Court File No. T-2030-13

FEDERAL COURT

BETWEEN:

NEIL ALLARD
TANYA BEEMISH
DAVID HEBERT
SHAWN DAVEY

Plaintiffs

and

HER MAJESTY THE QUEEN IN RIGHT OF CANADA

Defendant

AFFIDAVIT OF LEN GARIS

VOLUME I

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I, Len Garis, Professor at the University of the Fraser Valley and Fire Chief for the City of Surrey, in the Province of British Columbia, SWEAR THAT:

1. I am employed as a Professor at the University of the Fraser Valley and as Fire Chief for the City of Surrey, Province of British Columbia; and as such have personal knowledge of the matters hereinafter deposed to by me, except where same are stated to be based on information and belief and where so stated I verily believe them to be true.

2. I have been retained by the Attorney General of Canada in the above proceeding to provide an expert report for the Court. Attached at **Exhibit "A"** is my expert report, dated October 8, 2014.

SWORN before me at the City of Vancouver, in the Province of British Columbia, this 8 day of October, 2014.

Commissioner for taking Affidavits in and for the Province of British Columbia

Len Garis

BJ Wray
Barrister, Solicitor & Notary Public
for the Province of British Columbia
900-840 Howe Street
Vancouver, BC V6Z 2S9

LC.

This is Exhibit "A" of the affidavit of Len Garis dated October 8, 2014.

BJ Wray
Barrister, Solicitor & Notary Public
for the Province of British Columbia
900-840 Howe Street
Vancouver, BC V6Z 2S9

UNIVERSITY OF THE FRASER VALLEY

Growing Marijuana in Residential Dwellings
A Report on the Hazards

A report prepared for the Department of Justice Canada:

Allard et al. v. Her Majesty the Queen in Right of Canada

Prepared by:

Len Garis

Fire Chief, City of Surrey, British Columbia

and

Adjunct Professor, Centre for Criminal Justice Research, School of Criminology and Criminal Justice, University of the Fraser Valley

Certification:

The undersigned certifies that he is aware that he has a duty to assist the court and is not to be an advocate for any party in respect of the above-noted litigation. This report is made in conformity with that duty, and the undersigned will, if called upon to give oral or written testimony, give that testimony in conformity with that duty. My fees for the preparation of this report are based on the amount of professional time required and are not contingent on any action or event resulting from the use of this report.

Len Garis LC. Date Oct 8, 2014

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Assignment

1. As an independent expert, I have been asked to provide an expert analysis regarding the hazards of growing marijuana in residential dwellings (Appendices A-C).

2. The following facts alleged by the plaintiffs are outlined and relied upon in this report are found in the Amended Notice of Civil Claim (Appendix D).

3. I have been asked to provide expert opinion on the following matters:

   - The potential fire and electrical hazards of growing marijuana in a residential dwelling.
   - The contamination that may be caused by growing marijuana in a residential dwelling.
   - The risks that marijuana-growing operations in residential dwellings pose to first responders.
   - The differences, if any, between the illicit marihuana residential growing operations and medical marijuana residential growing operations in terms of potential fire hazards, contamination, and risks to first responders.

Qualifications

4. My professional qualifications include:

   - more than 34 years in fire service management (the past 13 as Fire Chief of B.C.'s second largest city and the 12th largest city in Canada),
   - more than four years as an Adjunct Professor at the School of Criminology and Criminal Justice at the University of the Fraser Valley (UFV),
   - more than two years as Adjunct Faculty at the British Columbia Institute of Technology,
   - a recent appointment as an Affiliated Research Faculty member at the John Jay College of Criminal Justice/Christian Regenhard Centre of Emergency Response Studies, New York,
   - an appointment two years ago to the National Council against Marijuana Grow Operations and Clandestine Laboratories, and
   - two years as President of the Fire Chiefs' Association of British Columbia (FCABC).

5. Through the UFV, City of Surrey and FCABC, I have authored and co-authored numerous research papers and articles on topics associated with home fire safety and prevention, including B.C.'s marijuana industry, the harms associated with indoor marijuana production, and methods for minimizing those risks. Recent published work has included:

- A June 2013 UFV research report entitled "Cleaning Up Former Drug Operations in Our Residential Neighbourhoods"
- A January 2013 UFV research report entitled: "What the Marihuana for Medical Purposes Regulations Overlook: Disclosure and Remediation of Inappropriately Used Dwellings"
- An October 2012 article in the *Journal of Global Policy and Practice* entitled: "An Updated Review of the Research on the Risk and Harms Associated to the Use of Marijuana"
- A July 2012 UFV research report entitled "Revisiting the Issues Around Commercially Viable Indoor Marihuana Growing Operations in British Columbia"
- An April 2012 article in *Canadian Fire Chief* entitled "Medical marijuana: The effect of legal grow operations on local government"

6. My keen interest in the public safety risks from residential marijuana grow operations (MGOs) began more than a decade ago, when I participated in a UFV research study that – for the first time – quantified the many hazards related to residential MGOs (discussed in detail later in this report). As a Fire Chief I was already well aware of the heightened fire risks associated with residential MGOs, but the study data clearly illustrated that an alternative approach was required and that immediate action was necessary.

7. In 2005, with the support of the City of Surrey, I spearheaded a multi-agency task group with representatives from all levels of government, and a pilot project involving city-led inspections of suspected MGOs for electrical and safety violations. The initiative led to Surrey's award-winning Electrical and Fire Safety Initiative (EFSI) along with similar inspection programs that were subsequently launched by a number of B.C. communities with the intent of reducing the risks associated with residential MGOs.

8. I also took a lead role in the successful lobby for changes to provincial legislation to give communities greater access to unusual electricity consumption records – a key indicator of MGOs. The program has been an unmitigated success, leading to various degrees of remediation of approximately 1,500 formerly unsafe properties, significant reductions in the number of active MGOs in the community, and reductions in MGO-related fires and the absolute number of dwelling fires.

9. The initiative has also been recognized by the FCABC (2005), the Lieutenant Governor of B.C. Awards for Public Safety (2005), the Union of BC Municipalities' Community Excellence Awards (2006, 2011) and the Solicitor General–Community & Crime Prevention Award (Crime Reduction Strategy, 2011).

10. About five years ago, my work with the EFSI introduced me to the harms associated with residential marijuana grow operations that were licensed by Health Canada to produce medical marijuana. These licensed MGOs were not disclosed to our city by Health Canada, but rather came to our attention because they shared many of the same indicators as illicit MGOs and therefore triggered an EFSI inspection.

11. Based on documentation from the EFSI inspections, I observed that the licensed MGOs displayed a similar array of safety and health risks as illicit MGOs. In some cases, the risks in medical MGOs were even more severe than their illegal counterparts, in particular, structural and chemical hazards. Through a Freedom of Information request I discovered there were 1,255 such sites operating in Surrey, although I was unaware of the specific locations because they were not disclosed by Health Canada.

12. The realization of the significant but unquantified public safety risk posed by medical MGOs led me to spearhead a Canada-wide fire services lobby of Health Canada to acknowledge the risks associated with their licensees' MGOs, and to release their location to cities to enable them to address these risks. Health Canada subsequently introduced legislation banning the growing of medical marijuana in residential settings.

13. My experience and first-hand knowledge of MGOs and their harms frequently leads others to seek me out for my advice and opinion. I have served as an expert witness on five occasions for the Ministry of Justice (Civil Forfeiture) on the harms of residential MGOs, and I am commonly quoted in the media as an expert on this subject matter.

14. I have also spoken and made presentations on at least 35 occasions over the years to government, communities, public safety audiences and conferences across North America and in Europe specifically on the risks associated with residential marijuana grow operations. In November 2012, I was appointed to the National Council against Marijuana Grow Operations and Clandestine Laboratories.

15. As a Fire Chief, I have an intimate knowledge of the hazards facing first responders in the field. Based on my field experience and training, I could easily identify the health, structural, fire and electrical risks that would be faced by firefighters, the public and occupants when I reviewed the photographs of residential MGOs taken by the EFSI inspectors. However, to quantify the risks for the purposes of this report, I engaged qualified experts in the areas of building safety, environmental health and electrical safety to review the EFSI photographs and provide the professional assessments and data on which this report is based. Please see the Methods section for further details.

16. Further details about my professional qualifications are provided in my CV (Appendix E).

Summary of Opinions on the Issues Addressed

17. While a significant proportion of the debate over using marijuana revolves around morality concerns and the rights of individual consumers, little emphasis has been placed on the health and safety issues related to growing operations themselves. As I will illustrate in this report, grow operations, whether illicit or licensed, tend to have significant numbers of health and safety issues associated with them regardless of any matters associated with consumption or use of the crop.

18. I will illustrate that both licensed and illicit operations, as they currently exist, pose dangers to both their occupants and others who may have occasion to be on the property. Most grow operations that come to my attention pose significant health and safety hazards for future occupants, neighbours, first responders and other service persons who visit the site.

19. Health and safety are not abstract concepts in Canada. There is a basic expectation that those who are required to frequent a residential structure, whether to deliver a newspaper, read an electrical meter, or install cable service, will not be placed in harm's way. That is one of the reasons we have building codes, electrical standards and other legislated requirements regarding basic standards for the structural and functional integrity of homes and other properties.

20. This report will outline the fact that a significant proportion of illicit grow operations have safety violations, ranging from minor to major, regarding their electrical wiring and structural integrity. It will also show that many operations pose environmental dangers due to excessive mould and moisture build-up within the structure, and the improper storage of various regulated chemicals.

21. It is perhaps not surprising that these are features of illicit operations, due to the fact that growers avoid the oversight of regulators. What is surprising, however, is that a significant proportion of the licensed medical grow operations that have come to my attention show similar violations of health and safety standards. In fact, the conditions of many licensed operations appear to pose even greater safety hazards than many of the illicit operations that eventually became known to authorities, particular in terms of chemical and structural hazards.

22. This situation is counterintuitive since licensed operators need not pursue their activities underground in fear of the oversight of regulators or law enforcement. In fact, one of the conditions of obtaining a licence from Health Canada is that producers be in compliance of zoning bylaws and other legislated standards.

23. Under the Medical Marijuana Access Regulations in effect until March 2014, Health Canada provided the following guidance to designated growers in a notice entitled "Information You Should Know About Your Designated-person Production Licence" (Appendix F):

> You are required to abide by all other federal, provincial and municipal legislation applicable to the activities authorized pursuant to this licence. These could include restrictions such as:
>
> - Legislation restricting smoking in public places,
> - Legislation regulating fire and safety standards,
> - Legislation regulating zoning and property use,
> - Policy restrictions regarding the use of the controlled substance in institutions or other private or public facilities.

24. In November 2010, federal Minister of Public Safety Vic Toews made a similar statement in his letter to me, stating that licensed growers of medicinal marijuana are "expected to comply with all federal, provincial and municipal laws, including bylaws, such as zoning, fire and safety regulations." (Complete letter in Appendix G.)

25. This report will show that a significant number of licensed production facilities appear to wilfully ignore municipal, provincial and national health and safety standards and therefore present the same health and safety risks as illicit operations.

Methods

26. In the current context, the primary question is: What is the likely risk that grow operations pose to the health and safety of the people engaged in the operations, emergency service personnel who respond to calls for service, or neighbours who are in close proximity to those facilities? The question is relevant since indoor cultivation – particularly on a larger scale – has, until now, generally resulted in some type of structural or contamination hazard to the growing premises (Plecas et al., 2012: 5-8 – Appendix H. Few operations, even those licensed by Health Canada, are operated in the type of municipally zoned and licensed commercial structures where market crops such as tomatoes or cucumbers are grown. The majority of grow operations have been, and currently continue to be, located in structures designed for residential purposes. As Diplock, Plecas and Garis (2013: 4; Appendix I) note:

> As residential houses are not originally designed to be ideal for indoor plant growing, buildings require substantial modifications to achieve a suitable environment. A number of extensive modifications are required including increased electrical power, altered ventilation, structural changes, added watering apparatuses, increased air flow, dehumidification, and increased levels of carbon dioxide, added cooling units, and anti-detection measures.

27. In this report, I will outline what has been reported in the professional literature relating to marijuana grow operations. I will augment that with data from the British Columbia Fire Commissioner's office, and a quantitative analysis of about 1,800 illicit and federally licensed operations inspected in the City of Surrey. These latter data were obtained through the City's Electrical and Fire Safety Initiative. I also draw on fire statistics and other research to outline the specific risks to first responders who attend residential MGOs.

Electrical and Fire Safety Initiative

28. In 2005, the City of Surrey implemented the Electrical and Fire Safety Initiative (EFSI) under the *Safety Standards Act*, based on a concept developed in collaboration with a multi-agency task force. The groundbreaking initiative was driven by new research quantifying the public safety hazards from grow operations, as well as a marked increase in fires attributed to MGOs in Surrey from 1997 to 2005.

29. The program was intended to reduce the incidence of house fires and associated public safety hazards caused by residential MGOs, and was one of the first attempts in British Columbia to apply an administrative solution to a problem that had previously been addressed only through the criminal justice system.

30. Surrey formed an EFSI team to administer the program that included representation from Fire Services, the RCMP, Electrical Inspections, and By-law Enforcement.

31. The team conducted electrical and fire safety inspections on addresses that originated from police tips of suspected MGOs. In the early days of the initiative, additional criteria to justify an inspection – that is, electrical consumption data – had to be obtained from BC Hydro through a Freedom of Information request. Legislation (Bill 25), which took effect in April 2006, amended the *Safety Standards Act* and permitted BC Hydro to release electrical consumption data to local governments for residential properties that exceeded three times the normal average residential consumption.

32. Violations observed by the EFSI team electrical inspector were documented, photographed and recorded on a secure server for compliance violation follow-up, either by the city electrical division, or by an approved electrical contractor through an electrical safety inspection checklist. Between March 2005 and December 2013, the Surrey program discovered 1,855 residential MGOs in Surrey, of which 1,541 were illicit operations and 314 were licensed with Health Canada.

33. The inspections were enabled under a Controlled Substances Bylaw designed to remove electrical, fire, health and other public safety risks from residential properties in the community, to ensure unsafe properties were remediated, and to recover costs from the property owners. Beyond the remediation of the former MGO sites, the program has contributed to a more than an 80 per cent reduction in the number of MGOs in the community, and a significant decrease in MGO-related fires.

34. Statistics provided on the Health Canada website indicate that as of December 31, 2013:

- Nationwide, there were 37,723 licences issued to possess medical marijuana, of which 28,829 were licences to produce.
- In British Columbia, there were 18,383 licences issued to possess, of which 16,010 licences were to produce.

35. A Freedom of Information request to Health Canada in August 2013 revealed that under the Health Canada Medical Marijuana Access Regulations (MMAR), 1,255 licences had been issued to produce medical marijuana in the City of Surrey. By that date, due to non-disclosure of licensed grow locations by Health Canada, the Surrey EFSI team had only discovered and inspected 314 of these federally licensed grow operations.

Analysis of EFSI Results

36. In April 2014, the City of Surrey and the University of the Fraser Valley initiated a research project to study the harms associated with MGOs in a residential setting. Experts in the fields of the Electrical Code, Building Code, and environmental health risks were commissioned to study and categorize photographs taken by the Surrey EFSI team during inspections over the past nine years. Using photographs of representative samples of the various hazards, the experts were asked to develop grading systems to rank the severity of the risk, based on each their respective opinion and analysis. These systems were then used to rank the balance of the sites. The research involved approximately 1,800 addresses, with 40-45 photographs per address.

37. As well, a criminology graduate student was commissioned to assist these experts, and to gather and collate from the case files all electrical violations issued by the electrical inspector during EFSI inspections from 2005 to 2014. All participants in the research project worked under a signed non-disclosure agreement.

38. A total of 1,855 operations were inspected under the EFSI program and case files opened. A few files, particularly in the early part of the EFSI program, were incomplete. Consequently, the subsequent analyses reported here excluded the small number of files with partial or missing data. Depending upon the specific issue examined, the number of incomplete files varied. The overall sample size for each analysis, including both illicit and licensed operations, was at least 1,700 sites.

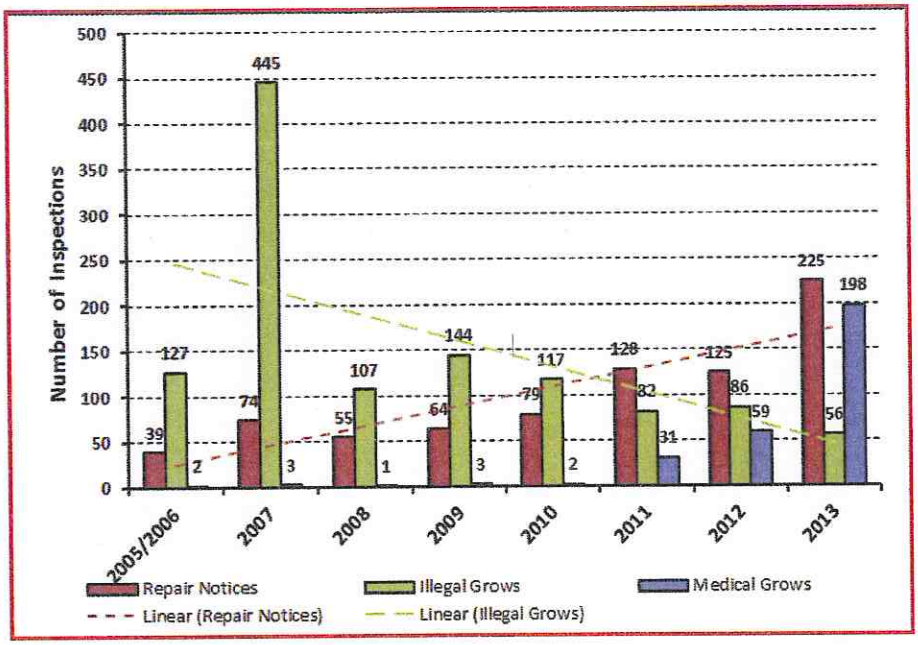
39. The actual sample sizes used in the various analyses are listed in the following table.

Sample Sizes Used in Analysis

	Type of Operation		
Analysis	**Illicit**	**Licensed**	**Total**
Total files available	1,541	314	1,855
Electrical (on site)	1,510	294	1,804
Electrical (photographs)	1,510	281	1,791
Mould	1,461	281	1,742
Chemicals	1,461	281	1,742
Structural Hazards	1,442	281	1,723

40. There are several reasons for the varying sample sizes. At the beginning of the EFSI program, a few cases were inadequately or incompletely documented as practices and procedures were being developed. In some instances, the documentation may have been hand written and was difficult to decipher. Also, photographic coverage was less extensive in some of the earlier cases. The initial concern was primarily focused on electrical problems (hence, the ***Electrical*** and ***Fire*** Safety Initiative) as these were considered as having the greatest potential for causing a fire. As a consequence, some issues relating to mould and the presence of chemicals were not documented. With experience, however, documentation practices quickly became more routinized.

41. The pattern of inspections from 2005 to 2013 inclusive is depicted below.



42. In the years following Surrey's introduction of EFSI, a number of local governments in B.C. have adopted similar inspection programs and Controlled Substance Bylaws. In some bylaws, property owners/landlords are required to inspect properties on a prescribed basis, as provided for in the *Residential Tenancy Act* (sec. 29; Appendix J). The bylaws address not only contraventions of city bylaws, but also of the *British Columbia Building Code*, the *British Columbia Fire Code*, the *Health Act*, and the *Safety Standards Act*. Importantly, the only focus is public safety; the bylaws do not address the criminal element of producing controlled substances.

43. From 2005 to August 2014, the City of Surrey has discovered and inspected 1,541 illicit operations and 314 federally licensed operations within the municipal boundary under the EFSI program. What I have observed is consistent with most of the literature detailing operations in jurisdictions throughout North America. In my experience, almost all MGOs to date violate at least one provincial or national building safety code section. In the majority of those cases, the violations are significant enough that a citation was issued, and in some cases, the property's electricity was disconnected until major safety issues were resolved. Many structures required substantial remediation efforts, and some were sufficiently damaged that the structure was torn down.

44. In terms of the professional assessments from the structural, electrical and environmental health experts, I have reviewed and assessed their work and have determined there are no anomalies or inconsistencies in the results. I have adopted the findings and can confirm that they are consistent with my own experience and observations over the years.

Caveats

45. The literature on MGOs is extensive and dispersed. A great deal of opinion on the matter is hearsay or experiential. Websites constructed both by amateurs and licensed professionals abound. Much of that material is of questionable reliability. Consequently, most of the published material I have referenced has been drawn from peer-reviewed journals or from reports by licensed professionals or recognized experts. Where publically, non-reviewed evidence is cited (mostly webpages), I have used only those where the author has recognized credentials.

46. The data on grow operations examined by under the EFSI has the limitation imposed on all non-randomly sampled data. The results of the analysis are limited to MGOs known to the City of Surrey only. They may or may not be representative of all MGOs in British Columbia, or even the City of Surrey. Obviously, this was an inherent issue with the illicit operations since it is not possible to generate a census of all operations. The total number in the community can only be estimated indirectly, since the operators have a clear incentive to stay hidden.

Summary of Key Findings

47. For this report, I was asked to discuss the following four issues:

- The potential fire and electrical hazards of growing marijuana in a residential dwelling.
- The contamination that may be caused by growing marijuana in a residential dwelling.
- The risks that marijuana-growing operations in residential dwellings pose to first responders.

- The differences, if any between the illicit marijuana residential growing operations and medical marijuana residential growing operations in terms of potential fire hazards, contamination, and risks to first responders.

48. Based on the evidence outlined in the literature and first-hand data available to me, I would assert that current practices of growing marijuana, particularly in residential buildings, generally pose a significant health and safety hazard to the growers, future occupants, casual visitors, first responders and other service personnel who visit the site. In summary, this report highlights the following:

a. Illicit grow operations pose significant electrical hazards by bypassing or diverting electricity around electricity meters; through improper modifications to the building's electrical service panel; and, through the use of unapproved or improper electrical devices. While rates are lower for licensed operations, some are found to also engage electrical bypasses and make improper service panel modifications. These are serious practices that can constitute a significant fire hazard. Only about one in seven illicit operations inspected by the EFSI had an operating smoke alarm/carbon monoxide detector installed. Fewer than one in 20 inspected licensed operations had one installed.

b. Over half of all illicit and licensed operations inspected by the EFSI had an electrical risk factor that might be ranked as high or extreme.

c. About a quarter of both illicit and licensed operations inspected by the EFSI had observable mould, and about 10% of both situations had mould growth rated as being a major problem.

d. Visible chemical containers were seen at almost one in five illicit operations and more than one in two licensed operations inspected by the EFSI. Labeling was a problem; many containers had no visible indication of the contents. Licensed operations were more than twice as likely as illicit operations to have unlabeled containers, although, in many instances, the illicit operations had been partially cleared of plants and other paraphernalia before the EFSI team arrived.

e. About 13% of the illicit operations and 71% of the licensed MGOs had building modifications not in compliance with zoning regulations. Almost all inspected licensed MGOs (98%) had modifications to the structure without a permit. The structural risk due to various modifications was ranked high for about 11% of the illicit MGOs and for about 72% of the licensed MGOs. In this sense, the inspected licensed operations posed a significantly greater hazard than the illicit ones.

f. At about one per 100, the death rate for recorded fires was about the same for MGOs as for fires in other types of residences. However, the injury rate for MGO-associated fires was about 16.8 per 100 fires. This is about 2.2 times that for incendiary fires in non-MGOs.

49. I have structured the information in this report to address illicit residential MGOs first, followed by licensed medical residential MGOs. My findings are as follows, illustrated with photos showing the typical risks found by the EFSI at residential MGO sites.

1. Potential Fire and Electrical Hazards of Growing Marijuana in a Residential Dwelling

Fire Hazards

50. The history of marijuana production in British Columbia has been one of increased sophistication and productivity. Illicit crop production has generally shifted indoors, where the growing environment can be controlled, resulting in higher crop yields and better quality control. Outdoor crops are relatively easy to detect and are subject to the challenges of nature. Indoor cultivation is much more predictable, to the point where Bouchard (2008; Appendix K) estimates that each 1,000-watt bulb in a grow-op can result in a pound of harvested marijuana. Furthermore, indoor grow operations are capable of generating multiple crops per year.

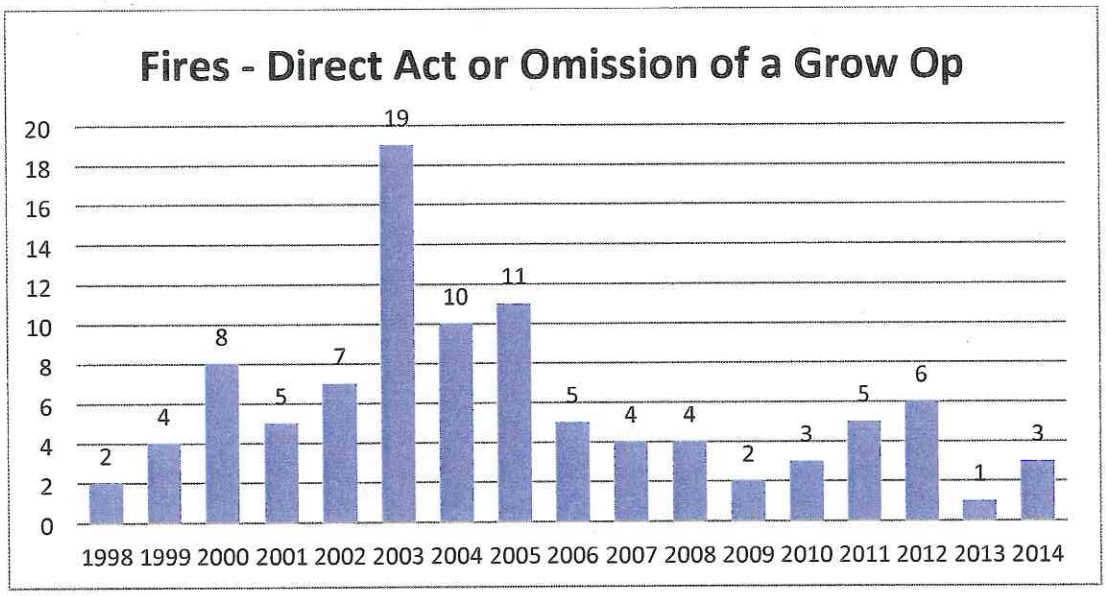
51. Assessing the *absolute risk* from marijuana operations is challenging since it is difficult to determine the combined level of exposure without an accurate estimate of the total number of operations in any particular jurisdiction. For example, we can estimate the rate of house fires in a given year because we know how many fires are reported and how many residential structures exist, but the same types of data are not available for marijuana operations. However, we can estimate the *relative risks* of some events, and this can help provide a clearer picture of the risk from grow operations. For example, we can determine the number of fires resulting from grow operations and the injury and death rate in the same way we can for other known types of residential fires.

52. Although knowing the exact number of grow operations is difficult, Plecas, Diplock and Garis (2009: 23, 26; Appendix L), using various methods outlined by Bouchard (2007; Appendix M) and Easton (2004; Appendix N), estimated that there were about 10,000 illicit grow operations in British Columbia alone, producing a crop valued at about $1.67 billion. With the advent of licensed operations, it is likely that the number of illicit operations has decreased. Regardless, as at December 2013, under the Medical Marijuana Access Program (MMAP), there were more than 16,000 production licenses granted B.C. How many illicit operations still exist is currently an open question.

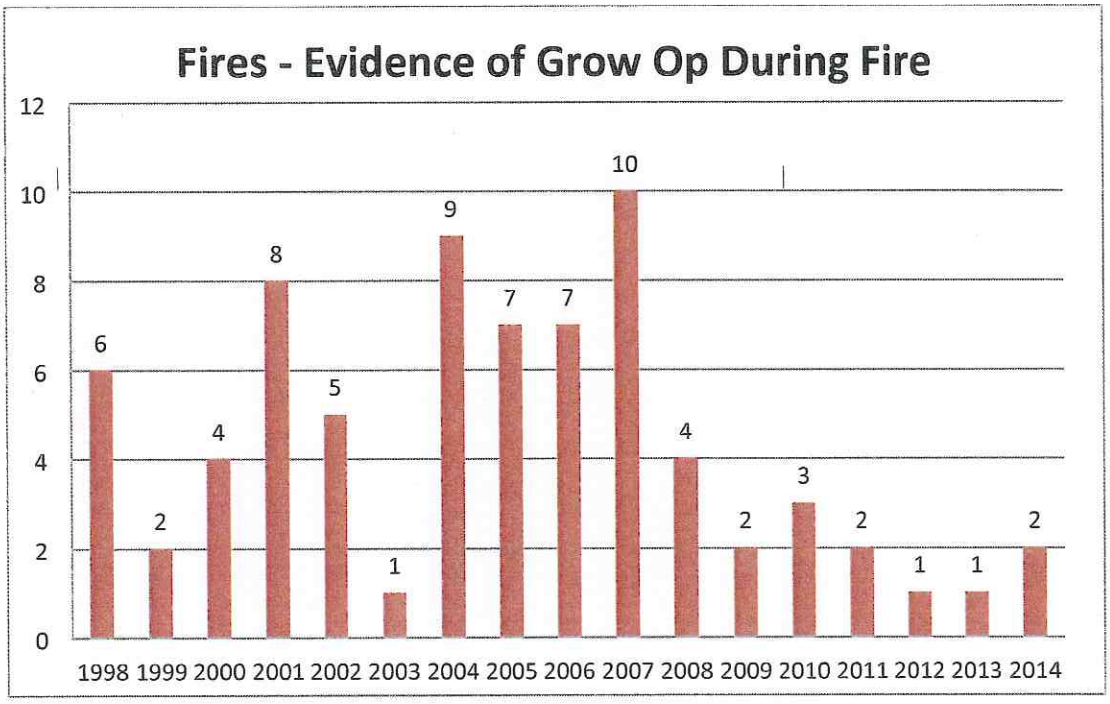
53. Besides the number of operations increasing with time, the scope of the individual operations has also increased, affecting the relative risk. The typical indoor MGO in British Columbia is estimated to have increased in size from nine high-intensity lights and 149 plants in 1997, to 16 lights and 236 plants in 2003 (Plecas, et al., 2005: 1-2; Appendix O).

54. Fires and MGOs became a focus following the 2005 publication of "Marihuana Growing Operations in British Columbia Revisited (1997-2003)" by Plecas, Malm and Kinney (2005; Appendix O). Of specific interest was how many MGOs became known to police because a fire had occurred on the premises. The study identified a yearly average of about 3.7% (n=419) of grow operations coming to the attention of the police as a result of a fire.

55. As indicated in the figure below, 99 fires occurred in the City of Surrey between 1998 and 2014 that were a direct result of a grow operation. These fires occurred in residential properties only, with barns and commercial properties being excluded. These fires were primarily a consequence of electrical bypasses, improperly wired grow lights, and overloaded electrical equipment used in the grow operation.



56. During the same period, the City of Surrey experienced a further 74 fires where grow operations were discovered during a firefighting operation or follow-up investigation, but were not the direct cause of the fire. These fires, graphed below, include suspicious fires and arson.



57. The most recent evidence suggests that the typical grow operation now has more than 30 lights (Plecas, Chaisson, Garis & Snow, 2011: 6; Appendix P)—an increase over the estimated average of 16 lights in 2005 (Plecas, et al., 2005: 1; Appendix O). With improved lighting and other controls, it is estimated that yields have doubled in that period. Because of the impact of technology on plant yields, it has been suggested that the best overall indicator of productivity is the number and power of lights present in the operation (Bouchard, 2008: 315; Appendix K. Also see: Toonen, Ribot & Thissen, 2006:1052-3; Appendix Q).

58. The increased use of high intensity lighting and its associated apparatus places greater strain on operations, particularly in structures meant for residential purposes. In the 1950s, many houses were built with only 60-ampere service.[1] Since then, houses have typically been provided with 100-ampere service, which can easily be overwhelmed by a medium-sized grow operation. For example, an operation with 16 1,000-watt lights would draw 133 amperes for the lights alone at 120 volts. A 30-light operation under similar conditions would draw 250 amperes, which is beyond the rated service capacity of a 200-ampere home.[2]

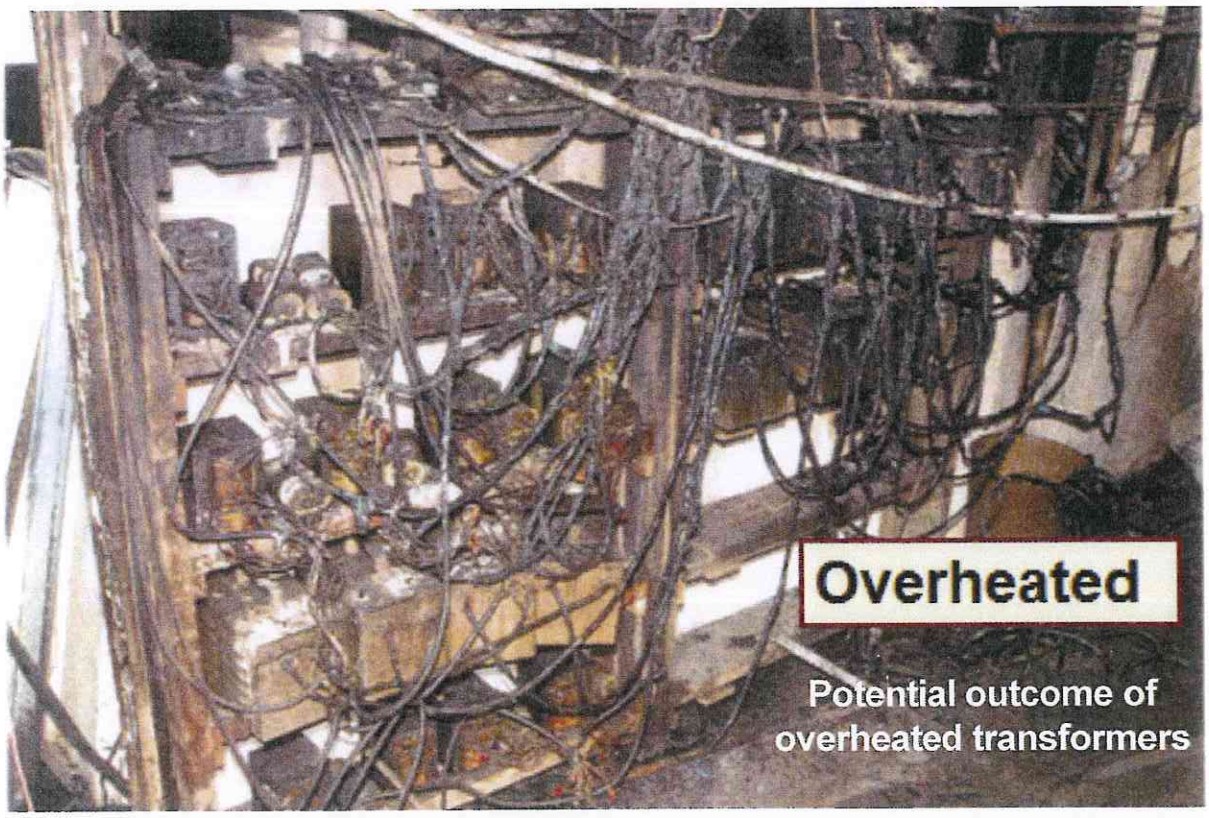
59. The heavy current draw required by MGOs led to growers making two primary modifications to their structures. First, to avoid detection and to keep costs down, they steal electricity by bypassing the electrical meter. Second, electrical service panels are often modified to bypass the limitations of the typical domestic 100- or 200-amp service found in residential units. Both of these actions can pose safety hazards. Many houses also need to be internally rewired to distribute the power to lights, fans, CO_2 generators and other equipment.

60. Electrical issues have become an increasing problem as MGO techniques have evolved. As indicated, typical operations in British Columbia have employed high intensity, 1,000-watt mercury vapour or sodium lamps that are estimated to consume around 181,000 kWh of electricity per year (Diplock & Plecas, 2011: 3; Appendix R).

61. The experience is that few installations are professionally wired and that most are in clear violation of electrical code standards. That is to say, many installations are discovered with such issues as exposed or uninsulated wiring, inadequate electrical panels or no circuit breaker components, and improper gauge wiring. All of these elements pose a fire or potential electrocution risk. Furthermore, the high amount of electricity consumed provides an incentive for operators to bypass electrical meters. The photograph below shows the damage that can be caused by improper wiring.

[1] 60-amp main breaker panels are still available through many distributors, including some major home and garden supply shops. See, for example, http://www.rona.ca/en/electrical-panel-02655078--1.

[2] The amount of current drawn (amperage) in a circuit is determined by dividing watts by voltage. Hence a typical 100-watt bulb on a 120 volt circuit would draw 100/120=.83 amps. A corresponding 1,000-watt bulb draws 8.3 amps.



62. As indicated, since 2005, the City of Surrey EFSI team has inspected approximately 1,800 buildings that turned out to be both illicit and licensed MGOs. The properties were checked in detail for fire and safety violations. The status of the properties was recorded through checklists and written commentaries. Photographs were also taken of the premises, with typically 40-45 photos taken per property to detail the overall condition of the property and to further record safety code violations. In the summer of 2014, those files were reviewed by professionals to generate a quantitative overview of the potential risks of hazards the properties pose.

Electrical Hazards

63. The 2014 analysis of safety hazards in Surrey suggests that fire is one of, if not the, primary concern within grow operations. The issue was examined from two perspectives.

    a. First, I had a summary analysis conducted of the 1,541 case files of illicit grow operations inspected by the EFSI team. Because of incomplete recording, the effective useful number of files was 1,510. Those files contain reports by both fire and electrical inspectors who had been on site–that is, *physically at the facility*–at the time of the inspection. The original inspectors' observations and assessments were copied from the files, summarized in a spreadsheet, and used to generate an analysis of the conditions of the wiring and other electrical equipment in the building.

    b. The second analysis was a detailed *secondary* inspection of the photographs taken at the grow operation by the investigators. A typical location generated 40-45 photographs, giving a general overview of the premises and focusing on specific observed safety issues such as electrical wiring, chemical storage or ventilation configurations. In the summer of 2014, I commissioned a review of those photographs taken from all Surrey EFSI case files for assessment by a licensed electrical inspector/contractor. This contractor has had considerable field experience while contracted out to a major hydro authority for the detection of theft of power typically associated with MGOs (see attached CV in Appendix S).

64. The table below summarizes the electrical issues documented by the original Surrey EFSI electrical inspector during property inspections conducted from 2005-2014 (the first analysis as noted above).

Summary of Electrical Issues from On-site Inspection Reports of 1,510 Illicit MGOs (Surrey, B.C.)

Issue	Percent of Units
Electrical Bypass or Diversion	13.6%
Hydro Disconnected	22.8%
Service Panel Action Required	55.6%
Smoke Alarm/CO Detector Present	14.2%

65. The figures do not add to 100% since some facilities had more than one issue. From these data, however, it is clear that there are substantial problems associated with the illicit grow operations. In about 14% of the cases, there was clear evidence of theft of electricity. This generally involved bypassing the meter. Twenty-three percent of the locations had their electricity disconnected. Most of the disconnections were at properties where the meter had been bypassed and there were other imminent safety hazards. Often, it was BC Hydro that detected the MGO and informed the city. Generally, in those situations, electricity was disconnected prior to the site being fully surveyed. In some of the bypass cases, BC Hydro had not yet performed the electrical service disconnection at the time of the EFSI inspection.

66. In more than half of the illicit grow operation sites (55.6%), the building's electrical service panel was compromised. Typically, in those situations, circuit breakers or fuses had been bypassed, the wiring modifications resulted in an excessive current draw, or the wiring was completed in a haphazard or dangerous fashion with little or no regard to electrical codes or safe practice.

67. It was also noted that an operational smoke alarm/carbon monoxide detector was present in only 14.2% of homes.

68. While issues such as electrical meter diversions or bypasses and wiring modifications can pose a risk to both tenants and first responders, some modifications clearly pose a greater risk than others. For example, an exposed panel in a basement may not be as dangerous as a bypassed circuit breaker, which can result in overheating from excess current draw.

69. To obtain a qualitative assessment of the relative hazard posed by the electrical code violations, I had case photographs of the operations' wiring, fixtures and electrical panels assessed by a trained and licensed electrical inspector/contractor. The assessor ranked the sites on a four-point scale: extreme, high, moderate and low risk, based on his understandings of the electrical code and professional experience. The elements composing the various risk levels are outlined in Appendix T.

70. Some examples of what issues might constitute extreme, high, moderate and low risk are illustrated in figures 1 through 8. These images were selected by the electrical contractor as being representative of these rankings, and I concur with their selection based on my experience.

Figure 1 – Extreme

Extreme

This is a photograph of the interior side of a meter base. The metal has been cut open to expose the line-side supply conductors from the power utility. There is evidence of an electrical diversion/bypass.

These line-side electrical conductors have no over-current protection, except from the utility power source. This utility power supply is designed to support multiple residences. A fault or damage will result in a catastrophic failure to this electrical apparatus.

Fire and electrocution can result from this condition, putting residents, neighbours, first responders and support crews into harmful and lethal circumstances.

Because of the extreme danger that this scenario posses around loss of property and life, immediate disconnection from the utility power grid is required.

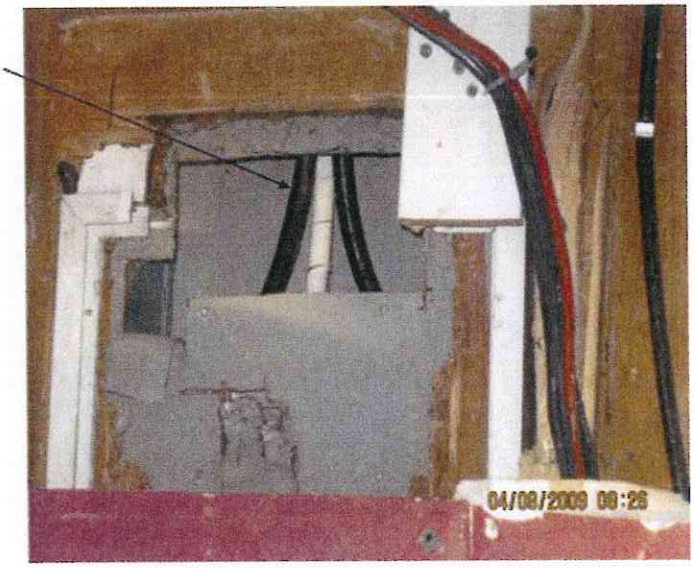


Figure 2 – Extreme

Extreme

This is a photograph a power utility underground supply conductors and electrical conduit. This has been cut open showing evidence of a diversion/bypass that has been tapped into the supply conductors.

These line-side electrical conductors have no over-current protection, except from the utility power source. This utility power supply is designed to support multiple residences. A fault or damage will result in a catastrophic failure to this electrical apparatus.

Fire and electrocution can result from this condition, putting residents, neighbours, first responders and support crews into harmful and lethal circumstances.

Because of the extreme danger that this scenario poses around loss of property and life, immediate disconnection from the utility power grid is required.

Figure 3 – High

High

This is a photograph of a electrical apparatus installed in a hazardous and non-standard application.

The transformer equipment produces a great deal of heat that can cause combustion in surrounding materials that are susceptible heat, such as the wood wall.

The over-current rating of the time clock greatly exceeds the required over-current rating of the transformers.

The transformers typically step the voltage up to operate the high-powered lights. This higher voltage represents a volatile risk of electrocution to any unqualified persons.

There is no apparent guarding or protection of this apparatus from persons and property, posing a high risk to life, limb and property.

Figure 4 – High

High

The electrical equipment in this photograph has been installed in a non-standard way. There is exposed live electrical wires and parts.

The transformer equipment produces a great deal of heat that can cause combustion in surrounding materials that are susceptible heat.

The over-current rating of the time clock greatly exceeds the required over-current rating of the transformers.

The transformers typically step the voltage up to operate the high-powered lights. This higher voltage represents a volatile risk of electrocution to any unqualified persons.

There is no apparent guarding or protection of this apparatus from persons and property, posing a high risk to life, limb and property.

Figure 5 – Moderate

Moderate

The electrical equipment in this photograph has been installed in a non-standard application.

The condition of the apparatus suggests that a non-qualified person completed this work and would indicate that other parts of the electrical apparatus has been altered by unqualified persons.

Electrical inspection of the residence would be required after a Certified Electrician has performed remediation of the residence's electrical system.

The risk assessment is moderate.

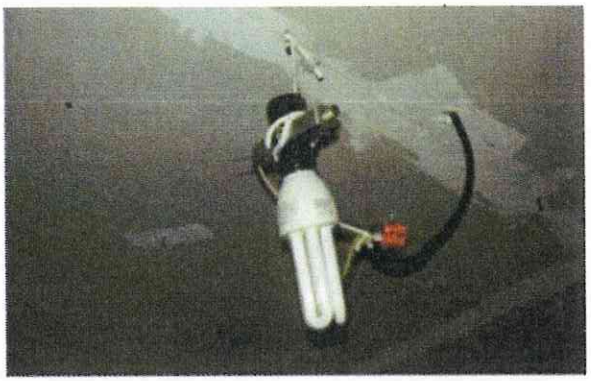


Figure 6 – Moderate

Moderate

The electrical apparatus depicted in this photograph is non-standard.

The electrical conductor has been installed by non-qualified persons. Based on the condition of this electrical apparatus, there is a indication that other areas of the electrical system have been tampered with by unqualified persons.

Electrical inspection of the residence would be required after a Certified Electrician has performed remediation of the residence's electrical system.

The risk assessment is moderate.

Figure 7 – Low

Low

The electrical panel in this photograph appears to have been installed to Canadian Electrical Standards.

The electrical wire has been installed in a non-standard manner.

Proper support and termination will correct the deficiency.

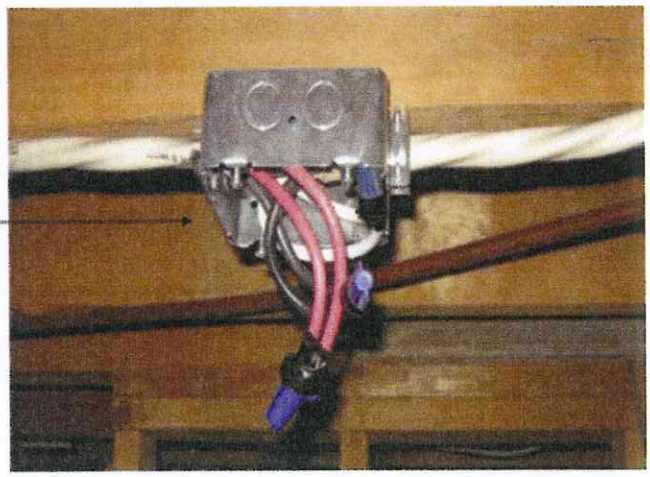
The risk assessment is low.

Figure 8 – Low

Low

Electrical Apparatus depicted in this photograph is in a condition that requires very little work to correct it to Electrical Code Standards and makes the risk assessment low.

With proper guarding of the terminated wires with a cover plate, it will meet standards.



71. Because this review was based on photographic observations only from the EFSI files, some potential violations could not be observed or detected. In those instances, the potential electrical hazard was assessed as inconclusive and the risk was considered to be "low." An inconclusive determination was generated in about 30% of the grow operations.

72. Assessments of the photos suggested that 37% of the operations demonstrated some form of tampering with the electrical panels and equipment. About 17% of the sites showed evidence of nonstandard equipment and wiring. The following table summarises the overall risk assessment for the grow operations.

Summary of Electrical Risk Factors from Photographs of 1,510 Illicit MGOs (Surrey, B.C.)

Risk Level	Percent of Operations
Low	40.8%
Moderate	8.8%
High	34.8%
Extreme	15.6%
Total	**100.0%**

73. From this analysis, it is estimated that at least 50% of the operations fall into the "high" or "extreme" risk category. This should be taken as a conservative estimate since it is possible that some of the indeterminate assessments, which had been placed in the "low" category, could have posed much higher risks. Again, these assessments were based on case photographs taken at the time of the inspection and examined in August 2014 and not at the time of the physical on-site inspection. Please see Appendix U for further detail about electrical code violations.

2. Contamination that May be Caused by Growing Marijuana in a Residential Dwelling

Biological Hazards

74. Marijuana, like all plants, is subject to blight and insect infestations. Mould is a significant problem for grow operations due to the high humidity within the growing area. It is a particular problem when plants are dried. Studies of marijuana plants (Kurup et al., 1983: 62; Appendix V and Verweij, et al., 2000: 2875; Appendix W. Also see McLaren et al., 2008: 1105-1106; Appendix X) indicate that almost all samples contain opportunistic "mould" pathogens such as *Aspergillus fumigatus*, *Aspergillus flavus*, *Aspergillus niger*, and *Mucor*, among others. A significant proportion of the population has been shown to be allergic to these (Flannigan, et al., 2011; see bibliography) and, in some instances, exposure can be fatal (Sebat, Avdalovic and Morrissey, 2011: 304; 305-6; Appendix Y).

75. I submitted our sample of EFSI inspections to an industrial hygienist to examine the photographs for mould infestation and to complete a qualitative assessment based on the extent of the visible mould. A detailed explanation of her method for analysing the data and assessments, along with her CV, are outlined in Appendix Z.

76. Examples from that document of what would constitute suspected, minor and major mould growth are illustrated in figures 9 through 11. These images were selected by the hygienist as being representative of these rankings, and I concur with their selection based on my experience.

Figure 9
This is an example of what was classified as suspected mould growth.

Example of suspected mould growth (S)

This photo is an example of suspected mould growth. The base of the walls and below the window show what is presumably water staining, with fungal growth suspected at the base of the far corner and on the backside of the drywall.

Figure 10

This figure illustrates obvious mould growth. In this instance, however, it is described as *minor* since the coverage is estimated to be less than one square meter (1 m^2).

Example of minor mould growth (1)

This photo shows an example of minor mould growth (dark staining on top left corner of drywall). Minor mould growth is to be considered <1m^2.

Figure 11
This is an example of major mould growth, since it is estimated to cover more than one square meter.

Example of major mould growth (2)

This photo shows an example of major mould growth (dark and spotted staining throughout drywall). Major mould growth is to be considered >1m^2.

77. The results of the analysis are presented below.

Summary of Mould Existence from Photographs of 1,461 Illicit MGOs (Surrey, B.C.)

Visible Mould	Percentage of Operations
Yes	26.4%
Suspected	18.3%
No	38.1%
Indeterminable	17.1%
Total	**99.9%**

78. Mould was clearly visible in about 24% of the cases and not evident in 38% of the cases.[3] Because the analysis was based on photographic analysis, however, it was not possible to determine whether mould was present in about 16% of the cases. Usually, this was because there was insufficient photographic coverage of the area, staining due to other elements was possible, or wall coverings and other material were obstructing a complete view of the facility. Furthermore, in 22% of the cases, mould was suspected but could not be identified irrefutably. Generally, in those situations, mould-like features could be seen in typical locations, but either the pictures did not have sufficient granularity, potential growth was in early stages, or the pictures were taken from too far away.

79. Besides assessing the presence of the mould, I also asked the hygienist to provide an assessment of the extent of the mould problem. Focusing on those cases where mould was clearly determined to exist or was suspected, the growth was categorized as being either a "major" or a "minor" issue based on the extent of the growth.[4] Generally, suspected mould growth was assessed as being minor. About 11% of all facilities inspected clearly showed major mould issues; 34% of the facilities were classified as having minor amounts of mould in existence.

80. Mould risk to inhabitants of grow operations would appear *prima facie*. However, there is also the broader issue of whether others who come into contact with the operations might also be at risk. Martyny et al., (2013, Appendix AA) conducted a field study measuring the impact of various chemicals and pathogens on law enforcement investigators visiting indoor marijuana grow operations in Colorado. Clothing and skin swabs were taken before and after the officers entered the buildings. Air samples were also taken to measure for several items including fungal spore levels. Significant spore counts were discovered both inside and outside the buildings. However, the types tended to differ. The primary fungal types found indoors tended to be Aspergillus sp./Penicillium sp. varietals. This is different from the outdoor situation where Cladosporium sp. predominated. Overall, officers who entered the buildings, particularly those engaged in plant removal, were often exposed to unhealthy levels of spores.

[3] In 80 of the original 1,541 case files, pictures were either not available or were limited to a few specific areas such as the electrical panel or containers of chemicals, thus not allowing for an overall assessment of whether mould could be present or not.

[4] Where possible, the square footage of the visible mould was estimated within the pictures. "Minor" would be defined as less than 1 m^3 of visible mould, and major would be greater than 1 m^3.

81. In 45% of the indoor MGOs, the spore counts were at least five times the level of the ambient air outdoors. To put this in context, indoor air generally has lower–or at worst, equal–spore counts to outdoor air. The removal process increased indoor spore levels by a median of nine times that of ambient air, with a maximum count of 45 times. Martyny et al. (2013; Appendix AA) concluded that the levels were sufficiently high that they posed a potential health challenge and that "proper respiratory, skin, and eye protection be worn as outlined in current mold remediation guidelines."

82. While some grow operations are stand-alone units, many are contained in residences. The occupants typically tend the crop and guard the premises against intruders. In many instances, families are hired to perform this task and young children are often present. Moller et al., (2011: 766; Appendix AB) report that an estimated 10,000 children were living in such an environment between 2000 and 2003 in Ontario alone.

83. Obviously, the hazards children face in grow operations mirror those of adult occupants but also pose issues unique to children. One area of concern has been the absorption of tetrahydrocannabinol (THC – the active ingredient in marijuana) by children.

84. The medical consequences of children residing in an MGO are ambiguous. Moller et al., (2011; Appendix AB) examined 61 children (median age 6.5 years) who had resided in an MGO in Ontario, and concluded that "the majority of children removed from drug-producing homes were healthy and drug free." Testing was done between one and two weeks from the point at which the Children's Aid Society had removed the children from their homes. Testing hair samples from those who had been living in a grow operations, however, indicated that 13% tested positive for THC.

85. In the more general instance, however, there is ample evidence that poor indoor air quality–including the presence of abnormally high humidity, mould, and fungal spores–can adversely affect children, particularly regarding their respiratory health (Freeman, Schneider & McGarvey, 2003; Appendix AC, Garrett et al., 1998; Appendix AD, and Pettigrew, et al., 2004; Appendix AE).

86. Douglas and Sullivan (2013; Appendix AF) conducted a study of 181 children found to have been living in MGOs in two regions in British Columbia. Data were collected by child protection workers who visited the grow operation homes. The homes exhibited the characteristics of many MGOs, with 96% housing pesticides and chemicals, 59% having had gasses re-vented from the furnace or hot water heater, and 77% having evidence of mould (Douglas and Sullivan, 2013: 447). The average number of plants discovered among the homes was 362. The researchers noted that among the children, 21% were reported as "unwell." Respiratory problems were reported in 17.7% of the children, 11.2% had dermatological symptoms and 1.2% had ear infections.

87. More information about the risks to children is provided later in this section.

88. Where illicit grow operations are discovered by the authorities, code-based remediation is generally ordered before the building can be used again for residential purposes. In some instances, the level of contamination is such that the building must be demolished. Where the operations are not discovered by authorities, it is possible for owners to cover mould and other matters with cosmetic adjustments such as painting, carpeting, and new drywall. This does not remove the mould; the structures remain contaminated. Consequently, purchasers may unknowingly acquire a contaminated property, thereby placing themselves and any visitors at risk.

Chemical Hazards

89. Marijuana, as with all other plants, requires nutrients to grow. Regardless of the type of operation, it is typical to find some form of chemical fertilizer being used. As noted, marijuana is also susceptible to fungal and insect infestations (such as aphids and fungus gnats). To combat those issues, growers often use various fungicides and pesticides (National Collaborating Centre for Environmental Health, 2009; Appendix AG and Cochran, 2011; Appendix AH). Used according to the instructions, most of those compounds are relatively safe. However, in most jurisdictions the application of some compounds is restricted to trained and licensed personnel. Furthermore, notices indicating that those compounds are stored or in use on the premises are generally mandated.

90. While most commercially available herbicides and pesticides pose little risk to those applying the compounds or to passersby when diluted and used as directed, exposure to large quantities can be harmful to residents and first responders. Because no illicit and few licensed operators post the fact that such chemicals are stored on the premises, firefighters and other responders can be exposed to toxic levels of those chemicals. Firefighters face particular risks since containers may explode and the contents vaporize should the structure catch fire.

91. Based on experience, there are four typical categories of insecticides used in grow operations: *avermectins* (such as abemectin or Avid); *organophosphates and carbamates* (Azinphos, Chlorpyrifos, Diazinon, Dichlorvos, Methyl Parathion, Malathion, Parathion, Phosmet & Tetrachlorvinphos); *pyethoids* (Cypermethrin, Cyfluthrin, Permethrin, Resmethrin, and Tetramethrin); and, *sinosyns* (Cochran, 2011; Appendix AH and National Collaborating Centre for Environmental Health, 2009; Appendix AG. Also see Pacific EHS submission in Appendix Z). Material Safety Data Sheets (MSDS) are provided for these chemicals in Appendix AI. With all of the compounds mentioned above, the MSDSs strongly recommend that in the event of fire, special respiratory equipment and protective clothing be used by the firefighters. Furthermore, in many cases, water jets should not be used in an attempt to suppress a fire.

92. Several properties are common to the majority of the compounds. With continual exposure, there is a risk of sensitization to the insecticides, resulting in increased toxic effects. Long-term occupational exposure could lead to cumulative health issues. It is recommended that protective clothing, rubber gloves, eye protection, and inhalation protection be used by all handlers and applicators of these pesticides to minimize exposure levels. Subsequently, the protective clothing should be carefully removed and washed with strong detergents.

93. With one or two exceptions, the compounds noted above are highly toxic to fish, aquatic species, and bees. Many insecticides are also highly toxic to birds, but in some cases the avian toxicity is reduced. Under no circumstances should the pesticides be permitted to enter any water source, or to contaminate soil.

94. The cleanup of spills can require harsh treatment with caustic agents or strong alkaline detergents. All cleanup solutions and materials should be retained by adsorbents and placed in sealed disposal bins.

95. The pyrethrin-based pesticides appear to have lower toxicities than the organo-phosphate based compounds. The pyrethrins act on cell receptors, inhibiting their activity, and also act on the nervous system, causing neurotoxicity. There is evidence that the pyrethroids may act as immunosuppressants. Many insects have developed resistance to some of the insecticides, particularly the pyrethroids.

96. The majority of organo-phosphate pesticides are particularly dangerous because of their toxicity and physical properties. They have very high toxicities for humans, mammals, and other vertebrate species. Their development was based on the nerve gas Sarin, and there have been instances of their use as chemical warfare agents. The organo-phosphate compounds are neurotoxic, inhibiting cholinesterase activity. They are particularly dangerous when in contact with children; there is recent evidence that exposure to organo-phosphates has affected the neuro development of infants and young children.

97. With many of these insecticides, sample-handling protocols must be rigorously followed by the applicator to avoid serious toxic effects, especially in the close environment of a grow-op, and to keep pesticide residues to a low level. In particular, those handling organo-phosphates should have frequent blood tests to check their cholinesterase levels. Repeated exposure to organo-phosphates can have effects similar to acute exposure. Safe storage conditions are necessary to minimize the risk of exposure to humans, and the environment. They also have significant negative environmental impacts. The use of some organo-phosphate insecticides have been banned or are being phased out for insecticide use.

98. Many insecticidal formulations include aromatic hydrocarbons liquids as carriers, since the pesticide often has limited solubility in water. Examples of these aromatics include xylene, toluene, and trimethylbenzene. Sometimes naphthalene is added to the formulation. All these aromatics are considered to be carcinogenic.

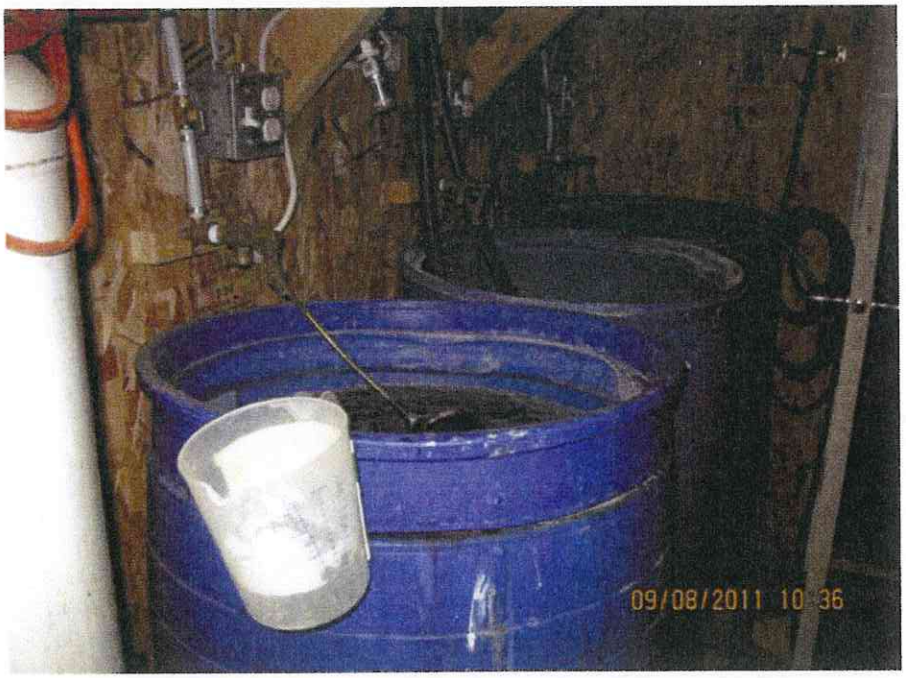
99. To supplement the literature on chemical hazards associated with grow operations, I retained the services of an industrial hygienist to assess the previously mentioned EFSI photographs of grow operations. We did not have a hygienist available for the on-site inspections. However, using file photographs of the facilities, we were able to generate a risk assessment for most cases.

100. Based on the hygienist's professional experience, we also had a four-point hazard rating assessed for each case file. A detailed explanation of her method for analysing and assessments is outlined in Appendix Z).

101. Reviewing the file photographs from our sample of illicit grow operations mentioned above, we attempted to determine whether or not containers of chemicals existed on site. Specifically, the photographs were examined for a presence of pesticides, herbicides, fungicides and other potentially harmful chemicals. Example photos of chemical containers are presented in figures 12 through 14. These images were selected by the hygienist as being representative of these hazards, and I concur with their selection based on my experience.

Figure 12

This figure shows an example of a container of suspected chemicals. The type of container, associated paraphernalia and visible residues strongly suggest the contents might be fertilizer or some other compound.

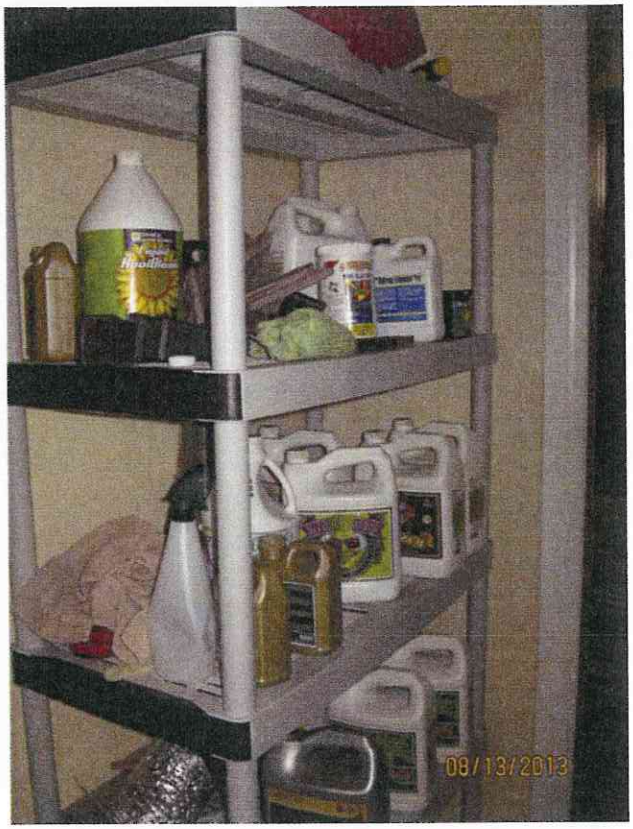


Example of suspected chemical container (S)

This photo is an example of suspected chemical containers. In our experience, plastic drums (particularly blue-coloured as shown) are frequently used in marijuana grow operations to mix and distribute chemical such as fertilizers. As no labels are present, the contents are unknown.

Figure 13

This figure indicates the presence of chemical containers where the labels are mostly visible. In some instances it is possible to identify what the original contents would have been; in others a determination is difficult or impossible.



Example of chemical containers—labels mostly visible

This photo is an example of stored chemical containers presumably related to the marijuana grow operation. Most containers have labels that are at least partially visible.

Figure 14
This figure shows containers typically manufactured to store chemicals, but the labels were either not visible of sufficiently indistinct not to be able to identify the likely contents.

Example of chemical containers—labels mostly **not** visible

This photo is an example of stored chemical containers presumably related to the marijuana grow operation. Due to the way the containers are being stored, the labels are not visible and therefore the contents cannot be identified by photos alone.

102. A summary of the analysis is listed in the following table.

Summary of Existence of Chemical Containers from Photographs of 1,461 Illicit MGOs (Surrey, B.C.)

Visible Chemical Containers	Percentage of Operations
Yes	18.9%
Suspected	1.7%
No	62.4%
Indeterminable	17.0%
Total	**100.0%**

103. Chemical containers were clearly identified in 19% of the illicit operations that were examined. In a further 1.7% of the operations, chemical containers were suspected but, in general, partial or indistinct labelling made it impossible to identify the container with any degree of certainty. In 17% of the installations, what appeared to be containers that could have held chemicals were noticed, but there was no identifiable labelling of contents. In the remaining 62% of the grow operations, no visual evidence could be detected in the file photos. Overall, our figures on the use of pesticides, fungicides and herbicides is likely an underestimate since the original on-site records suggested that material from some of the sites (e.g., plants, most growing equipment) had been cleared out before the formal inspection had taken place.

104. A key safety aspect is whether chemical containers have clear labels on them so that it is possible to identify the contents. As indicated previously, many of these chemicals can be highly toxic to both humans and the general environment. The results listed in the following table suggest that only a minority of containers had clear labeling on all of the observed containers (7.3%). Another 7% of the properties had identifiable labels on some of the containers or at least partial labels on some of the containers.

Summary of Container Labeling from Photographs of 1,461 Illicit MGOs (Surrey, B.C.)

Containers Labeled	Percentage of Operations
Labeled	7.3%
Some labeling	7.1%
No labeling	5.0%
Indeterminable	1.8%
Not applicable	78.8%
Total	**100.0%**

105. From both the clear and partial labels, it was possible to identify some of the general categories of chemicals used. Some grow operations had only one compound identifiable (e.g., fertilizer) while others had several identifiable (e.g., pesticides and fertilizers). The distribution is outlined in the following table.

Summary of Chemical Identified from Photographs of 1,461 Illicit MGOs (Surrey B.C.)

Type of Chemical Identified	Percentage of Operations
Fertilizer	10.9%
Pesticide	0.8%
Other	1.7%
Unknown	8.0%
None observed	78.6%

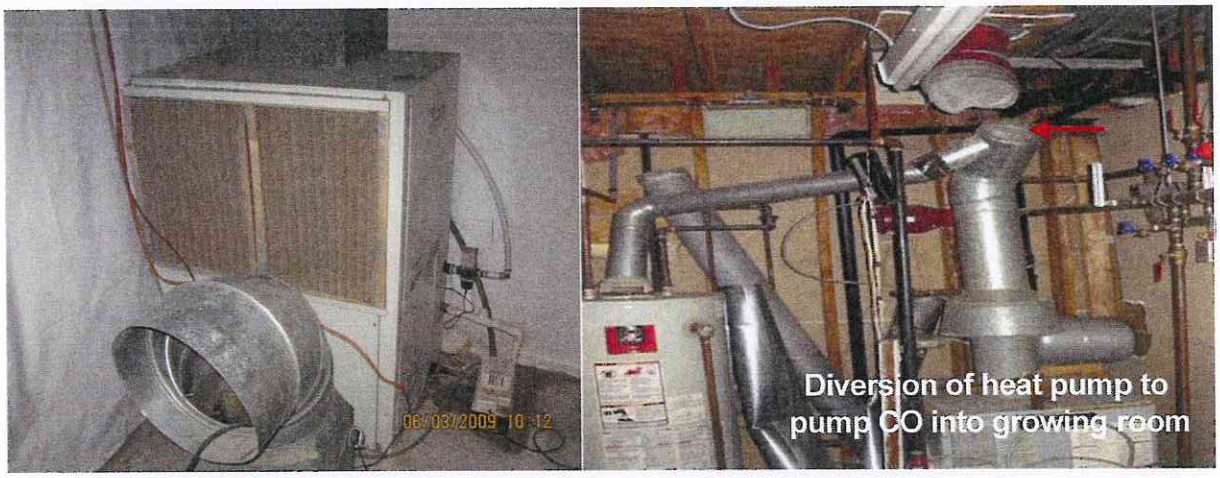
106. The figures do not add up to 100% because, in some instances, more than one substance was observed (e.g., fertilizers and pesticides). Among the illicit grow operations, about 11% had identifiable fertilizer; about 1% had pesticides; 1.7% had other chemicals (herbicides or caustic substances); and 8% were of unknown contents.

Structural Hazards

107. Often, buildings used for MGOs are structurally modified. Common modifications involve removing walls to open up growing areas, and cutting holes in walls to accommodate ductwork. Buildings are also structurally repurposed in such a way as to violate zoning regulations.

108. Based on my professional experience, I was able to identify a variety of structural risks in the photographs from the EFSI inspections. However, to quantify the risks, I had a professional building inspector (see CV, Appendix AJ) from the City of Surrey review 1,442 photos of residential MGOs to identify structural situations that contravened zoning regulations or building codes. Using a representative sample of the photos, the building inspector developed a structural hazard rating system (no, minimal and high risk). This system was then used to analyse the balance of the photos for structural hazards and violations to zoning and building regulations and the British Columbia Building Code (see full report, Appendix AJ).

109. The images that follow were among the selection of EFSI photographs that were assessed by the building inspector.



Examples of unsafe mechanical modifications found in MGOs.

Examples of unsafe building modifications found in MGOs.

110. Examining the illicit operations, the inspector noted that about two-thirds of the properties had been modified and were in a state that posed some form of potential risk. As summarized in the following table, about 13% of the structures were in contravention of zoning regulations and 49% exhibited work performed without a valid permit. Again, the figures do not add to 100% because each condition is exclusive and some properties exhibited more than one risk factor.

Summary of Building Risk from Photographs of 1,442 Illicit MGOs (Surrey, B.C.)

Issue Relating to Risk	Percentage of Operations
Contrary to Zoning Regulations	12.8%
Building/Repair Permit Required	0.5%
Work Done without Valid Permit	48.9%

111. While one might argue that all building code violations are problematic, some issues are worse than others. The removal of one stud in a load-bearing wall is unlikely to be catastrophic in most instances. The removal of an entire load-bearing wall poses another level of risk. I also commissioned the building inspector to evaluate the files in terms of the level of risk posed by the structural modifications.

112. The overall assessment demonstrated that about 11% of the structures would be considered high risk; 81% were judged to be a minimal risk; while about 8% were considered to pose no risk.

Summary of Structural Risk from Photographs of 1,442 Illicit MGOs (Surrey, B.C.)

Risk	Percentage of Operations
None	8.3%
Minimal	80.9%
High	10.7%
Total	**99.9%**

Children and Marijuana Grow Operations

113. Among the illicit grow operations investigated under the EFSI program, 119 had children present. These locations were separated from the main data set to see whether the health and safety conditions differed from the overall sample of illicit grow operations. Depending upon the issue, usable data could be extracted from between 100 and 117 files. Again, in some of the earlier cases, photographs were only taken of certain area and not the premises as a whole.

114. Similar to the earlier assessments, the analysis focused on electrical, mould, chemical and structural hazards. Generally, those operations where children were present were either similar to or somewhat safer than the overall sample of illicit grow operations, depending upon the issue examined.

115. The images that follow in this section were among the selection of EFSI photographs that were taken in residential MGOs in which children were housed, and were assessed by the professional building inspector, hygienist and electrical contractor for public safety hazards.

Electrical Hazards at MGOs With Children

116. From the file records, assessments of the primary electrical issues were extracted. As the table below illustrates, about half as many properties with children had electrical bypasses or diversions in comparison with the overall sample. In both instances, about half of the properties reviewed had service panel issues. More of the homes with children than without had a working smoke alarm/carbon monoxide detector present. Also, none of the MGOs with children had had their electricity disconnected.

Summary of Electrical Issues from 1,510 Illicit and 117 MGO Locations with Children (Surrey, B.C.)

Issue	All Illicit	Children
Electrical Bypass or Diversion	13.6%	6.8%
Hydro Disconnected	22.8%	0.0%
Service Panel Action Required	55.6%	51.3%
Smoke Alarm/CO Detector Present	14.2%	24.8%

Examples of electrical issues found in MGOs with children.

117. After photographs of all of the properties were assessed for their overall risk concerning electrical issues, it was noted that, in some respects, those MGOs with children present faced a greater electrical hazard than the average illicit operation.

118. As indicated below, while fewer of the properties with children present were ranked as having an extreme risk, almost half were ranked as having a high risk. Furthermore, far fewer of the MGOs with children were ranked with electrical hazards rated as posing a low risk (4.2% v. 40.8%).

Summary of Electrical Risk Factors for 1,510 Illicit and 117 MGO Locations with Children (Surrey, BC)

Risk Level	All Illicit	Children
Low	40.8%	4.2%
Moderate	8.8%	11.1%
High	34.8%	49.6%
Extreme	15.6%	5.1%
Total	**100.0%**	**100.0%**

Biological Hazards at MGOs with Children

119. The previous analyses noted that mould and spores were present in a substantial proportion of the properties examined, and discussed the health risks of high mould counts to both adults and children. Children appear to be more susceptible to health problems than adults when exposed to high mould and spore counts.

120. Comparing MGOs with children to the overall sample of illicit operations, it was noted that a slightly higher proportion of children lived in mould-free residences (49% v. 38%). Still, as the table below indicates, visible mould was detected in about 20% of the residences where children were present.

Examples of biological issues found in MGOs with children.

Summary of Mould Existence from Photographs of 1,461 Illicit and 110 MGO Locations with Children (Surrey, BC)

Visible Mould	Illicit	Children
Yes	23.7%	20.9%
Suspected	22.0%	16.4%
No	38.4%	49.1%
Indeterminable	15.9%	13.6%
Total	**100.0%**	**100.0%**

121. Where mould was present, the severity of the distribution of mould was similar between MGOs where children were found and the overall sample of illicit operations. About half of the observed mould was ranked as a major issue and half as a minor one in both samples.

Chemical Hazards at MGOs with Children

122. Overall, the distribution of chemical containers and identifiable labels was similar for both the overall sample of illicit operations and for those where children were present. About one-fifth of both samples either had chemical containers clearly identifiable or reasonably suspected in the photographs.

Summary of Existence of Chemical Containers from Photographs of 1,461 Illicit and 110 MGO Locations with Children (Surrey, B.C.)

Visible Containers	All Illicit	Children
Yes	18.9%	15.5%
Suspected	1.7%	3.6%
No	62.4%	65.5%
Indeterminable	17.0%	15.5%
Total	**100.0%**	**100.1%**

Examples of chemicals found in MGOs with children.

123. In those instances where chemical containers were identified, labeling of the contents was sometimes an issue. While the data show that slightly more of the MGOs with children appear to have labeling issues (only "some labeling" or "no labeling"), the differences are not statistically significant due to the relatively small sample size of residences with children. A summary of container labeling follows.

Summary of Container Labeling from Photographs of 1,461 Illicit and 110 MGO Locations with Children (Surrey, B.C.)

Containers Labeled	All Illicit	Children
Labeled	7.3%	3.6%
Some labeling	7.1%	10.0%
No labeling	5.0%	8.2%
Indeterminable	1.8%	0.0%
Not applicable	78.8%	78.2%
Total	**100.0%**	**100.1%**

124. A concern for all residences was the significant proportion of operations where unknown or, at least, unlabeled substances were observed. This was the case in 8% of all illicit operations and in 16% of those with children. In many ways, unknown substances can pose a greater health hazard because if children ingest the substances, it becomes more difficult to identify an immediate medical response.

Summary of Chemical Identified from Photographs of 1,461 Illicit and 110 MGO Locations with Children (Surrey B.C.)

Summary of Chemical Identified	All Illicit	Children
Fertilizer	10.9%	10.9%
Pesticide	0.8%	1.8%
Other	1.7%	0.9%
Unknown	8.0%	15.5%
Not applicable	78.6%	44.5%

Structural Hazards at MGOs with Children

125. From the photographic evidence, MGOs with children appeared to have far more modifications than those without. This is probably not surprising since it is likely that residents of operations with children present took greater efforts to separate the living quarters from the grow areas. Unoccupied or marginally occupied structures generally require a lesser need for renovation than those serving dual purposes.

126. Consequently, it is not surprising to see that a very high proportion of the MGOs with children had structural modifications that violated zoning or building code standards.

Summary of Building Risk Issues from Photographs of 1,442 Illicit and 110 MGO Locations with Children (Surrey, B.C.)

Issue Relating to Risk	All Illicit	Children
Contrary to Zoning Regulations	12.8%	70.8%
Building/Repair Permit Required	0.5%	97.9%
Work Done without Valid Permit	48.9%	89.8%

Examples of structural issues found in MGOs with children.

127. Despite the amount of modifications to MGOs with children that were outside code standards, the overall risk assessed for those structures was ranked as slightly lower than for the illicit operations as a whole. Regardless, 14% of the operations with children were assessed with modification judged to pose a high risk. About two-thirds of the operations had structural modifications that were judged to be minimal risk, and about one-fifth of the structures were judged to pose no risk to the occupants or others.

Summary of Structural Risk from Photographs of 1,442 Illicit and 110 MGO Locations with Children (Surrey, B.C.)

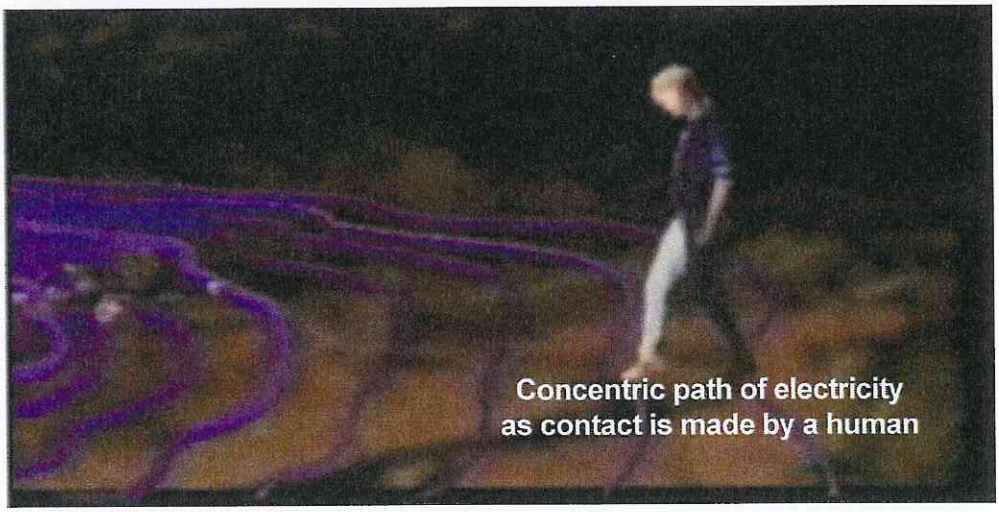
Risk	All Illicit	Children
None	8.3%	19.2%
Minimal	80.9%	66.3%
High	10.7%	14.4%
Total	**99.9%**	**99.9%**

3. Risks that Marijuana-growing Operations in Residential Dwellings Pose to First Responders

128. While inadequate electrical installations *can* pose potential hazards, the key question becomes, what *is* the actual hazard?

129. As I noted previously, the average grow operation requires several lamps that typically require auxiliary wiring. As Gustin (2010: 69; Appendix AK) notes, each lamp needs "its own ignitor, capacitor and transformer. Firefighters risk electrocution if they make bodily contact with a metal tool or direct a stream of water on this equipment at a range of 10 metres (30 feet) or less. The risk for electrocution is intensified when firefighters operate in limited visibility which may not be improved by a thermal imaging camera, because the ceilings and walls are commonly covered with reflective insulation board."

130. The images that follow illustrate the potential electrocution risk to firefighters and other individuals who visit the residential MGOs with unsafe electrical work.



131. Beyond electrical hazards, there are other issues. Most grow operations in residential structures require significant modifications to optimize production. Marijuana production, even on a small scale, is generally more similar to an industrial commercial set-up than a house with a few plants in the living room. Enhanced and rerouted electrical wiring issues have already been discussed. For optimal production, plants require warm, humid conditions and high concentrations of CO_2.

132. Most of the moisture in MGOs comes from the cultivation of the plants and from drying operations (Johnson & Miller, 2012: 596; Appendix AL). As Johnson and Miller (2012: 597) note, "As plants are added to an MGO, moisture release will overwhelm home ventilation capacity and/or worsen the situation, if ventilation failure already exists." This results in substantial amounts of mould growth (as discussed previously) and overall moisture damage to the structure (Salares & Dyck, 2007; Appendix AM). In their analysis, Johnson and Miller (2012) conclude that few Canadian homes constructed after World War II have sufficient ventilation under their original design to support even a modest grow operation. Furthermore, because marijuana plants give off a unique odour, structures with illicit operations are often modified to minimize venting to avoid detection.

133. Operators also punch substantial holes through walls, including load-bearing or structural walls, to insert piping either for ventilation or for CO_2 injection. CO_2 injection is typically performed by installing CO_2 canister operations or, as Johnson and Miller note, by internally venting exhaust from furnaces. To contain the CO_2, grow areas are typically encapsulated in plastic sheeting, which also contributes to the containment of moisture (Salares & Dyck, 2007; Appendix AM).

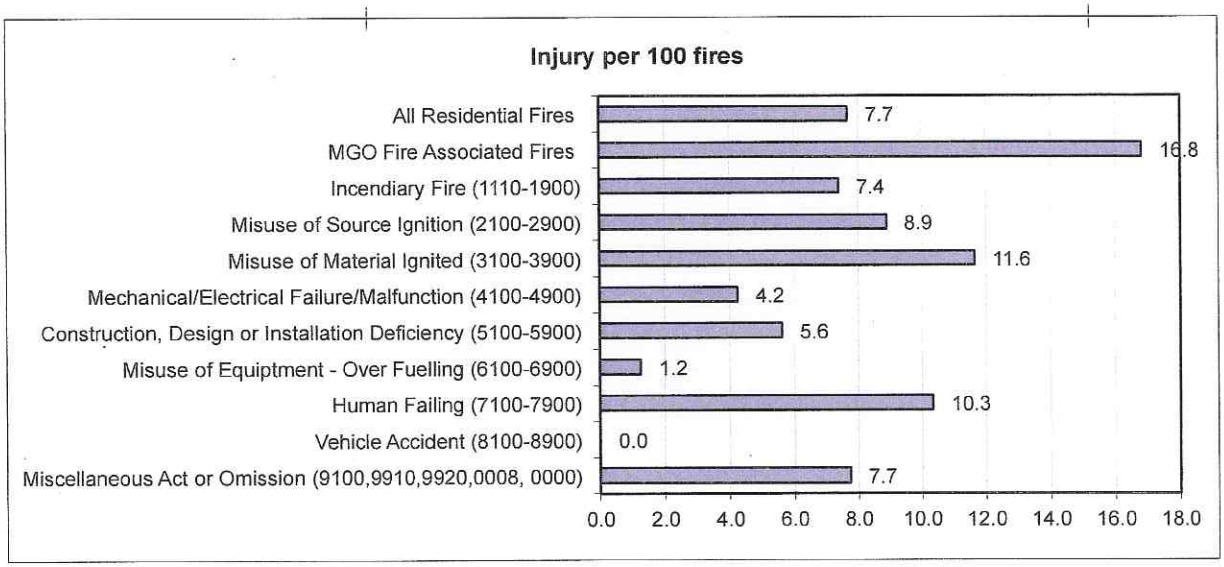
134. Added insulation and covered exterior openings are often found in the structures as a mechanism for avoiding detection. As Gustin (2010; Appendix AK) indicates, these increase the risk of a "flash over" which further place firefighters at risk. Excess insulation can also hide fire in attics or in crawl spaces.

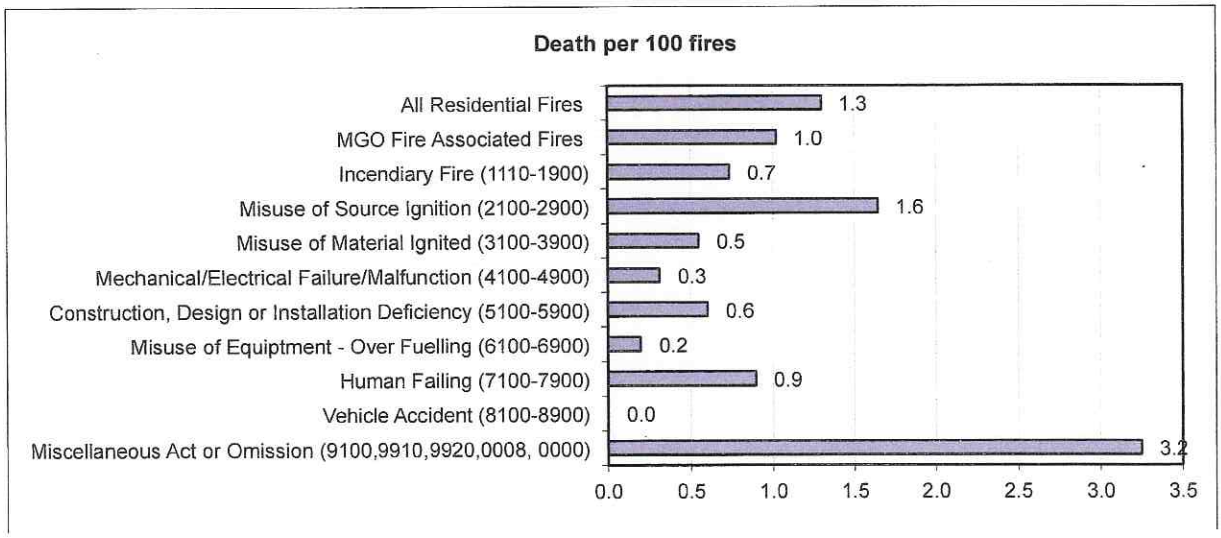
135. Little is known about the harms experienced by residents and operators in MGOs. Operators do not report incidents to WorkSafe BC or other authorities. However, some data are available relating to first responders that suggest that MGOs pose a substantial risk to outsiders.

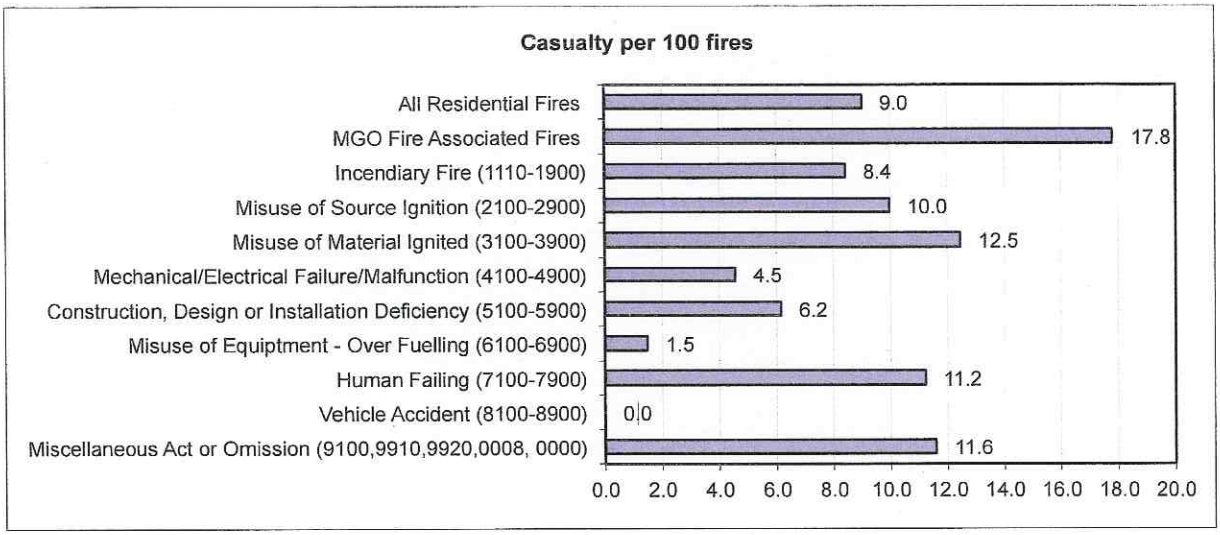
136. From January 2005 to December 2013, B.C. fire departments reported 67,465 fires to the British Columbia Fire Commissioner, Ministry of Justice. Of those, 18,843 were reported as residential fires, of which 196 were determined to have been caused by a MGO and were listed under the Fire Reporting Code "Act or Omission" (human action or inaction that contributed to the fire cause or the factor which caused the fire).

137. The MGO contingent represented about 1% of the total residential fires during that time period. As shown in the tables below, the overall injury rate per 100 residential fires in B.C. was 7.7 and the death rate was 1.3 per 100 fires.

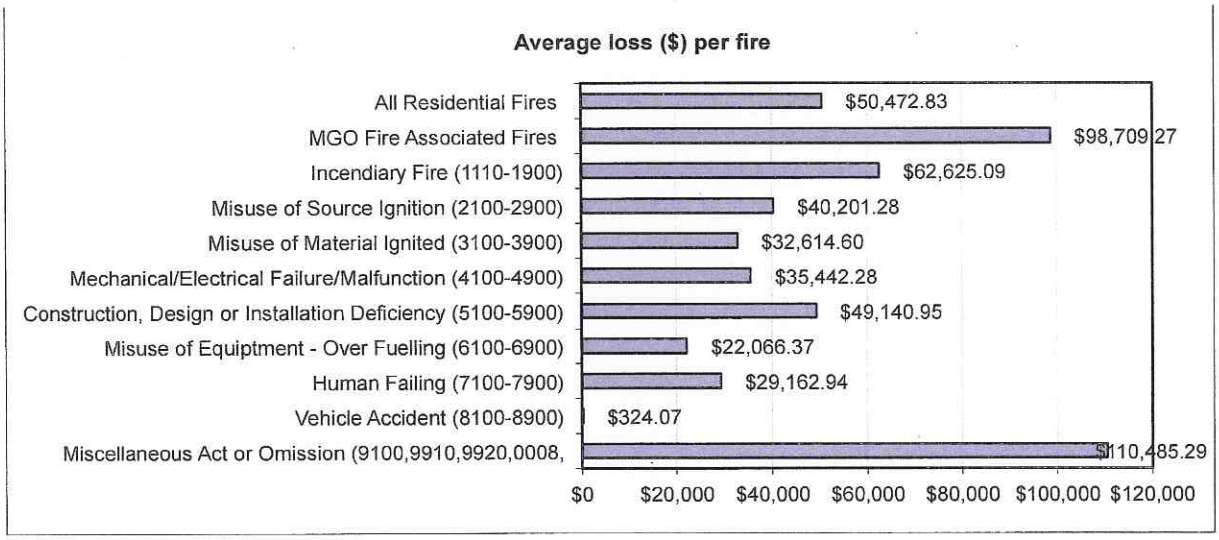
138. The charts below show that for fires caused by MGOs, the injury rate was 16.8 per 100 fires and the death rate was about one per 100 fires. That means the injury rate for fires at MGOs is *2.2 times* the rate for non MGO-related fires. Both substantively and statistically, this figure is significant and confirms that, for firefighters and civilians at least, calls to MGO-related fires pose injury risks beyond the norm. Further, although there is no statistically significant difference in the death rate between fires in MGOs and other structures, the overall casualty rate (combined injury and deaths) caused by MGO fires is more than twice that of other structures.







139. Another proxy for the severity of a fire that occurs as a result of a MGO is the amount of damage that occurs. As shown below, the average economic loss reported from the 18,843 residential fires was $50,472.83, while the loss for MGO fires was $98,709.27. This is 51% greater that all residential fires reported where the cause was able to be determined.



140. While deaths and injuries can be immediately assessed, there are also potential longer-term health issues that first responders might face. For example, the mould caused by high levels of humidity in most operations is not something that is likely to affect either a first responder or a tenant immediately. Similarly, first responders might be exposed to chemical toxins.

141. Both the B.C. Office of the Fire Commissioner and WorkSafe BC have recognized the various potential dangers that MGOs pose to first responders. Bulletins issued by these agencies on this topic can be found in Appendix AN (OFC) and Appendix AO (WorkSafe BC).

4. Differences Between the Illicit Marijuana Residential Growing Operations and Medical Marijuana Residential Growing Operations

142. Besides conducting an analysis of the illicit operations, the reviewers also examined information on 294 of 314 operations in Surrey that were licensed by Health Canada to grow medical marijuana and had been inspected by the EFSI. These data were collected from 2008 onward. Again, the properties were reviewed in detail for fire and analogous safety violations, with the status of the properties recorded through checklists and written commentaries. As with the illicit operations, typically 40-45 photos were taken per property.

143. Using data for both the illicit and the licensed samples, we were able to conduct comparisons on electrical and other hazards.

144. Please note: I use the term "licensed" cautiously, since the licence to grow is from Health Canada. As discussed earlier in this report, this does not imply that the operation adhered to other municipal, provincial or national licensing requirements.

Electrical Hazards

145. The table below summarizes the electrical issues reported in the inspection reports for both illicit and licensed grow operations.

146. In total, there were 1,510 illicit operations and 294 licensed ones from which data could be drawn. The figures do not add to 100%, since a particular operation may exhibit more than one issue.

Summary of Electrical Issues from 1,510 Illicit and 294 Licensed Inspection Reports (Surrey, B.C.)

Issue	Illicit	Licensed
Electrical Bypass or Diversion	13.6%	1.4%
Hydro Disconnected	22.8%	10.9%
Service Panel Action Required	55.6%	20.1%
Smoke Alarm/CO Detector Present	14.2%	4.8%

147. Generally, there were proportionately fewer electrical hazards in the licensed operations than in the illicit ones. As a group, however, the licensed operations still exhibited substantial safety hazards. About 11% of the operations had their electricity disconnected at the time of the inspection. Only a few instances (1.4%) were found to be stealing electricity through a meter bypass—about one-tenth the percentage of illicit operations doing so. This is not a surprise, since the licensed growers did not feel they needed to steal electricity in order to hide the operation from the authorities.

148. What was notable, however, was that one-fifth of the operations noted electrical problems in the service panel—often of a magnitude similar to that of the illicit grow operations. As well, while only 14% of the illicit grow operations had a smoke or carbon monoxide detector, they were still three times more likely than a licensed grow to have a functional detector installed.

149. As with the illicit MGOs, I had the electrical contractor assess case photographs of the licensed operations' wiring, fixtures and electrical panels. Both types of sites were ranked on a similar four-point scale: low, moderate, high and extreme risk. The elements composing the various risk levels are outlined in Appendix T.

150. Because this review was based on photographic evidence, some potential violations could not be detected. In those instances, the evidence was assessed as inconclusive and the risk was considered to be low. An inconclusive determination was generated in about 30% of the illicit grow operations and 21% of the licensed operations.

151. Although there were fewer instances of meter bypassing in the licensed operations, assessments of the photos suggested that similar rates of improper wiring or use of electrical equipment and apparatus existed across both groups. For example, 37% of the illicit operations and 39% of the licensed operations had exposed panels and equipment. About 17% of the illicit sites and 20% of the licensed sites showed evidence of unsafe electrical practices and non-standard equipment and wiring.

152. The following table summarises the overall risk assessment for the grow operations.

Summary of Electrical Risk Factors for 1,510 Illicit and 294 Licensed Operations (Surrey, B.C.)

Risk Level	Illicit	Licensed
Low	40.8%	30.6%
Moderate	8.8%	11.6%
High	34.8%	38.4%
Extreme	15.6%	19.4%
Total	**100.0%**	**100.0%**

153. At the high and extreme risk levels, there is no statistically significant difference between the illicit and licensed operations. In fact, in both instances, more than half of the operations were considered to pose a high or extreme risk. At the lower end of the distribution, somewhat more of the illicit operations were ranked in the low category than the licensed operations. This is largely because of the proportionately higher number of indeterminable rankings for the illicit operations.

154. The overall conclusion we drew from this analysis is that both illicit and licensed grow operations pose a substantial electrical risk to both the tenants and emergency responders. The only major difference between the two groups is that licensed growers are far less likely to steal electricity than their illicit counterparts. Both groups of grow operations exhibit substantial electrical code violations in their facilities, with 15-20% of the operations being rated in the extreme risk category.

Biological Hazards

155. Illicit and licensed operations were also compared for the presence of mould and chemical compounds. To do this, I asked an industrial hygienist to review the photographic evidence from the EFSI case files.

156. The "licensed" operations tended to show similar characteristics to the illicit operations. That is, in both instances, about a quarter of the cases surveyed had clearly visible mould (about 24% for the illicit operations and 25% for the licensed ones).

Summary of Mould Existence from Photographs of 1,461 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Visible Mould	Illicit	Licensed
Yes	23.7%	25.3%
Suspected	22.0%	13.0%
No	38.4%	50.2%
Indeterminable	15.9%	11.6%
Total	**100.0%**	**100.0%**

157. I also asked the hygienist to provide as indication of the extent of the mould problem. Among those cases where mould was clearly determined to exist or was suspected, the infestation was categorized as being either major or minor, based on the extent of the observable growth.

Severity of Mould Problem from Photographs of 1,461 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Mould Problem	Illicit	Licensed
Major	11.2%	9.9%
Minor	34.2%	27.6%
No Mould Observed	38.7%	51.9%
Indeterminable	15.9%	10.6%
Total	**100.0%**	**100.0%**

158. Overall, there was no statistically significant difference between the illicit and the licensed operations with regard to the presence of mould and the related assessments of severity of infestation. About 11% of the illicit operations showed signs of major mould infestation, while 10% of the licensed operations exhibited similar issues. Thirty-four percent of the illicit operations had minor issues, while 28% of the licensed operations were assessed as such. One significant difference between the two groups was that proportionately more of the licensed operations were clearly mould-free than the illicit operations (52% v. 39% respectively).

Chemical Hazards

159. The analysis of the photos for evidence of chemicals produced quite different results from the mould analysis. Far more of the licensed operations had visible chemical containers on site than did the illicit operations (see table below). As noted previously, this may have been a consequence of the fact that some of the illicit MGOs showed signs of having been partially cleaned out of plants and growing paraphernalia prior to the EFSI inspection. Undoubtedly, this was due to the fact that the operators of illicit operations were attempting to avoid the authorities. Licensed growers, on the other hand, suspect they have little to fear from law enforcement personnel since they have a grow permit. Overall, about three times as many visible chemical containers (59% v. 19%) were identified in the licensed operations as in the illicit ones.

Summary of Existence of Chemical Containers from Photographs of 1,461 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Visible Containers	**Illicit**	**Licensed**
Yes	18.9%	58.7%
Suspected	1.7%	4.3%
No	62.4%	33.5%
Indeterminable	17.0%	3.6%
Total	**100.0%**	**100.1%**

160. Ironically, while the chemical containers were more evident in the licensed operations, labeling was still an issue. About 13% of the licensed operations had clearly labeled containers; another 23% had containers with some or partial labels. Twenty-three percent of the operations had containers with no labeling.

161. While some labeled chemicals can pose known hazards, unlabeled material can be more problematic, since emergency personnel and others might not know the most appropriate or effective response in an emergency. This applies to firefighters dealing with incendiary incidents, as well as emergency medical service personnel who might respond to a poisoning incident. Of particular concern are children on site whose curiosity might lead them to either intentionally or inadvertently ingesting some of the contents.

Summary of Container Labeling from Photographs of 1,461 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Containers Labeled	Illicit	Licensed
Labeled	7.3%	12.8%
Some labeling	7.1%	22.8%
No labeling	5.0%	22.8%
Indeterminable	1.8%	4.3%
Not applicable	78.8%	37.4%
Total	**100.0%**	**100.1%**

162. From the labels, it was possible to identify some of the general categories of chemicals used. As noted previously, some grow operations had only one compound identifiable (e.g., fertilizer) while others had several identifiable (e.g., pesticides and fertilizers). The distribution is presented in the following table. Since some operations had more than one type of chemical present, the figures do not add to 100%.

Summary of Chemical Identified from Photographs of 1,461 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Summary of Chemical Identified	Illicit	Licensed
Fertilizer	10.9%	33.5%
Pesticide	0.8%	2.3%
Other	1.7%	1.6%
Unknown	8.0%	52.5%
Not applicable	78.6%	10.1%

163. Fertilizer is the primary chemical compound identified in both the illicit and licensed grow operations. The main difference between the two groups is that, proportionately, three times as many licensed grow operations have identifiable fertilizer on the premises in comparison with the illicit operations. The same general pattern holds true for pesticides, although the proportion of both illicit and licensed operations with clearly identifiable pesticides is small. Of significant concern, however, is the fact that 53% of the licensed operations had unknown substances on the property. These could be relatively benign compounds or they could be relatively dangerous chemicals. Again, the case can be made that unknown compounds pose an even greater danger than known substances.

164. Based on the available evidence, what strikes is the fact that growers in charge of licensed operations are no more likely to follow appropriate health and safety regulations than are growers in charge of illicit operations. Both types of facility pose significant health and safety hazards to the building's occupants as well as emergency responders and casual visitors. Mould appears to be a major problem in both types of operations, and little concern appears to be shown for the safe handling of chemicals used in the growing process.

Structural Hazards

165. I noted earlier that significant structural modifications, particularly to residential structures, are needed to support a typical MGO. It is also apparent that alterations to illicit operations are typically done without reference to building codes or referrals to the appropriate inspectors. As a consequence, it is somewhat surprising that 38% of the buildings with illicit operations in the EFSI inspections did not appear to have any issues.

166. Comparing the licensed to illicit operations, however, provides an interesting contrast. Operators of licensed sites also make modifications to their structures. Despite the fact that the licensed operations can operate openly, few appear to get the required permits and inspections that structural modifications to buildings require.

167. As shown in the table below, only 5% of the licensed operations had no issues, in contrast to 38% of the illicit sites. Of the licensed operations, 71% had modifications contrary to zoning regulations; 98% had modifications requiring a building or repair permit, but a permit had not been obtained; and 90% had work done without a valid permit. Getting a permit to grow from Health Canada comes with the requirement that operators follow all appropriate provincial and federal safety standards and codes relating to the setup and operation of the licensed grow. Clearly, there is a blatant disregard for that requirement among the EFSI sample.

Summary of Building Risk Issues from Photographs of 1,442 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Issue Relating to Risk	Illicit	Licensed
Contrary to Zoning Regulations	12.8%	70.8%
Building/Repair Permit Required	0.5%	97.9%
Work Done without Valid Permit	48.9%	89.8%

168. The contrast between the illicit and licensed operations was further highlighted when I asked for an estimation of the safety risk posed by the alterations. While only 11% of the illicit operations were judged to be high risk, 72% of the licensed operations were judged as such.

Summary of Structural Risk from Photographs of 1,442 Illicit and 281 Licensed MGOs (Surrey, B.C.)

Risk	Illicit	Licensed
None	8.3%	0.5%
Minimal	80.9%	27.1%
High	10.7%	72.3%
Total	**99.9%**	**99.9%**

Conclusion

169. As outlined throughout this report and in the Summary of Key Findings, residential MGOs pose a wide variety of dangers – including fire, electrocution, structural, health and environmental – to occupants, neighbours and others who visit the property, such as first responders. Further, the evidence clearly demonstrates that these dangers differ little between illicit residential MGOs and licensed residential MGOs used to produce medical marijuana.

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APPENDICES

Growing Marijuana in Residential Dwellings
A Report on the Hazards

A report prepared for the Department of Justice Canada:

Allard et al. v. Her Majesty the Queen in Right of Canada

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