating illegal drug operations in the province of Alberta.

The intent of the recommendations in this report is to ensure that properties used as illegal drug operations produce no adverse health effects or building code implications that will hinder their resale or habitation. Benefits of the recommendations include reduced risk to occupant health, better decision-making and management control, better cost control, better communication, and decreased possibility of incidents resulting in legal action.

This report describes particular contaminants and hazards of marihuana grow operations and methamphetamine labs. Primary hazards are those that may cause immediate bodily harm (fire, explosion, booby traps, electrocutions, combustion gases, structural damage and ultraviolet light). Secondary hazards are more difficult to identify and remediate (mould, chemicals, hazardous materials). The First Response Team neutralizes the primary hazards. Alberta Health Services (Executive Officer), the Environmental Consultant, and the Remediation Contractor address the secondary hazards. Recommendations in this report describe the assessment and remediation of the secondary hazards.

Properties used as illegal drug operations pose a long-term health and safety hazard due to the presence of mould, chemicals and hazardous materials. Identifying contaminants and producing a scope of work requires specialized knowledge. Assessment and remediation must be carefully undertaken with qualified consultants and contractors.

Recommendations for assessment include requirements specified in the Executive Officer's Order and the Scope of Work prepared by the Environmental Consultant. Recommendations for remediation include mould, chemical and hazardous materials abatement. Procedures for structural repairs, site remediation, air scrubbing, and air testing are presented.

Recommendations for education, communication, organization, roles and responsibilities, and reporting are included in this report. Recommendations for education include a course delivered through a technical institution or university that would be a requirement for Environmental Consultants and Remediation Contractors.



INTRODUCTION

The Alberta Real Estate Association (AREA) commissioned this report for the purpose of petitioning the province of Alberta to establish guidelines for the assessment and remediation of properties used as illegal drug operations. Provincial guidelines would protect property owners, tenants, and prospective buyers from the adverse health effects of indoor contaminants and building code violations that would otherwise hinder the property's resale or habitation. In addition, the guidelines would facilitate a cohesive and reasonable rehabilitation process.

Recommendations in this report apply after the First Response Team has seized the property and neutralized the primary hazards. This report includes recommendations for education, communication, organization, reporting, as well as more technical issues of remediating secondary health hazards such as mould, chemicals and hazardous materials. Remediation is deemed successful when the property is considered fit for re-occupancy.

This report is organized from a management perspective. Anyone familiar with environmental management systems will recognize the headings: roles and responsibilities, procedures, education, communication, and review and improvement.

Part One provides background information about the particular contaminants and hazards associated with marijuana grow operations and methamphetamine labs. Part Two describes the methodology. Part Three outlines recommendations for assessing and remediating properties used as illegal drug operations. A summary of recommendations is provided at the end of this document.

Many of the procedures that appear in this report for remediating marijuana grow operations rely heavily on the Calgary Health Region's guidelines. The main differences between Calgary Health Region's guidelines and the recommendations appearing in this report arise from the trend that places less emphasis on air sampling, and more emphasis on the expertise of the Environmental Consultant.

These recommendations are essentially a work in progress. Comments and feedback from the stakeholders have been extremely important in compiling this report, and will remain essential to continual improvements.

The study was undertaken July-October, 2009.

PART ONE: BACKGROUND

1.1 Problem Definition

1.1.1 Illegal Drug Operations Pose a Health and Safety Hazard

Illegal drug operations, such as marihuana grow operations and methamphetamine labs can compromise a property's ability to provide habitable shelter for current and future occupants. Operators of illegal drug operations consider the living conditions and damage to the property unimportant compared to the potential revenues of the illegal operation. Extensive alterations to the property are often made, and the property is typically unhygienic with chemical spills, faeces and other debris strewn throughout. When the property is seized, restoration can be extensive and expensive.

1.1.2 Proper Restoration Requires Technical Expertise and Management

The use of a property as an illegal drug operation and the activities that have taken place within it are atypical. Identifying contaminants and producing the scope of work requires specialized knowledge. Assessment and remediation must be carefully undertaken with qualified consultants and contractors. Appropriate education and experience of the Environmental Consultant and Remediation Contractor are critical. Proper restoration requires essentially the following three components.

1. Qualified consultants to assess the scope of work.
2. The safe removal of primary and secondary hazards.
3. An authoritative body to oversee the process.

1.1.3 There are No Consistent Remediation Standards

Remediation procedures and the amount of guidance offered by local health authorities vary between jurisdictions in Alberta and between provinces (CMHC, 2007). Inconsistent interpretation of remediation procedures and techniques can lead to inadequate remediation resulting in a continued health and safety risk for occupants, or a costly and unnecessary sterilisation of a property. Recommendations adopted by the Province would remove inconsistencies and facilitate a more cohesive remediation process. They would also assure prospective property buyers in Alberta that all properties identified as illegal drug operations have been restored to a provincial standard.

1.1.4 There are No Standards for Safe Levels of Contaminants

While there are some guidelines with regards to target levels of contaminants (methamphetamine, fungi, or volatile chemicals), that may be considered acceptable, there is no consensus amongst authorities within Alberta, across provinces, nationally (Health Canada), or in other countries. Due to the complexity, variability, controversy and accuracy of testing, it is difficult to set safe levels of contaminants in a property previously used as an illegal drug operation. There is a need for nation-wide remediation guidelines for illegal drug operations (CMHC, 2007).

1.1.5 Liability Concerns

The real estate industry may be held liable for not disclosing a listed property that is known or should be known to be a former illegal drug operation. Under common law, the disclosure obligations of a listing agent are the same as those of the seller. Sellers (and therefore listing agents) are obligated to disclose that a property was an illegal drug operation when any one of the following criteria applies (Canadian Real Estate Association, 2004).

1. There is an actual material latent defect of which the vendor knows or ought to know.
2. The buyer asks a specific question or expresses a specific concern.
3. The agreement of purchase and sale contains representations that the property was not used as an illegal drug operation or for criminal activities.
4. There is some statutory or regulatory requirement that this disclosure be made.

If none of the above criteria are met, there is likely no obligation to disclose but the Codes of Ethics and provincial regulations may impose a higher obligation of disclosure. To protect their client, the buyer's agent is responsible for making such an inquiry and receiving such a disclosure. In some situations, the real estate agent may not be able to simply take the seller's word for the status of defects, and may be required to investigate further.

1.2 Objective

The objective of this project is to develop a provincial set of recommendations for the assessment and remediation of properties formerly used as illegal drug operations. The intent of the recommendations is to ensure that properties used as illegal drug operations produce no adverse health effects or building code implications that will hinder their resale or habitation.

Adoption of the recommendations by the Province will protect all property owners, tenants, and prospective buyers in Alberta from indoor contaminants caused by illegal drug operations and facilitate a cohesive rehabilitation process.

Benefits of the recommendations include reduced risk to occupant health, better decision-making and management control, better cost control, better communication, and decreased possibility of incidents resulting in legal action. Adoption of the recommendations by the Province would be considered proactive.

1.3 Types of Illegal Drug Operations

The two primary illegal drug operations found in Alberta are marihuana grow operations and methamphetamine laboratories. Of these two, marihuana grow operations are the most common in Alberta and usually cause more damage to properties.

1.3.1 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, skunk, 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.

1.3.2 Marihuana Grow Operations

A marihuana grow operation consists of marihuana plants grown indoors in containers filled with a soil-based media. It 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 property under an arrangement of commercial grow lamps.

Components of the marihuana organic grow operation include:

- high intensity grow lamps and ballasts (fluorescent or metal halide lamp systems),
- sophisticated wiring systems and timers,

- irrigation 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, and
- fuel systems for carbon dioxide generators.

Marihuana grow operations require an artificial indoor environment involving modifications to power, lighting, mechanical, plumbing and structural systems. Increased humidity, through watering systems and humidifiers, combined with higher temperatures cause moisture damage and mould growth. Structural damage is caused by alterations to walls, floors, roofs, and foundation walls. Exhausts from the furnace and hot water tank are often disconnected so the carbon dioxide (CO₂) can filter out and help the plants grow. This practice also introduces carbon monoxide (CO) into the indoor air, which can build up to dangerous levels in enclosed spaces. Sometimes carbon dioxide generators powered by burning propane are used indoors. Insecticides, fungicides, solvents and other chemicals used in operations can be absorbed by gypsum board, carpeting, wood, insulation, subfloors and even concrete basement floors.

Remediation procedures vary depending on the extent of alterations and length of time the operation was in production. The property may have to be gutted with finishes removed and the insulation stripped to remove the contaminants. The Property Owner can be faced with expensive remediation. The Insurance Bureau of Canada estimates the average repair bill for a former grow op house is between \$60,000 and \$80,000 (Weber, 2004). The Calgary Health Region (CHR) estimates the typical cost of remediation to be \$35,000-\$50,000 (Wearmouth, person. comm.).

In the past five years there has been a drop in the extent of damage to properties that were used as marihuana grow operations (Dong, person. comm.). The reason for this is unknown, but may be because the grow operators are getting better at using ventilation or containing the growing area with plastic enclosures.

1.3.3 Weed-oil Extraction

Weed oil extraction procedure is used 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 an evaporation process. The remaining dark oily liquid contains a high concentration of the chemical THC.

Weed oil extraction is sometimes carried out at the marihuana grow operation. Obvious dangers include the presence of highly flammable solvents and an electrical unit that applies heat to drive off volatile solvents. The weed oil extraction process may be completed in a matter of hours. Only very basic easily portable equipment is required.

1.3.4 What is 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. 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. Chronic users are 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).

1.3.5 Methamphetamine Laboratory

Over the past several years, the number of illicit laboratories found by drug enforcement officials has increased dramatically. In Alberta it is considered "rampant and verging on becoming an epidemic" (Goldblatt, 2004). Laboratories have been found in kitchens and bathrooms, vehicles, garages, hotels, apartments, and other buildings. Many of the chemical agents used in production are caustic, corrosive, or create noxious and harmful fumes. Methamphetamine and other illicit substance production have a serious impact on buildings across Canada and are often associated with organised crime. Methamphetamine laboratory fires or explosions have destroyed buildings and homes, injuring occupants and endangering neighbouring residents and buildings. The chemicals used, including hydrogen chloride gas, are extremely dangerous and can cause death or serious injury not only to the individuals making the methamphetamine, but to others who may be living in adjoining properties. The chemical vapours released



during production permeate the walls and carpets making buildings uninhabitable. Cleaning up these sites is time-consuming, costly, and requires specialized training.

Statistics from the US indicate the average cost of a methamphetamine lab cleanup in an average-sized clandestine methamphetamine lab ranges from \$2,500 to \$10,000, but the problem of toxic chemicals and higher cost of hazardous waste disposal charges can result in a cleanup cost exceeding \$50,000 (U.S. Office of National Drug Control Policy, 1998).

1.4 Contaminants and Hazards of Illegal Drug Operations

Primary hazards are those that may cause immediate bodily harm (fire, explosion, booby traps, electrocutions, combustions gases, structural damage and ultraviolet light). Secondary hazards are more difficult to identify and remediate (mould, chemicals, hazardous materials). The First Response Team neutralizes the primary hazards. Recommendations in this report describe the assessment and remediation of the secondary hazards.

1.4.1 Primary Hazards

Primary hazards include fire, explosion, booby traps, electrocutions, combustion gases, structural damage and ultraviolet light. The First Response Team neutralizes these hazards.

Fire and explosion

Fire and explosion is a hazard not only to the property with the illegal drug operation, but also to the properties surrounding it. In a typical marihuana grow operation; there is a greater need for power to run high intensity lights, humidifiers and extra exhaust fans. Electricity is diverted and electrical wiring is tampered with. Modifications are not usually done to acceptable building code standards.

In the manufacturing of methamphetamine, several types of fuels are used including starting fluid, camp fuel, ether, etc. Red Phosphorous may produce “phosphine gas” which is poisonous and flammable. Lithium/Sodium metal is air reactive when mixed with water causing it to be corrosive and flammable. Alterations to chimney flues may result in hot gasses leaking into the building or insufficient clearance of combustible materials.

In a marihuana grow operation explosion can result from the combination of solvents and oxygen that exist in “weed oil extraction labs” or from the use of propane tanks

indoors. In a methamphetamine laboratory, explosion hazards are from improper use of flammable fuels, ignition sources, and mixed chemicals.

Booby traps

Operators of marihuana grow operations often “booby trap” the property to target unauthorized entry of emergency responders (fire fighters, paramedics and law enforcement personnel). Spring-loaded knives and guns; light switches, refrigerators, VCRs or other electrical appliances wired to explosive devices; spikes in entranceways; and live wires on door handles are common. These can cause injury or even death to members of the First Response Team as well as other people (newspaper carriers, children) who happen to wander on to the property. The First Response Team is trained to recognize and deactivate booby traps.

Electrocutions

Marihuana grow operations require a significant amount of energy to operate. To avoid detection, the electrical meter is often bypassed, and secondary distribution panels and transformers are installed. Typically, the illicit drug operators do not use qualified electricians. Faulty wiring, exposed circuits, and hanging bundles of live wires can result in electrocution of the occupants, fire fighters (if responding to a fire), the police and First Response Team, utility workers, health inspectors, and others. Sometimes 240 volt power is connected to 120 volt sockets for the grow lights. Any ordinary appliance will be destroyed and possibly cause a fire if it is unknowingly plugged into these ‘normal’ sockets. The use of caustic chemicals can also corrode wire insulation causing short-circuiting and fires.

Combustion Gases

Gas appliances, such as furnaces and hot water heaters, may have their flues disconnected to release the carbon dioxide (CO₂) into the indoor air for absorption by plants. This practice also introduces carbon monoxide (CO) into the indoor air. Propane and natural gas may be used indoors to power carbon dioxide generators. Containers of compressed gases used to power the CO generators can leak or explode. Alterations to the chimney can cause chimney backdrafting of flue gasses back into the indoor environment. There can also be a build-up of other poisonous gases from the chemicals used in the production of the marihuana grow operations. Open containers or spilt fuels such as those used in Methamphetamine labs are extremely flammable and toxic.

Structural Damage

Alterations to the property often cause structural damage. Holes are drilled in foundation walls to access power lines before the electric meter. Ventilation systems are installed through haphazardly created holes in stairs, floors and ceilings, and discharged into the



attic or crawlspace causing condensation, mould growth and rotted structures. High humidity in the indoor environment can lead to mould growth and damage to interior and exterior finishes. Alterations to or chemicals dumped into the water supply can result in drainage deficiencies causing sewer gas and effluent backup.

Ultraviolet light

Electrical shock and serious eye-damage are potential hazards when high-intensity discharge lamps are present. Such grow lights may not be properly installed or maintained. Broken HID lamps can emit UV radiation.

1.4.2 Secondary Hazards

Mould/Fungi

High humidity and increased temperatures associated with marijuana grow operations usually lead to mould growth. Water spills on the floor and walls may be ignored resulting in mould growth. Some mould growth is obvious, but it also may be hidden inside wall assemblies, under carpets, or behind wallpaper. Mould can be allergenic, pathogenic or toxigenic depending on the species and is considered a public health issue.

Chemicals

Exposure to hazardous liquids and gases may result from large amounts of chemicals and volatile organic compounds used in marijuana grow operations such as pesticides, fertilizers, solvents, and other unknown chemical mixtures. Large barrels containing chemicals often have connected hoses resting inside, creating a potential for backflow into the potable water line.

Chemicals found in a methamphetamine lab may include acids, gases and solvents that are corrosive, toxic, irritating to skin and respiratory tract, poisonous, and flammable.

Even though the chemicals and their containers are removed, chemical residue persists due to spills, overspray, and subsequent absorption by building contents and building materials.

Hazardous materials

Hazardous materials, other than mould and chemicals noted above, that might be present include lead, asbestos, mercury, polychlorinated biphenyls, radioactive isotopes, and refrigerants.

Exposure Scenarios

Table 1: Summary of exposure scenarios (contaminants, exposure pathways, and potentially exposed populations) associated with different phases in the life of a clandestine methamphetamine lab (CEPA, February 2009).

Scenario	Potentially Exposed Populations	Contaminants & Exposure Pathways
Operational Clandestine Lab	Operators Visitors Innocent bystanders Neighbours	Primary: inhalation of volatile contaminants, intentional dosing (all routes) Secondary: dermal contact with non-volatile residues on surfaces, non-dietary ingestion via hand-to-mouth activities
Discovery and Removal	Police First Response Team Executive Officer	Inhalation of volatile contaminants stored in original containers Inhalation of re-suspended, particle-adsorbed contaminants <i>Exposure minimized by personal protective equipment</i>
Cleanup and Verification	Environmental Consultant Remediation Contractor	Inhalation of volatile contaminants off-gassing from 'soft' media ¹ Inhalation of re-suspended, particle-adsorbed contaminants. <i>Exposure minimized by personal protective equipment</i>
Re-occupancy	Residents (including sensitive sub-populations)	Dermal contact with methamphetamine residues on surfaces. ² Dermal contact with non-volatile chemicals on surfaces that lack cleanup standards. Inhalation of volatile contaminants off-gassing from 'soft' media (assumed to be minimal).

¹ "Soft" media includes upholstered furniture, drapes and carpet (assuming they have not been removed as part of cleanup operations), and wallboard. During this phase, storage containers (the primary sources of volatile contaminants) will have been removed. Secondary sources, such as solvents that were spilled or improperly disposed of, will still be present.

² For re-occupancy to occur methamphetamine residues on surfaces *must* be cleaned up to the specified cleanup standard.

PART TWO: METHODOLOGY

2.1 Approach

The approach for this study included:

- Reviewing existing procedures and guidelines in Alberta for assessing and remediating illegal drug operations,
- Identifying authoritative documents and sources,
- Contacting environmental consultants in the Calgary area for their opinion on the CHR guidelines,
- Contacting stakeholders such as executive officers of AHS and microbiologists for their knowledge, experience and opinion regarding the remediation of illegal drug operations
- Reviewing remediation guidelines for marihuana grow operations and methamphetamine laboratories in other provinces and countries,
- Formulating recommendations from the literature review and consultations,
- Obtaining feedback from a draft of this document that was kindly provided by staff of several Health Regions across Alberta as well as environmental consultants, microbiologists, and others.

2.2 Literature Review and Consultations in Alberta

During the preparation of this study, the public health regions in Alberta were in the process of merging into Alberta Health Services. Each health region has developed their own procedures for managing illegal drug operations. The Calgary Health Region, Capital Health Region (Edmonton), David Thompson Health Region (Red Deer) and Chinook Health Region (Lethbridge) were contacted. The procedures and guidelines developed by the Calgary Health Region were considered to be the most rigorous and had either been adopted or referenced by other health regions.

Other Alberta documents reviewed include:

- ABC, 2007. Alberta Building Code 1997, Building Standards Branch, Alberta Labour
- Alberta Health and Wellness, 1999. "Minimum Housing and Health Standards".
- Government of Alberta. "Public Health Act."
- Housing Regulation, Alberta Regulation 173/99, Public Health Act



- Alberta Regulation 243/2003, “Nuisance and General Sanitation Regulation”, Public Health Act
- Alberta Regulation 62/2003, OH&S, 2003. Alberta Occupational Health and Safety Act, Government of Alberta, Employment and Immigration.

A summary of policy or practices of the various health regions in Alberta and environmental consultants are discussed below.

2.2.1 Calgary Health Region (Calgary)

The Calgary Health Region developed a rigorous set of guidelines for remediating marihuana grow operations in 2004. They also developed guidelines for fungal air testing. Their website has information about marihuana grow operations, frequently asked questions, guidelines / policies / standards, and resources (CHR website, 2009a).

2.2.2 Capital Health Region (Edmonton)

Edmonton Environmental Public Health has procedural guidelines for managing marihuana grow operations. The main difference between Edmonton’s guidelines and Calgary’s guidelines is that Edmonton has not developed additional guidelines for fungal air testing (Dong, person. comm.). Instead they rely on existing guidelines from Health Canada (1995, 2004, 2007), EPA (2001), New York City (2008), and Canadian Construction Agency (2004).

2.2.3 Chinook Health Region (Lethbridge)

Chinook Health Region in Lethbridge adopted the Calgary Health Region’s guidelines in the fall of 2008 (Langemann, person. comm.).

2.2.4 David Thompson Health Region (Red Deer)

Environmental Public Health in Red Deer has borrowed many of the procedural guidelines developed by the Calgary Health Region. They have an average of four marihuana grow operations seized a year. They rely on the expertise from one pre-screened contractor to carry out the assessment, remediation and Environmental Clearance Testing (Brown, person. comm). They expressed a concern over potential conflict of interest when the remediation contractor is conducting his/her own clearance test, essentially evaluating his/her own work.

2.2.5 Consultations with Environmental Consultants in Calgary

Twelve environmental consultants who carry out assessment and Clearance Testing at marihuana grow operations in the Calgary area were contacted and asked if they would comment on the CHR's guidelines. Most Environmental Consultants thought the guidelines provided excellent direction, but when asked what they would change, had the following suggestions.

- The most common suggestion involved the lack of education and experience of the Environmental Consultant. Several mentioned that the current trend is towards more reliance on the expertise of the Environmental Consultant and visual assessment, and less emphasis on air sampling and the Clearance Test. Some suggested that the Calgary Health Region screen Environmental Consultants better, and ensure that a senior individual with considerable experience in mould remediation supervision be on site to carry out the initial assessment and write the Scope of Work. Guidelines on the expertise of the Environmental Consultant should include education, minimum years of experience, and references for projects they have personally worked on.
- Several mentioned the importance of the Environmental Consultant seeing the property as soon as possible in its original state in order to make a more informed assessment.
- Several mentioned the importance of getting utilities back on line as soon as possible so that heat and light are available for the assessment and remediation.
- Several thought the air sampling guidelines were too stringent and did not seem to be scientifically based.
- Several mentioned the need for more guidance on attic insulation removal, the use of air scrubbers prior to air testing, asbestos abatement, and the use of biocides.
- Two suggested that Air-O-Cell should not be the only air sampling method used during the Clearance Test. However, another two were in favour of the practice. Most suggested that the two methods, Air-O-Cell and RCS, always be used together. One suggested that surface sampling be required as well.
- Two consultants would like to have more guidance on reporting and suggested a standardized report template.
- Two expressed a need for better training of the Remediation Contractors.
- Two mentioned the need for better monitoring of personal protection worn by people (real estate agents and prospective property buyers) before the property is fully remediated.
- One suggested that the list of indicator moulds be revised.

- One suggested that the attic and garage should not have to be tested, as these areas are open to the outside.
- One suggested that the guidelines address plumbing, heating, ventilation, electrical and structural as well as air quality.

2.3 Literature Review and Consultations in Other Provinces

Examples of recommendations from other provinces for assessing and remediating illegal drug operations are scarce. The Calgary Health Region found a lack of guidelines when undertook such an examination in 2004 (Wearmouth, person. comm.)

In the province of British Columbia, the Municipality (not the health region) takes the lead on assessing and remediating marihuana grow operations. Their authority comes from building and safety regulations (building code). Fire and electrical inspectors play a key role. The Fire Chief of the City of Surrey, BC published a document, “Eliminating Residential Marijuana Grow Operations - An Alternate Approach”, which describes their method of obtaining electrical consumption data to identify properties that are using too much energy (Garis). This document does not include remediation considerations.

The City of Toronto drafted a document in response to methamphetamine labs (City of Toronto, 2006). This document was adapted and formalised in a response protocol by the Town of Halton Hills (Town of Halton Hills, 2009).

Canadian documents reviewed include:

- Canada Mortgage and Housing Corporation, 2007 “A Discussion Paper on Indoor Air Quality Investigations of Houses Used for Marijuana Grow Operations”
- Canadian Construction Association, 2004. “Mould Guidelines for the Canadian Construction Industry”
- The Canadian Real Estate Association, December 2004. “Grow-ops. What REALTORS Need to Know.” Ottawa
- City of Toronto, 2006. “Coordinated Marijuana Grow House and Illegal Drug Lab Response Protocol (Draft)”. Municipal Licensing & Standards, City of Toronto. November 6, 2006
- Health Canada, 2007. “Residential Indoor Air Quality guidelines: Moulds.” HC Pub: 407 5E.
- Health Canada, 2004. *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*. Ottawa: Health Canada. ISBN 0-662-37432-0.
- Health Canada, 1995. *Fungal contamination in public buildings: A guide to recognition and management*. Ottawa: Health Canada.



- Insurance Bureau of Canada, 2004. “Average cost of remediating MGO”.
- Ontario Safety Association for Community & Healthcare, March 2001.

2.4 Literature Review and Consultations in Other Countries

The United States has considerable information on prevention and remediation for both marihuana grow operations and methamphetamine labs.

International documents reviewed include:

- California Environmental Protection Agency (CEPA), February 2009, p.5. “Assessment of Children’s Exposure to Surface Methamphetamine Residues in Former Clandestine Methamphetamine Labs, and Identification of a Risk-Based Cleanup Standard for Surface Methamphetamine Contamination.” California Environmental Protection Agency.
- EPA, March 2001. *Mold Remediation in Schools and Commercial Buildings*. US Environmental Protection Agency, 402-K-01-001.
- Minnesota Department of Health (MDH) and Minnesota Pollution Control Agency (MPCA), April 3, 2007. “Clandestine Drug Lab General Cleanup Guidance”
- New York City Department of Health, 2008. *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*.
- U.S. Office of National Drug Control Policy (1998).

2.5 Review of Related Guidelines and Standards

2.5.1 Building Codes

The mandate of building codes is to provide a minimum standard for structures and ventilation, and address fire and occupant safety in the design and construction of buildings. Measures impacting indoor environmental quality, such as remediation of hazardous materials or de-gassing of buildings before they are occupied are not addressed.

The Alberta Building Code (ABC 2006) sets out technical provisions for the design and construction of new buildings. It also applies to the alteration, change of use and demolition of existing buildings. The Alberta Building Code establishes provisions to address the following five objectives, which are fully described in the Preface to the Code:

- safety



- health
- accessibility for persons with disabilities
- fire and structural protection of buildings
- energy conservation

Municipalities can go beyond the minimum provincial codes in regulating or implementing more stringent building or use requirements such as restrictions on building materials and methods of construction.

2.5.2 Occupational Health and Safety

Canadian employers have a duty under provincial occupational health and safety acts to take reasonable precautions to protect workers from substandard environmental quality, including air contaminants exceeding workplace guidelines (OH&S, 2003). These guidelines apply to workers carrying out the inspections and remediation. However, the epidemiological studies on which the guidelines are based are for the average adult healthy male and an 8-hour exposure. They do not necessarily apply to women or children or other members of the population that might become future occupants of the building.

2.5.3 Public Health Authorities

Health Canada was the first national health authority in the world to develop a national programme of research on indoor air quality and to publish a set of guidelines. Their document “Fungal contamination in public building: A guide to recognition and management” (1995) has been widely referenced across Canada. It was followed by “Fungal Contamination in Public Buildings: Health Effects and Investigation Methods” (2004). In 2007, Health Canada replaced their 1995 guidelines with new residential guidelines for mould (Health Canada, 2007).

Regional health authorities have been playing an active role in providing guidance on assessing and remediating illegal drug operations. The guidelines developed by the Calgary Health Region for remediating marihuana grow operations and fungal air testing remain the most comprehensive in Canada.

2.5.4 Other Guidelines

Guidelines on mould exist for residential buildings, such as those by Canada Mortgage and Housing Corporation (CMHC, 1987) but these are not enforceable by law.

There are ‘human rights’ provisions in the legislation such as “duty to accommodate” which may pertain to indoor air quality.



There is currently no established mechanism to license, regulate, permit or certify people or companies who investigate, remediate and test the environmental conditions in former illegal drug operations. The so-called “certified mould-environmental consultant” or “certified mould remediator” offered by industry groups and private associations are not government regulated or endorsed, and thus do not provide assurance that their members have sufficient qualifications to properly undertake the work.

2.6 Developing Recommendations

Information from existing policy, procedures, recommendations and guidelines was critically reviewed and synthesized into a set of recommendations for this report. A draft was developed and sent to the Executive Officers of Alberta Health Services in Calgary, Edmonton, Red Deer and Lethbridge to review. Environmental Consultants in the Calgary area as well as several microbiologists were also given the opportunity to provide feedback. Their comments were considered for incorporation into the final report.

PART THREE: RECOMMENDATIONS

This section discusses our recommendations to address the remediation of former illegal drug operations. It outlines an organizational framework, describes the roles and responsibilities of each stakeholder, discusses technical procedures for assessing, remediating and testing, and outlines recommendations for education and communication.

3.1 Recommendations for the Organizational Framework

The organizational chart below describes the relationships between the key stakeholders involved in the assessment and remediation of former illegal drug operations. Executive Officers of Alberta Health Services have a central role in directing the process.

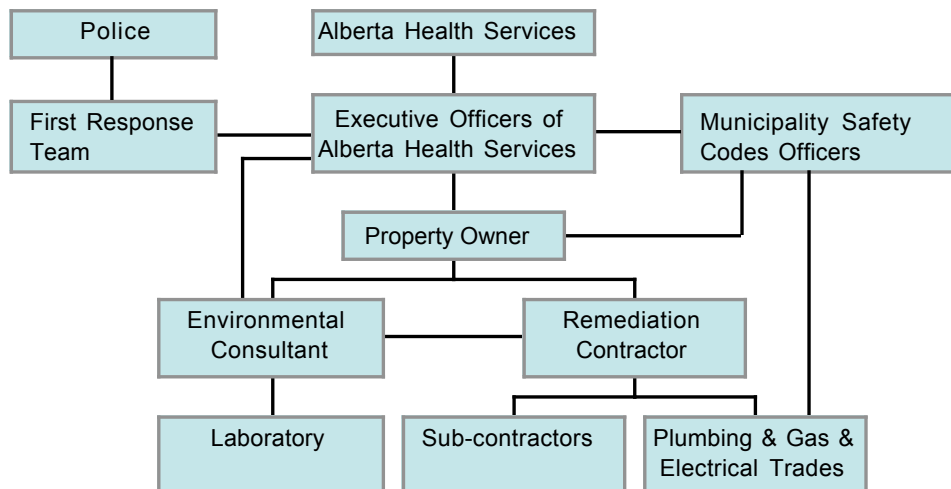


Figure 1: Organizational Chart

3.2 Recommendations for Roles and Responsibilities

3.2.1 Alberta Health Services

In Alberta the assessment and remediation of illegal drug operations is regarded as a health issue and therefore is controlled by Alberta Health Services.³ Section 62(1) of the Public Health Act of Alberta grants Executive Officers of Alberta Health Services the authority to close and restrict access or occupancy when it is believed there would be a health hazard, including a property that was formerly used for illegal drug operations. Executive Officers may issue an order (“Unfit for Human Habitation Order” or “Executive Officer’s Order to Repair”) and register a “Notice of Health Hazard” on the land title pertaining to that property that will not be lifted until the property has undergone remediation and the success of the remediation can be demonstrated.

“62(1) Where, after an inspection under section 59 or 60, the executive officer has reasonable and probable grounds to believe that a nuisance exists in or on the public place or private place that was the subject of the inspection or that the place or the owner of it or any other person is in contravention of this Act or the regulations, the executive officer may issue a written order in accordance with this section.”

Alberta Health Services also follow requirements set out in the “Minimum Housing and Health Standards” published by Alberta Health and Wellness (1999). Alberta Health Services’ primary role is to work with government agencies to set policy and procedures for the remediation of properties used as illegal drug operations. They provide the necessary resources (finances, skilled people, and technology) to realize their goals and objectives. Other responsibilities include to:

- hire and support the Executive Officers and review their performance,
- ensure effective organizational planning,
- provide adequate resources and manage resources effectively,
- assemble a list of qualified Environmental Consultants and Remediation Contractors, and
- assess its own performance and implement improvements.

In the province of Alberta, the Executive Officer also has responsibility for the Nuisance and General Sanitation Regulation of the Public Health Act. This prohibits any person from creating, committing or maintaining a nuisance with regards to unsanitary conditions and emitting smoke or aerosols, noxious vapours or odours arising from plumbing systems that may be injurious or dangerous to the public health (Alberta Public Health Act, 1999). The Public Health definition of “nuisance” is *“a condition that is or that might become injurious or dangerous to the public health, or that might hinder*

³ In British Columbia, the municipality has responsibility and control.

in any manner the prevention or suppression of disease.” The Executive Officer can erect a notice, abate or remove for disposal the offending substances. This may be applied particularly to methamphetamine labs.

3.2.2 Executive Officers of Alberta Health Services

The primary role of the Executive Officer is to evaluate the health hazard and ensure the property has been properly remediated before it is reoccupied. Responsibilities include to:

- implement goals and objectives of Alberta Health Services,
- work with the First Response Team, the police, fire, and the Safety Codes Officers to evaluate the health and safety hazards,
- issue the Executive Officer’s Order (“Unfit for Human Habitation Order” or “Executive Officer’s Order (to Repair) as necessary,
- register a “Notice of Health Hazard” on the land title pertaining to that property, if an order has been issued,
- contact the Property Owner to provide information for rescinding the Unfit Order or for complying with the Repair Order, and to provide the Property Owner with procedural information,⁴
- develop criteria and a list of qualified Environmental Consultants and Remediation Contractors,
- review, develop or amend guidelines for assessing and remediating illegal drug operations,
- keep guidelines current when methods for operating illegal drug operations change,
- keep abreast of what other jurisdictions are doing,
- review all documents related to the assessment, remediation, permit process, and testing,
- re-inspect the property to evaluate the remediation
- invoice the Property Owner for any incurred expenses and fees, and
- rescind the Unfit Order once all conditions are met and fees are paid.

3.2.3 First Response Team

In Alberta, the Green Team investigates illegal drug operations found in the northern part of the province, while Project SAMIT (Southern Alberta Marihuana Investigative Team) investigates illegal drug operations in the southern part. The First Response

⁴ Procedural information may include a list of tasks the Property Owner should carry out as soon as possible such as hiring an Environmental Consultant and draining water lines if there is a danger of freezing due to the property being left unheated. See also Sections 3.3.1 and 3.4.1 of this report.

Team may include police officers, fire fighters, and social workers (if children are present). The role of the First Response Team is to seize the property, remove the illicit drugs, and neutralize the primary hazards.

3.2.4 Municipality

The role of the Municipality is to:

- regulate the occupancy of buildings through controlling occupancy permits,
- issue permits (environmental restoration, plumbing, gas, heating, ventilation, electrical), and
- perform inspections.

No building can be occupied without an Occupancy Permit. The Occupancy Permit is issued only after other permits such as electrical, plumbing, etc. are issued. The Occupancy Permit is required for new construction and any renovation work including remediation of an illegal drug operation. Thus both the Municipality and AHS must be satisfied before re-occupancy of a property used as an illegal drug operation is permitted.

3.2.5 Property Owner

The primary role of the Property Owner, after being notified of a seizure of an illegal drug operation, is to hire an Environmental Consultant to oversee the remediation process and to pay for the remediation costs. Responsibilities include to:

- cooperate with Alberta Health Services,
- arrange for financing to pay for the remediation, permits, and fees,
- hire an Environmental Consultant approved by AHS,
- hire the Remediation Contractor approved by AHS, and
- complete the reconstruction (finishing, appliances, etc.) once the Unfit Order is rescinded.

Although it seems unfair for the Property Owner to incur such high costs to repair damage that was caused by a tenant, it is the Property Owner's responsibility as landlord to conduct periodic visits to the rental unit to ensure it is not being used for illegal purposes. Property insurance may not cover the cost of remediating rental properties used as illegal drug operations, especially when there has not been adequate vigilance by the property owner.

Property Owners, who are also contractors, must be qualified and approved by AHS to remediate their own property and must work in close association with the Environmental Consultant. However, they can not act as both the Environmental Consultant and Remediation Contractor due o a conflict of interest.

3.2.6 Environmental Consultant

The primary role of the Environmental Consultant is to act as a liaison between the Executive Officer and the Property Owner, and to direct the remediation process. Responsibilities include to:

- ensure all requirements in the Executive Officer's Order are met,
- provide a Scope of Work for remediation,
- coordinate with the Property Owner and Remediation Contractor to obtain permits for heating, electrical and gas as soon as possible,
- obtain building permit and any other required permits prior to commencing work,
- ensure all work is completed by an approved Remediation Contractor,
- direct, observe and document the proper management of hazardous materials,
- discuss details about the recovery or disposal of building contents and finishes with the Property Owner,
- ensure that anyone such as Safety Codes Officers and trades wear proper personal protection equipment before entering the property,
- determine method of cleaning,
- deliver Certificate of Payment to AHS (certifies the work done by the Remediation Contractor and Subcontractors),
- conduct the Environmental Clearance Test and deliver a report to AHS,
- arrange final inspection from the Executive Officer with AHS, and
- arrange final inspections from Municipality Safety Codes Officers for the occupancy permit.

3.2.7 Remediation Contractor

The primary role of the Remediation Contractor is to carry out the work specified by the Environmental Consultant in the Scope of Work. Their responsibilities include to:

- comply with the work order of the Environmental Consultant,
- ensure all workers wear appropriate personal protection equipment,
- hire specialized Subcontractors when needed (soil remediation, ice blasting, hazardous materials specialists, restoration),
- carry out the demolition and remove hazardous materials,
- remove contents for cleaning and disposal,
- complete repairs to heating and ventilation,
- repair the building envelope,
- coordinate with local authorities for all permits, and
- clean building surfaces.

3.2.8 Plumbing, Gas, and Electrical Trades

The responsibility of the plumbing, gas and electrical trades is to apply for permits, repair the damage, and certify their work. They should coordinate their work with the Remediation Contractor and the Environmental Consultant.

3.2.9 Laboratory

A Laboratory analyzes samples for the Environmental Clearance Test. The Laboratory should be accredited for the substance they are analyzing (moulds, VOCs, heavy metals, iodine, P2P, methamphetamine chemicals, mercury vapour, etc.).⁵

The Laboratory selected by the Environmental Consultant to undertake the microbial analysis shall demonstrate AIHA (American Industrial Hygiene Association) certification as an Environmental Microbiology Accredited Laboratory with a competence in moulds, or other comparable accreditation. Alternatively, the Laboratory should have demonstrated routine participation and acceptable performance in an Environmental Microbiology Proficiency Analytical Testing (PAT) program for both culturable and direct examination determination of fungi, or other comparable accreditation. Documentation of laboratory certification or performance in PAT programs is to accompany analytical reports and is to be included in reports submitted to Alberta Health Services.

3.3 Recommendations for Procedures

3.3.1 Procedures to Prevent Further Damage to the Property

The cold Alberta winter climate can cause water lines to burst in unheated buildings. This can result in further potential for damage due to mould growth. As such it is recommended that the Executive Officer inform the Property Owner to drain the water lines if there is danger of freezing. The Property Owner or Environmental Consultant (as representative) should arrange this as soon as possible.

It is the responsibility of the Property Owner or Environmental Consultant to obtain the appropriate permits to restore the heating, electricity and gas to the building as soon as possible. Buildings should not be left unheated during the winter because thermal movements from fluctuating outside temperatures can cause cracks in the building envelope. In addition, there is greater chance of condensation on a cold exterior wall if

⁵ Non-accredited labs may be acceptable if they are currently participating in the AIHA EMPAT (PAT) program, the Environmental Consultant has reviewed their most recent culturable and direct exam results (two separate reports), and the lab can make available an up-to-date report. The Environmental Consultant can review the lab's most recent culturable and direct exam results by going to the AIHA Proficiency Analytical Testing website at http://www.aiha.org/1documents/lab/AAT_PT_Schedule.pdf

the building is not heated. Furthermore, the assessment and remediation procedures are made easier with the availability of heat and light.

It is highly recommended that the Executive Officer communicate to the Property Owner the importance of hiring an Environmental Consultant to manage the project. AHS should have a list of pre-qualified consultants that the Property Owner can choose from. Obtaining the services of an Environmental Consultant early will:

- expedite the permit process and the time it takes to restore the heating, electricity and gas,
- provide the Environmental Consultant the opportunity to view the original condition of the property, which is important for determining the Scope of Work and may have a bearing on the success of the Environmental Clearance Test, and
- reduce the likelihood of any further damage to the property that may arise from being unheated, especially in winter.

3.3.2 Permit Application and Inspection Procedures

The Municipality Building Regulations Division is responsible for examining plans, issuing permits and performing inspections for renovations to properties used as illegal drug operations. Permits are divided into four areas:

- electrical,
- mechanical,
- plumbing & gas, and
- building.

Before carrying out any work inside the property, the Environmental Consultant will apply to the Municipality for all required permits. In addition to the four types of permits named above, other permits may be required such as structural and demolition. The City of Calgary also requires an Environmental Restoration Permit when an inspection is required for buildings closed due to moisture impact.

The Municipality charges fees for issuing the permits and performing inspections. These fees vary between jurisdictions.

Preliminary inspections of the electrical repairs and gas line repairs need to be carried out so that services can be reinstated to the building as soon as possible, providing power and light for proper cleaning and air sampling.

Safety Codes Officers will not carry out final inspections until they have received verification from Alberta Health Services of satisfactory air quality inside the premises.

Once inspections have been completed and passed, and the “Unfit Order” has been lifted, reconstruction can take place (replacement of insulation, vapour barrier, gypsum board, carpet, etc.). Reconstruction may require additional building permits.

3.3.3 Property Owner / Environmental Consultant Checklist Procedures⁶

If a property is the subject of an Executive Officer’s Order relating to a former illegal drug operation, the registered Property Owner or Environmental Consultant shall:

1. **OBTAIN ORDER** - Obtain a copy of the Executive Officer’s Order
2. **HIRE CONTRACTORS** - Hire an Environmental Consultant and a Remediation Contractor
3. **OBTAIN PERMISSION TO ENTER** - The Environmental Consultant and Remediation Contractor shall obtain written permission from the Executive Officer prior to entering the premises.
4. **PREPARE ASSESSMENT & SCOPE OF WORK** - The Environmental Consultant shall prepare a detailed Assessment and Scope of Work based on their initial inspection prior to carrying out any work inside including cleaning. The Environmental Consultant shall oversee all remediation and repair work and perform or arrange for a Clearance Test.
5. **APPLY FOR PERMITS** – An application shall be made to the Municipality for all required permits. The detailed Assessment and Scope of Work report must be submitted with this application to the Municipality. A structural permit may be required.
6. **SUBMIT DOCUMENTS** - The detailed Assessment Report and Scope of Work must be submitted to the Executive Officer.
7. **INSPECTION** - Call the Municipality to carry out an “electrical service inspection” and a “gas inspection” when related deficiencies have been corrected.
8. **REINSTATE GAS & ELECTRICITY** - Once these inspections have passed, contact the utility companies to reinstate the electrical service and the gas service. (Proper and thorough remediation work and air sampling cannot be completed nor accepted without the availability of heat, light and hot water.)
9. **REMEDiate & CLEAN** - Ensure that all remediation is completed by the Remediation Contractor and Subcontractors according to the requirements set out in the Executive Officer’s Order and the Environmental Consultant’s Scope of Work.
10. **FURNACE & FIREPLACE** - Ensure that furnace and duct inspection and cleaning are complete and fireplace inspection and cleaning (if required in the Order) are complete.
11. **AIR SAMPLING** – The Environmental Consultant will perform or arrange for the Environmental Clearance Test after all remediation and clean up have been completed.
12. **SUBMIT DOCUMENTS** - Submit all documents to the Executive Officer for review and acceptance.

⁶ Adapted from CHR, 2009a.



13. **CLEARANCE TEST PASSES** - If the Environmental Clearance Test passes, contact the Executive Officer for inspection.
14. **CLEARANCE TEST FAILS** - If the Environmental Clearance Test does not pass, further cleaning and remediation will be necessary.
15. **LIFTING OF ORDER** – The Unfit Order will be lifted once all documents have been submitted as required and the Executive Officer has inspected the property. Any postings may then be removed from the premises.
16. **FINAL INSPECTIONS** – Once the Environmental Clearance Test has passed and the Executive Officer has made their final inspection, contact gas and electrical inspectors to carry out their final inspections.
17. **REMOVAL OF NOTICE OF HEALTH HAZARD** - Obtain the invoice for the removal of the Notice of Health Hazard from Alberta Health Services. Once this has been paid, the Executive Officer will remove the Notice of Health Hazard from the title.
18. **COMPLETE RENOVATIONS** - Once the notice of health hazard is removed, the final renovations may be done to ensure the dwelling is in a habitable condition (gypsum board, floor coverings, cabinetry, etc.). When the basement is redeveloped, separate electrical, building & plumbing permits are required. Contact the building inspector to carry out a framing inspection prior to reinstallation of insulation and vapour barriers. The Building Inspector will carry out a final inspection after reinstallation of insulation and vapour barriers.

3.3.4 Conflict of Interest

The Remediation Contractor who performs the necessary decontamination tasks must be independent from the Environmental Consultant who prepares the Scope of Work and Environmental Clearance Test.

3.4 Recommendations for Assessment

3.4.1 Executive Officer's Order

The Executive Officer should issue an “Unfit for Human Habitation Order” (Unfit Order) if during inspection, conditions are found which are in contravention of the Public Health Act and might be considered dangerous. These conditions may include visible mould, the presence of combustion gases, evidence of electrical system tampering, chemical contamination and structural damage.

The Unfit Order should be sent to the Property Owner and the occupants of the building. The building must be vacated immediately and unauthorized entrance is prohibited.



Direction should be given to the Property Owner to:

- apply in writing for permission to enter the property,
- hire a qualified Environmental Consultant to prepare a Scope of Work,
- obtain permits,
- hire an approved Remediation Contractor to carry out the work,
- follow predetermined reporting requirements, and
- respect the Unfit Order until all deficiencies have been corrected to the satisfaction of the Executive Officer.

3.4.2 Assessment and Scope of Work of a Marihuana Grow Operation

A preliminary assessment should be carried out by the Executive Officer at the time of first response, however a detailed assessment, which leads to the Scope of Work, is carried out by the Environmental Consultant. The detailed assessment follows the minimum requirements set out in the Executive Officer's Order and includes a determination of the extent of mould contamination, the identification of hazardous materials and chemicals, and remediation recommendations.

The complexity of contamination varies according to the size and construction of the building, how long the illicit activity was in operation, and the extent and use of ventilation equipment during operation.

The assessment includes a visual inspection and may include intrusive and destructive testing such as cutting access holes in walls and ceilings, lifting carpets or vinyl sheet flooring, and removing wallpaper for investigation purposes. A moisture meter is useful in detecting non-accessible or hidden wet areas. An infrared camera that detects moist building materials is also useful. The previous layout of equipment may provide clues to where water damage, mould growth, or chemical contamination may be expected.

The assessment will identify mould contamination, chemical contamination, and hazardous materials such as lead, asbestos, pesticides and mercury contamination that were disturbed or caused by the illegal drug operation, or that may be impacted by the planned remediation or by general repair and renovation work.

The Environmental Consultant will document the assessment and provide a detailed report to the Executive Officer outlining the Scope of Work required to remediate.

3.4.3 Assessment and Scope of Work of a Methamphetamine Laboratory

The amount of work required to remediate a Methamphetamine Lab varies. Complete removal and disposal of all porous building materials (wood, fabric) that have been subject to chemical contamination (based on visual and olfactory clues) is recommended. Encapsulation of chemical contaminants is acceptable in some instances and should be done at the discretion of the Environmental Consultant.

Nevertheless, testing may be carried out to determine what can be cleaned and what should be discarded. Testing guidelines have been developed by Minnesota Department of Health (MDH and MPCA, 2007). Testing should be considered a screening process only to allow sufficient leeway for:

- cleaning and salvaging items and materials that would otherwise have to be discarded,
- distinguishing between heavily contaminated former lab sites and those that may have been minimally used, and
- allowing for differences in eventual occupancy.

Keep in mind, it is often more cost effective to remove or encapsulate chemical contaminants than pay for testing. In addition, testing results and the guidelines below are unreliable.

Table 2: Recommendations for Sampling Levels and Action Taken for Methamphetamine Lab (MDH and MPCA, 2007)

Chemical	Interpretation and/or Action Taken
Methamphetamine (Remediation is required whenever sample levels are 1 µg/ft ² or greater)	1 to <10 µg/ft ² Modified cleaning or disposal of some building materials and contents is allowed and will be determined by the Environmental Consultant and Executive Officer >10 µg/ft ² Full remediation of all building materials and contents is required
Corrosives	Clean to: pH 6-8
Volatile Organic Compounds (solvents)	Clean to: <1 ppm total VOCs in air ⁷
Phosphorus / Iodine	Discard stained/affected material
Mercury	Clean to <0.3 µg/m ³ (0.036 ppb) in air
Lead	Clean to <40 µg/ft ² wipe sample

⁷ Ensure the equipment used is precise enough. The common error for Photoionization Detectors (PIDS) can be as much as +/- 5 ppm.

3.5 Recommendations for Remediation

3.5.1 Marihuana Grow Operation General Remediation

All grow operation related materials remaining behind, including plant pots, soil, fans, lights, cutting tools and general rubbish, should be removed and discarded.

The Environmental Consultant must be present on site to observe and document the following activities:

- remediation or abatement of any hazardous materials, including moulds and water damaged materials,
- removal of any remaining marihuana grow equipment and chemicals,
- removal of gypsum board, vapour barrier and insulation (walls and attic), and
- removal of carpet and underlay or other flooring.

Chemicals, both in their original containers and in mixed solutions, must be appropriately discarded and not dumped into the sewers. The local fire department or hazardous material transfer stations may accept these chemicals for disposal and should be contacted in that regard.

Wallboard, floors and ceilings, including floor coverings, drywall, vapour barrier, insulation and wood framing, in any grow area or chemical mixing area should be considered contaminated by an assortment of chemicals and possible mould, and must be removed and appropriately discarded.

Heat, odours and air laden with chemical particulates are frequently vented out of the grow areas through or into the attic. In winter months this can result in significant amounts of condensation building up inside the attic with resultant water damage to the underside of the plywood sheathing, trusses, insulation and ceilings beneath. Often water seeps down the outer edges, through soffits, and inside exterior and interior walls making intrusive testing for moisture and moulds imperative. These continually moist conditions are suitable for mould growth. When moist conditions have been maintained in the attic, all insulation in the attic area is to be removed and disposed. The vapour barrier will have to be removed or properly repaired as necessary. Roof sheathing, trusses and/or beams must be assessed for structural damage and repaired or replaced.

3.5.2 Mould Remediation

The following procedures for mould remediation are based on “Mould Guidelines for the Canadian Construction Agency” (CCA, 2004), and “Guidelines on Assessment and

Remediation of Fungi in Indoor Environments” (New York City Department of Health, 2008).

- Porous building materials such as gypsum board, insulation and plywood with visible mould growth should be removed. Extensively damaged solid wood structural members should be replaced. Lightly damaged solid wood structural members can be sanded down or wire brushed to remove water staining and associated mould growth. Non-porous building materials such as metal, ceramic, and glass can be cleaned with a detergent.
- The use of anti-microbial disinfectants, biocides, or bleach is not recommended.
- Encapsulation of mould contaminated building materials is not recommended.⁸
- Ensure workers wear respirators equipped with a P100 filter, gloves, and protective clothing.
- Remediation should be done by health and safety professionals with experience and training in microbial remediation.

Ontario Safety Association for Community & Healthcare provides practical information summarizing procedures and cleaning methods for various building materials (Ontario Safety Association for Community & Healthcare, March 2001).

Mould remediation consisting of treatment only with a biocide or disinfectant has not been proven to be effective and thus is not recommended. Dead mould spores and fragments still present a health hazard because their toxigenic and allergenic properties remain. In addition, the application of a biocide, anti-microbial disinfectant, or bleach following the completion of mould remediation, with the intent of inhibiting possible future fungal growth, is not considered effective, necessary or beneficial. Encapsulation of a mouldy area is also not a recommended procedure. Removal of mouldy materials is the only effective mould remediation strategy.

Once the renovations and remediation are completed, the property should undergo a comprehensive cleaning of the entire occupied space. This cleaning will remove any dust and debris left by the renovation activities and any microbial contaminants that may be on various surfaces and materials. Specific tasks include the cleaning of all exposed surfaces such as floors, walls, ceilings, doors, light fixtures, bookshelves, countertops, and windowsills.

Mechanical duct cleaning should be done by an experienced duct-cleaner who will cut access holes into the ducts and scrub them spotless. Vacuuming the ducts is not acceptable. All air cleaning filters need to be replaced, all vents and grills removed and cleaned, and all ductwork thoroughly cleaned. It is recommended that the furnace

⁸ Encapsulation of chemicals is valid, but encapsulation of mould contaminated materials is not recommended due to its low success rate.

cleaning company be a member in good standing of the Better Business Bureau (BBB) and/or the National Air Duct Cleaners Association or an equivalent professional body.

3.5.3 Chemical Remediation

Marihuana Grow Operation

All containers containing chemicals should be removed and disposed in accordance with local and provincial regulations. The locations, volumes, and identity of chemicals, where known, should be recorded in the Scope of Work and this information made available to the Remediation Contractor.

All porous building materials suspected of absorbing chemical contaminants should be removed and discarded (gypsum board, wall insulation, wood studs, carpet, plywood subfloor, attic insulation⁹, etc.). Furnishings capable of absorbing chemicals should be removed and discarded as well (carpets, drapes, upholstered furniture, etc.).¹⁰

Methamphetamine Lab

Every methamphetamine lab facility is different and thus the remediation will differ. In general the appropriate strategy for methamphetamine lab cleanup is as follows.¹¹

- **Inspection:** Evaluate extent of damage to building materials and contents. Inspect plumbing and sanitary sewer. Perform outdoor investigation.
- **Air and Surface Sampling:** Testing may provide direction on remediation action.
- **Removal:** Remove and discard clothing, toys, bedding, baby bottles and cups, and other personal items used by infants and small children. Furnishings, draperies, carpeting, panelling, wallpaper, mattresses, paper items, and other porous contents that the Environmental Consultant believes cannot be cleaned must be disposed of according to the type and degree of contamination. Some toxic materials may not be suitable for landfill disposal but must be disposed of by a qualified contractor. Empty septic tank if VOCs are present over recommended limits. Flush plumbing.
- **Ventilation:** When solvents and other chemicals that may have soaked into the walls are slowly vaporizing indoors, ventilation may reduce contamination and decrease odours. Ventilate for two days after remediation activities.
- **Neutralization:** Where acids or bases have been used, the potential for harmful effects may be reduced or removed through neutralization. Acids may be

⁹ A hole in the ceiling leading to the attic provides a pathway for chemicals to contaminate the attic insulation.

¹⁰ Complete removal is the preferred method for dealing with chemically contaminated building materials in a marihuana grow operation. Testing is costly and there are no guidelines for the chemicals that are being tested.

¹¹ Adapted from Minnesota Department of Health, 2007.

neutralized with solutions of sodium bicarbonate (baking soda). Bases may be neutralized by using weak acidic solutions of vinegar or acetic acid in water.

- **Cleaning:** Some nonporous and semi-porous surfaces, such as floors, tiles, walls and ceilings, can be scrubbed with a detergent and water solution. Depending on the situation, some porous materials, such as carpeting and draperies, may also be decontaminated through washing. Steam cleaning or high-pressure washes may be helpful for large areas of contamination. HEPA vacuum semi-porous building materials such as concrete block, brick, raw wood studs, wooden floors and all floors under removed carpeting. Double wash with detergent and hot water, followed by a thorough rinse with clean water. Alternatively, concrete and raw wood can be steam cleaned with extraction. After each room is cleaned, cordon off doors and openings to other rooms using (at least) 4-mil plastic sheeting to avoid recontamination. Seal air-tight. Clean heating, ventilation and air conditioning (HVAC) system. Replace filters at the end of the remediation process.
- **Encapsulation or Sealing:** Contaminated materials may be covered with two layers of oil-based paint, polyurethane, or other materials. Paint should be sprayed and not brushed or rolled. Paint should be allowed to cure for the recommended time between coats.
- **Air and Surface Sampling:** Test after remediation to provide evidence of remediation success.

3.5.4 Hazardous Materials Abatement Procedures

A hazardous materials audit of the building should be completed by the Environmental Consultant prior to the start of any mould remediation or any other building disturbance activities. The hazardous materials audit shall include, but not be limited to, the identification of the following.

- Asbestos-containing materials
- Lead-containing surface coatings
- Mercury-containing switches, thermometers, etc.
- Pesticides
- Poly Chlorinated Biphenyls
- Radioactive equipment such as some smoke/fire detectors
- Refrigerants

The Environmental Consultant should ensure that the identified hazards in the building are properly managed or disposed of in accordance with government standards and guidelines and industry codes of practice. The findings of the hazardous materials audit, including the management or disposal activities undertaken on the premises, should be

documented and submitted in a report to the Executive Officer prior to active remediation work proceeding.

3.5.5 Asbestos Abatement Procedures

Where removal or repair of materials containing asbestos is required or undertaken, the work must be carried out by a certified Asbestos Abatement Company. Asbestos abatement and remediation work should include, but is not limited to:

- removing any damaged building materials that may contain asbestos,
- conducting remediation in accordance with industry standards,
- providing documentation that remediation was conducted by an Asbestos Abatement Company, and
- taking any additional steps as may be required by the Executive Officer or Environmental Consultant.

3.5.6 Pest Abatement Procedures

Where applicable, contract the services of a licensed Pest Control Operator to address the pest infestation until there is no further evidence of pest activity. In addition the Property Owner may be required to:

- remove and properly dispose of all garbage, and waste material from the housing premises and associated property,
- remove and /or disinfest and clean pest-contaminated furniture,
- provide documentation of the pest control contract and associated pest control strategies, and
- take any additional steps as may be required by the Executive Officer or Environmental Consultant.

3.5.7 Water Supply Reinstatement Procedures

If the potable water in the building has been disconnected for some time, particularly in large buildings, the building distribution system should be flushed to move all stagnant water, microorganisms, and any leachates/particulates from plumbing materials. The cold water supply should exhibit measurable chlorine residual. Cold water samples should be submitted for microbiological/bacteriological testing at the Executive Officer's discretion. Ideally, two consecutive samples, each sample having been taken one week apart, must have satisfactory microbiological test results.

3.5.8 Structural Repair Procedures

Where applicable, structural repairs should be carried out by qualified individuals under the direction of a Professional Engineer or Architect. The Engineer or Architect should

provide a structural certification report to the Environmental Consultant, the Executive Officer, and to a Safety Codes Officer (Building Discipline) with the Municipality having jurisdiction.

The report should:

- provide the Engineer's or Architect's professional opinion on the structural integrity of the entire building, with specific comment on the individual components (including the foundation, support structure, ceilings, floors, and roof) and whether the building is safe for occupancy,
- be accompanied by a detailed design repair method, complete with drawings or plans that are affixed with the Engineer's or Architect's signature and professional seal, and
- if the Engineer's or Architect's Report identifies required repairs, provide a written construction schedule describing the Engineer's design repair method including inspection of the repair work upon completion.

3.5.9 Site Remediation Procedures

Remediation should not only include the building, but also the site immediately around it. Chemical spills may have contaminated the soil, surface water or groundwater. There may be glass, garbage, syringes, flammable materials, and other items requiring removal and cleanup. All hazards around the site should be identified and properly managed or disposed of in accordance with Alberta Hazardous Waste Regulations and Water Quality Regulations.

3.5.10 Air Scrubbing Procedures

Air scrubbing, using high efficiency particulate (HEPA) air scrubbers, is to be done in all areas of the building to remove airborne fungal spores (main floor, basement and attic). Filtration of air should be undertaken such that a minimum of six (6) equivalent air exchanges is completed.

Air scrubbers must be turned off 24 hours prior to the Environmental Clearance Test.

3.5.11 Reconstruction Procedures

Physical damage must be repaired in accordance with the current Alberta Building Code.

If a borehole for electrical bypass exists, it must be moisture proofed from the exterior and the excavation site not filled until inspected and approved by the City or Municipal inspector. Holes in ceilings and particularly in floors require proper repair and need to be left visible for inspection by the City or Municipal inspector.

General renovation work, such as painting, reinstalling gypsum board, or laying of new flooring or sub flooring must not occur until the Environmental Clearance Test results have been received and accepted by Alberta Health Services and all repair work has passed City or Municipal inspection.

All repairs affecting the structure, including floors and the building envelope, require inspection and reporting by an architect and/or structural engineer as applicable.

3.5.12 Recommendations for Demolition

If a property is beyond repair due to extreme structural deterioration or considered not economically feasible to remediate, it may be considered for demolition.

3.5.13 Pre-existing Conditions

Occasionally, properties are in poor condition before they are used as illegal drug operations. For instance, there may have been moisture problems and mould growth for many years before a marihuana grow operation was established. Does the mould remediation for the marihuana grow operation include pre-existing mould? Yes, it does. The property must be cleaned to a state that it will pass the Environmental Clearance Test and declare the property habitable. The remediation work will result in a dwelling that may be healthier than the original condition. This provides assurances to potential occupants and reduces liability risk to homeowners and real estate agents.

3.6 Recommendations for Environmental Clearance Testing

Once the remediations are completed, an Environmental Clearance Test is required. Along with a visual inspection, this test determines the success of the remediation activities.

Although the scope of work and remediation activities are specialized for illegal drug operations, criteria for passing the fungal contamination part of the test (fungal air sampling) are no different than any other fungi-related project.

3.6.1 Changes to Health Canada Guidelines

In 1995, Health Canada published a set of guidelines for fungal air sampling. These guidelines were quantitative, describe acceptable concentrations of fungi in indoor air (using RCS sampling method), and draw attention to certain pathogenic and toxigenic fungi. Environmental Consultants have been using these guidelines to interpret their clearance test until 2007 when Health Canada published their new guidelines.

Health Canada's new mould guidelines (2007) are not quantitative. They consider that any amount of mould growth in buildings may pose a health hazard.¹² These recommendations apply regardless of the amount or species of mould found growing in the building.

Health Canada now simply recommends:

- to control humidity and diligently repair any water damage in residences to prevent mould growth; and
- to clean thoroughly any mould growing in residential buildings.

Health Canada's new recommendations provide less guidance for interpreting the Environmental Clearance Test. The result places:

- increased importance on the outdoor control sample for comparing the indoor samples, and
- more emphasis on the expertise of the Environmental Consultant to assess the contamination, interpret the test results, and provide remediation recommendations.

3.6.2 Fungal Air Sampling Methods

There are two industry standard methods for sampling airborne fungi: 1) viable (RCS¹³ and Andersen), and 2) total fungal particulate (Air-O-Cell¹⁴). RCS and Andersen collect viable fungi and facilitate species identification. The Air-O-Cell method collects viable and non-viable fungi and facilitates genus identification (not as specific as species identification). However, the Air-O-Cell method will detect *Stachybotrys* and other types of fungi that do not easily become airborne or grow well on the growth media. Each method has advantages and disadvantages, and when used in conjunction, provides a reasonable picture of the kinds of fungi present and the associated health risks.

Fungal air sampling for marijuana grow operations should consist of both viable fungal air sampling (RCS or similar) and total fungal particulate sampling (Air-O-Cell). Speciation of all viable fungi is required.

Surface sampling (sponge, Q-tip, tape, scraping) is recommended during the Environmental Clearance Test to establish whether a building material has been

¹² There are too many variables to make an accurate risk assessment from mould exposure. Some of these variables include: 1) the nature of the fungal material (allergenic, infectious, or toxic), 2) the amount of exposure, and 3) the susceptibility of exposed persons. Individual susceptibility varies with the genetic predisposition, age, state of health, and concurrent exposures.

¹³ Reuter Centrifugal Sampler

¹⁴ Also known as "Spore Trap"

successfully cleaned. Air testing can sometimes produce false negative results because fungal spores do not always become airborne and are not always picked up by the air sampling method.

3.6.3 Fungal Air Sampling Strategy

The Environmental Consultant will collect representative air samples from each habitable floor of the building, including the basement, attic, attached garage and crawlspace. Fungal air sampling may not be required in an attic if the operation did not vent into the attic and the visual inspection passed (no condensation, water stains or mould growth on the structural members). Fungal air sampling may not be required in the garage if there was no direct access from the garage to the interior of the property (door, constructed opening) and the garage passed the visual inspection.

The Environmental Consultant shall collect a minimum of one (1) air sample per floor for an open concept floor plan or a minimum of two (2) air samples per floor for a compartmentalized floor plan. An open floor plan is where 75% or more of the floor footprint consists of one room. More samples per floor may be collected at the professional discretion of the consultant.

The Environmental Consultant may determine the sampling time. However, four minutes is recommended for the Reuter Centrifugal Sampler (RCS), and five minutes is recommended for the Air-O-Cell. Outdoor samples should be reduced to two minutes in spring, summer, and fall due to the risk of overgrowth on the sampling media.¹⁵ Outdoor samples should be reduced to one or two minutes in winter due to the risk of the sample media freezing.¹⁶

Fungal air sampling shall occur in compliance with Health Canada 'Fungal Contamination in Public Buildings: Health Effects and Investigation Methods' (2004), page 41, and requires:

- sampling conditions must occur during or simulate disturbance conditions associated with normal occupancy,
- the ventilation system is operational,
- to allow one or two hours between outdoor control air samples,
- sampling not to occur during or within 24 hours following precipitation events,

¹⁵ A four-minute sampling time when airborne mould spores are plentiful (spring, summer, fall, following precipitation events) may result in an overgrowth on the agar strip. If unsure of the best sampling time, take multiple samples with varying sampling times. Ask the lab to process one set and if they encounter problems with the thigh concentrations, process the alternate (lower volume) set.

¹⁶ Winter conditions in southern Alberta may include temperatures above zero (Chinook), and the absence of snow cover as well as very cold temperatures with snow cover.

- one of the outdoor control samples to be collected at the furnace outdoor air intake grill, however, if the air intake grill is not accessible, the test location is at the discretion of the Environmental Consultant, but sampling on the windward side of the structure is recommended, and
- a minimum of three (3) representative outdoor samples should be taken at least one hour apart.

The Environmental Consultant can have the Laboratory store viable test samples for a maximum of five days in a suitable environment for later analysis pending receipt of acceptable results of total fungal particulate samples. If the total fungal particulate results do not pass the Environmental Clearance Test, analysis is not required on the viable samples. More remediation is required and the Environmental Clearance Test can be repeated.

Windows should be closed and air scrubbers turned off 24 hours before testing.

Procedure for Obtaining Outdoor Samples in Winter

Under freezing conditions the sample time for viable air testing should be reduced to one or two minutes for the three outdoor control samples. The RCS sample strip should be at room temperature, loaded in the sampler and taken outside for the duration of the test. The sample strip should then be brought back indoors immediately and placed in a cooler.

The cassette for Air-O-Cell sampling should be at room temperature prior to sampling. Sample time can remain at five minutes as the sample media is less affected by freezing temperatures.

3.6.4 Interpretation of Fungal Air Sampling Results

The purpose of air sampling is to identify the presence of an indoor fungal amplifier that is not observed during visual inspection. An indoor fungal amplifier is a source of fungi growing and dispersing indoors, which is suspected if there is one or more fungal species occurring as a significant percentage of an indoor sample, and if those species are not similarly present in outdoor samples.

The recommended guidelines¹⁷ for interpreting fungal air sampling results are:

- An indoor fungal amplifier is suspected if there is one or more fungal species occurring as a significant percentage of an indoor sample and not similarly present in outdoor samples,

¹⁷ These guidelines are adapted from Health Canada with input from microbiologists (Mike Sheppard, Lynne Sigler) and from the authors' experience.

- The “normal” air mycoflora indoors should be qualitatively and quantitatively lower than that of outside air, except in winter,¹⁸ and
- The presence of some genera such as *Alternaria*, *Arthrrium*, *Stachybotrys*, *Chaetomium* and *Ulocladium*¹⁹ may indicate a problem if not observed within any of the outdoor controls even though they may not account for a significant percentage of an indoor sample.

Since there are no quantitative guidelines for interpreting fungal air sampling results, successful interpretation relies on the expertise and judgement of the Environmental Consultant. The Executive Officer will also review the Environmental Clearance Test results.

3.6.5 Sampling Methamphetamine Lab

Cleanup Guidelines

The following cleanup guidelines should be used to ensure a property has been adequately decontaminated (MDH, 2007).

- Surface wipe samples and vacuum samples for methamphetamine should not exceed a concentration of 0.5 ug/100 cm² for individual samples and 0.125 ug/100 cm² for composite samples.²⁰
- If there is evidence of iodine contamination on materials or surfaces that will not be removed, surface wipe samples for iodine should not exceed a concentration of 22 ug/100 cm².
- If the preliminary assessment indicates the phenyl-2-propanone (P2P) method of methamphetamine manufacturing was used, surface wipe samples for lead should not exceed a concentration of 40 µg/ft², and vapour samples for mercury shall not exceed a concentration of 1.0 µg/m³.

Methamphetamine Wipe Sampling Procedure

- Use one 3” x 3” general use gauze sponge (sampling wipe) per sample.
- Wear a new pair of nitrile gloves for each sample.

¹⁸ With snow cover and under cold temperatures, airborne fungal concentration outdoors will be very low. Indoor levels should be similarly low, but slightly greater is acceptable.

¹⁹ These fungi are considered harmful to human health and their spores do not capture well with currently available air sampling methods, therefore one or two spores may indicate a concern. These fungi are indicator species for Alberta; other provinces may differ.

²⁰ If composite samples are collected, the cleanup level above must be divided by the number of aliquots (individual samples) that make up the composite sample to determine the adjusted cleanup level used for “hot spot” screening. For example, if four individual samples are collected to make up a composite sample, then the adjusted cleanup level would be 0.125 ug/100 cm²

- Limit Handling of wipes to avoid contamination.
- Wet the individual gauze wipe with 2 mL of methanol just before sampling.
- Wipe in a tight Z pattern within a measured 6" x 6" area.
- Because methanol will evaporate to dryness, lessening the ability to pickup methamphetamine, wipe sample the area within 5 seconds.
- Place the wipe back into the jar and close the lid immediately after wiping.

Vacuum Sampling to Determine Presence of Methamphetamine

Typical sample materials may include carpet, drapes, upholstered furniture, porous masonry, raw wood, or any surface with accumulated dust particles.

Equipment needed:

- Area sampling pumps capable of at least 20 L/min flow rate
- 37 mm cassettes equipped with glass fibre filters and backup pads
- Flexible tubing to connect the pump to the filter cassettes
- Small piece of tubing (1 to 2 in.) with one end cut at a 45-degree angle to be used as the "vacuum nozzle"
- Primary flow meter for pump calibration
- Field rotameter for convenient calibration checks

Instruments for air sampling to detect explosives and narcotics at very low concentrations (nanogram levels) include the Sabre 4000 trace detection system manufactured by Smiths Detection. Some of the capabilities are listed.

- Explosives: TATP, HMTD, TNT, NG, RDX, PETN, Tetryl, Ammonium Nitrate.
- Narcotics: Cocaine, Heroin, Methamphetamine, THC, LSD.
- Chemical warfare agents: GA, GB, GD, GF, HN3, HD, VX, Vsubx.
- Toxic industrial chemicals: ammonia, chlorine, ethylene oxide, hydrogen chloride, hydrogen cyanide, hydrogen fluoride, nitric acid fuming, phosgene, sulphur dioxide.

3.6.6 Environmental Clearance Test Reporting Procedures

The Environmental Consultant is responsible for the thoroughness and accuracy of the Environmental Clearance Test Report and must ensure that all documents pertaining to the assessment, cleanup, repair, sampling, and Safety Codes Officers' inspections are submitted to the Executive Officer.

The Environmental Consultant's Clearance Test Report should include:

- an opinion as to whether or not the mould remediation work was effective, thorough and satisfactorily completed in accord with acceptable guidelines and protocols, and that air sampling results indicate that the property is suitable for re-occupancy,
- a comment on the assessment of the building regarding evidence of water damage or signs of mould contamination during air sampling,
- all laboratory test results as provided by the analytical laboratory (the Environmental Consultant can summarize the findings in the body of the report but must submit laboratory test results showing the mould genus/species breakdown for each sample),
- a description of environmental and building conditions on the day of sampling, including outdoor temperature and recent precipitation, the operational status of the ventilation system and the occupancy or disturbance activities prior to and during sampling,
- an interpretation of the air monitoring results and their significance,
- sampling locations,
- the duration of sampling and volume of air collected for each sample,
- the address, the date the work was performed and the name of the person and company who performed the work,
- detailed photographs or video, and
- original, signed reports.

3.7 Recommendations for Education

Education and training should apply to all stakeholders. With education comes awareness, understanding and behaviour change. Training programs should be ongoing, applicable to the job level or information needs, and kept relevant through information updates.

3.7.1 Environmental Consultant and Remediation Contractor Education Recommendations

Secondary educational institutions do not offer degrees in indoor air quality. The closest related occupations are architecture, engineering and occupational hygiene. These professions are useful, but insufficient in themselves to carry out indoor air quality work and be qualified to assess and direct the remediation of illegal drug operations. A training program for Environmental Consultants and Remediation Contractors specific to illegal drug operation is not yet available in Canada (CMHC, 2007).

Indoor air quality is an interdisciplinary profession. It requires knowledge and training in:

- the construction process,
- building codes,
- building envelopes,
- building science,
- heating, ventilation, plumbing, electrical, structural,
- building cost estimating,
- mould characteristics and health implications,
- chemical characteristics and health implications,
- mould remediation process,
- testing protocols for mould and chemicals,
- interpreting microbiology and chemical analysis lab reports,
- related guidelines and standards, and
- personal protection strategies.

Environmental Consultant

With less emphasis being placed on fungal air sampling by Health Canada, the expertise of the Environmental Consultant becomes more important (Lavoie, person. comm.).

There is no established mechanism to license, regulate, permit or otherwise certify Environmental Consultants or companies qualified to investigate, remediate and test the environmental conditions within former illegal drug operations. It is difficult for Property Owners to select a qualified Environmental Consultant considering the range of qualifications in the marketplace. Therefore, it is recommended that Alberta Health Services pre-qualify Environmental Consultants and have a list for the Property Owner to choose from. Criteria that AHS might use to pre-qualify Environmental Consultants may include:

- educational background (see knowledge and training list above),
- completion of a 40-hour course on remediation of illegal drug operations (described below),
- experience and references from a list of relevant projects,
- membership in the Institute of Inspection, Cleaning and Restoration or an equivalent professional body, and
- mandatory annual continuing education workshops, seminar or courses to update knowledge and regulations in this field.

Remediation Contractors

A mechanism needs to be established to license, regulate, permit or otherwise certify Remediation Contractors to remediate the contaminants associated with former illegal drug operations. Criteria that AHS might use to pre-qualify Remediation Contractors may include:

- minimum 5 years construction experience with knowledge in building and demolition,
- minimum 2 years experience in managing construction projects,
- hazardous waste management experience,
- WHIMIS,
- a member in good standing with the Better Business Bureau (BBB),
- mandatory annual continuing education workshops, seminar or courses to update knowledge and regulations in this field, and
- completion of a 40-hour course on remediation of illegal drug operations (described below).

Course on Remediating Illegal Drug Operations

The rigour of the course is maintained when the course is offered through an accredited academic institution. Therefore, we recommend that the course be delivered through a technical institution or university.²¹

The course would consist of 40 hours of in class instruction and an examination. Course curriculum would cover responsibilities and worker safety for the Environmental Consultant and Remediation Contractor, and provide information about assessing, remediating, and testing illegal drug operations. In addition, a real life project would be required for the Environmental Consultant (conducting an assessment, preparing recommendations and procedures for remediation, a report, and in-class presentation).

3.7.2 Education Recommendations for Other Stakeholders

Other stakeholders in the construction industry that would benefit from general knowledge on indoor air quality or assessing and remediating illegal drug operations include: safety codes officers, building inspectors, real estate agents, bank mortgage lenders, executive officers of AHS, property owners, building operators, building maintenance, trades, architects and engineers, and the general public.

²¹ Seminar type courses of one to two days are insufficient.

3.8 Recommendations for Communication and Reporting

Information is exchanged through communication, reporting and documentation. Well-defined reporting requirements will promote effective information exchange and will prevent delays by getting information to the people who need it. Communication helps stakeholders understand their roles and responsibilities, improve awareness and understanding of the procedures, and set the foundation for positive relationships. The ability to communicate is essential to the success of any undertaking and an important factor in the achievement of an organization's objectives. A standard reporting form that identifies the procedures helps the Environmental Consultant manage the project and assists the Executive Officer with evaluating the results.

3.8.1 Reporting Summary

The following table summarizes the reports issued during an illegal drug operation remediation process.

Table 3: Reporting Requirements

Report	Author	Recipient
Executive Officer's Order	EO	AHS, EC, PO
Environmental Assessment Report and Scope of Work	EC	AHS, PO, RC, C/M
Fungal and Hazardous Materials Assessment Report	EC	AHS, PO, RC
Environmental Clearance Test Report	EC	AHS, PO, RC
Disposal Documentation for Chemicals	RC	AHS, EC, PO
Disposal Documentation for all Removed Materials	RC	AHS, EC, PO
Invoices for all new replacement materials	RC	AHS, EC, PO
Detailed remediation / repair report including photographs and all documents relating to repair	RC	AHS, EC, PO
Furnace cleaning report	FC	AHS, EC, PO, RC
Building or Environmental Restoration Permit and inspection report from the Municipality	M	AHS, EC, PO
Plumbing Permit and inspection report from the Municipality	M	AHS, EC, PO
Gas Permit and inspection report from the Municipality	M	AHS, EC, PO
Mechanical Permit and inspection report from the Municipality	M	AHS, EC, PO
Electrical Permit and inspection report from the Municipality	M	AHS, EC, PO
Confirmation that utility services have been reinstated to the property (electricity, gas, water)	M	AHS, EC, PO
Payment of the required fee to remove the Notice of Health Hazard from Title	PO	AHS

AHS: Alberta Health Services
M: Municipality
EC: Environmental Consultant
EO: Executive Officer (Public Health Inspector)

FC: Furnace Cleaner
PO: Property Owner
RC: Remediation Contractor

3.8.2 Stakeholder Communication Strategy

Communication between AHS and stakeholders will include:

- a continually updated and accessible website established by AHS with pertinent information on policy, procedures, guidelines, links, and resources, and
- a designated contact person at AHS with an email address and phone.

The organization chart is reproduced here to illustrate lines of communication.

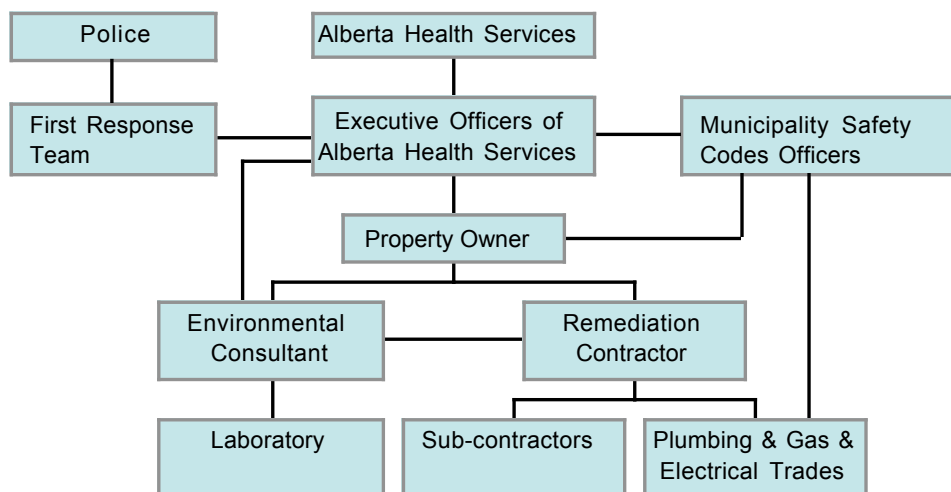


Figure 2: Communication

3.8.3 Community Communication Strategy

Illegal drug operations affect everyone in the community. Problems other than the hazards already listed in the report include:

- environmental hazards from the reckless disposal of chemicals that contaminate water systems, sewer systems, and soil,
- economic losses from mortgage and insurance fraud, theft of electricity, reduced property values in stigmatized communities, artificially inflated home prices that result from reselling homes within organized crime groups, cost of law enforcement, prosecution, and corrections, and
- violent crime from armed criminals protecting their product.

Organizations such as the STOP MGOs Calgary/Edmonton Coalitions have developed pamphlets that focus on awareness and prevention. Pamphlets that provide information about the physical signs of a marihuana grow operation should be distributed to the public by mail in their monthly electrical bill. Another option is to ensure the pamphlet is passed on to all prospective property buyers by their real estate agent.

The recommendations contained in this report can be summarized in a brochure for dissemination to property owners, real estate agents and other stakeholders.

3.8.4 Provincial Registry

The Calgary Health Region has developed a list of all properties in which orders were issued due to illegal drug operations since 2004 (CHR, 2009b). It is recommended that this list be expanded to include all properties in which orders were issued due to illegal drug operations in Alberta.²² This list would be maintained by AHS. In addition, there should be a clause in all property sales agreements that the real estate agent has checked this list. The real estate agent can also request an “Environmental Health Information Request Form” to check if the property had a former drug operation. There is a nominal cost for this request.

3.9 Recommendations for Review and Improvement

Periodic evaluation of the policy and procedures for assessing and remediating illegal drug operations is necessary to track management performance and ensure that the program is continually suitable and effective. A regular review process may lead to modifying the policy and procedures, updating educational components, or changing the way communication, reporting and documentation are carried out.

AHS should establish a written plan for monitoring the program that provides for:

- a responsible person who is adequately trained to undertake the review,
- a sampling strategy so that resource usage is optimized and quality data is obtained,
- the necessary resources to carry out the review process (financial and technological), and
- consultation with stakeholders.

AHS will review their guidelines and procedures, and evaluate its own performance on a regular basis.²³ The evaluation process will identify successes and shortcomings.

²² This list is not an exhaustive list of all properties known to have been used for the production of illegal drugs. It includes only those on which orders were issued. Some illegal drug operations are not condemned.

²³ A yearly review is recommended.



Corrective actions will be to put into place in response to shortcomings. A report will be generated.

Progress will be measured by evaluating performance indicators such as the:

- ability to fund and manage the program,
- level of sustained commitment from Executive Officers,
- effectiveness of the procedures, and
- level of feedback (number and nature of complaints or comments from Property Owners, Environmental Consultants, Remediation Contractors, prospective buyers, real estate agents).



SUMMARY OF RECOMMENDATIONS

ORGANIZATION AND PROCEDURES

1. Roles and responsibilities for all key stakeholders (First Response Team, Alberta Health Services, Executive Officers, Municipality Safety Codes Officers, Property Owners, Environmental Consultants, Remediation Contractors, Laboratories, Sub-contractors, and Trades) should be identified and communicated.
2. Alberta Health Services should provide adequate resources (finances, people, technology) to implement the program.
3. The Executive Officer of AHS should write the Executive Officer's Order and communicate procedures to the Property Owner as soon as possible.
4. AHS should keep a list of qualified Environmental Consultants and Remediation Contractors.
5. The Property Owner should hire an Environmental Consultant and Remediation Contractor approved by AHS as soon as possible.
6. The Environmental Consultant should write the scope of work, oversee the remediation process, conduct the Clearance Test, and meet requirements set out by the Executive Officer's Orders.
7. The Laboratory that analyzes samples for the Environmental Clearance Test should be accredited for the substance they are analyzing.
8. If the outdoor air temperatures are below freezing and the building's heat source has been disconnected, the Property Owner should arrange to have the water lines drained and should be advised to do so in a timely manner by the Executive Officer.
9. Permits to restore heating, electricity and gas should be obtained as soon as possible.
10. The Remediation Contractor who performs the necessary decontamination tasks must be independent from the Environmental Consultant who prepares the Scope of Work and Environmental Clearance Test.

ASSESSMENT AND REMEDIATION

11. The Environmental Consultant should conduct a visual inspection of the property and surrounding site, identify contaminants, and provide a detailed report to the Executive Officer outlining the Scope of Work.
12. Complete removal of contaminated porous building materials of a Methamphetamine Lab is recommended, but preliminary testing can be done at the discretion of the Environmental Consultant to determine what can be cleaned and what needs to be discarded. Encapsulation of chemical contaminants is acceptable.
13. Nonporous contaminated surfaces of a Methamphetamine Lab can be cleaned with detergent and water.
14. Porous building materials such as gypsum board, insulation and plywood with visible mould growth should be discarded. Extensively damaged solid wood structural members should be replaced. Lightly damaged solid wood structural members can be sanded down or wire brushed to remove water staining and associated mould growth. Non-porous building materials such as metal, ceramic, and glass with mould growth can be cleaned with a detergent.
15. The use of anti-microbial disinfectants, biocides, or bleach is not recommended.
16. Encapsulation of mould contaminated building materials is not recommended.
17. All porous building materials in a marihuana grow operation suspected of absorbing chemical contaminants should be removed and discarded.
18. Duct cleaning should be done by an experience duct-cleaner who will cut access holes into the ducts and scrub them spotless. Vacuuming the ducts is not acceptable.
19. Structural repair should be carried out by qualified individuals under the direction of a Professional Engineer or Architect.
20. Following remediation, air scrubbers should be installed to filter the air to a minimum of six equivalent air exchanges. Air scrubbers must be turned off 24 hours prior to the Environmental Clearance Test.
21. Mould remediation should include any pre-existing conditions.

ENVIRONMENTAL CLEARANCE TEST

22. Fungal air sampling for illegal drug operations should consist of both viable fungal air sampling (RCS or Andersen) and total fungal particulate sampling (Air-O-Cell).
23. Fungal air sampling should be in compliance with Health Canada 'Fungal Contamination in Public Buildings: Health Effects and Investigation Methods' (2004).
24. The Environmental Consultant may determine the sampling time. However, four minutes is recommended for the Reuter Centrifugal Sampler (RCS), and five minutes is recommended for the Air-O-Cell. Outdoor samples should be reduced to two minutes in spring, summer and fall due to the risk of overgrowth on the sampling media. Outdoor samples should be reduced to one or two minutes in winter due to the risk of the sample media freezing.
25. The recommended guidelines for interpreting fungal air sampling results are:
 - An indoor fungal amplifier is suspected if there is one or more fungal species occurring as a significant percentage of an indoor sample and not similarly present in outdoor samples,
 - The "normal" air mycoflora indoors should be qualitatively and quantitatively lower than that of outside air, except in winter, and
 - The presence of some genera such as *Alternaria*, *Arthrinium*, *Stachybotrys*, *Chaetomium* and *Ulocladium* may indicate a problem if not observed within any of the outdoor controls even though they may not account for a significant percentage of an indoor sample.
26. Surface sampling should be carried out after mould remediation of a marijuana grow operation to ensure remediation success.
27. Surface sampling should be carried out after chemical remediation of a Methamphetamine Lab to ensure remediation success.
28. The Environmental Clearance Test report should meet the requirements set out by the Executive Officer.

EDUCATION

29. The assessment and remediation of illegal drug operations must be carefully undertaken with qualified consultants and contractors. The Environmental Consultant and Remediation Contractor should take a course through an accredited academic institution consisting of 40 hours of in class instruction on assessing, remediating, and testing illegal drug operations.



COMMUNICATION AND REPORTING

30. Reporting requirements set out by the Executive Officer should be met.
31. Communication between AHS and stakeholders will include a continually updated and accessible website established by AHS with pertinent information on policy, procedures, guidelines, links, and resources, and a designated contact person at AHS with an email address and phone.
32. The recommendations contained in this report can be summarized in a brochure for dissemination to property owners, real estate agents and other stakeholders.
33. AHS should develop a list of all properties in which orders were issued due to illegal drug operations and make this list available to real estate agents and the public.
34. Policy and procedures for assessing and remediating illegal drug operations should undergo periodic review to track management performance and ensure that the program is continually suitable and effective.

SUGGESTIONS FOR FURTHER RESEARCH

1. Many properties used as illegal drug operations go undetected. Sometimes the operators grow a crop or two, then dismantle, perform a cosmetic clean up, and place the property back on the market. Damaged properties are slipping through the cracks placing prospective buyers and real estate agents at risk. A keen eye by an experienced inspector should be able to spot these. Mandating building inspections by qualified building inspectors trained in recognising previously used marihuana grow operations should be considered.
2. Placing a permanent caveat on properties previously used as illegal drug operations as they do in British Columbia should be considered. The caveat would remain on the property's history in the same manner as extensive damage to a car remains on its history even after it is repaired. The purpose of the caveat is to protect prospective buyers, however, it may be seen as unfair because the remediation process (if conducted by qualified individuals) should return the property to a healthy state. In addition, not all marihuana grow operations are condemned. This issue requires further research.
3. Some municipalities in British Columbia have mandated that landlords inspect their rental properties on a regular basis. As long as this can be done in a manner that does not put the landlord's safety at risk, this should be considered for Alberta. This issue requires further research.
4. The municipality of Surrey, BC has permitted the sharing of energy use information to the fire department. This is one way of identifying marihuana grow operations since they tend to use more energy than expected. A recent court ruling in Alberta considers this a breach of privacy under the Personal Information Protection Act. Other methods for detecting marihuana grow operations should be considered.
5. Property owners and real estate agents currently have a moral obligation to disclose pertinent information about a property such as past use as an illegal drug operation. Steps to make disclosure a legal obligation should be considered.
6. The recommendations in this report will have no bearing on properties that were damaged beyond repair. Criteria for determining when a property should be demolished should be developed.
7. Recommendations in this report are applicable to the province of Alberta. Although much of the procedural and technical information is transferable to other provinces,



not everything in the report is. Other provinces hoping to adopt these recommendations should ensure the recommendations are suitable for them.

8. The feasibility of fungal air sampling outdoors in winter under freezing conditions requires further research. It is not known how quickly the sample media freezes at various temperatures (-10, -20, -35°C). Information from this research will help Environmental Consultant set the sampling time for the outdoor control samples.

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Personal Communication

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Wearmouth, Vicki, personal communication. Vicki Wearmouth is the Illegal Drug Operations/Prosecutions Specialist and an Executive Officer/Public Health Inspector with Alberta Health Services in Calgary. Vicki Wearmouth was instrumental in developing the Calgary Health Region's guidelines and procedures for remediating marihuana grow operations in 2004. These guidelines have since been adopted by several other jurisdictions including Lethbridge, Red Deer and London, ON. Vicki Wearmouth and Daria Romanish (Public Health Inspector, CHR) were interviewed in person by the authors in July 2009.