



# PROPERTY



COMMENTARY PAPER

As cannabis increases in popularity, so do the risks at grow facilities

# As cannabis increases in popularity, so do the risks at grow facilities

## Can you spot a grow facility?

A grow facility is a “laboratory” housed inside a residential or commercial building that is turned into an indoor nursery or hydroponic operation to grow cannabis plants. Grow facilities operate in virtually every state — from large urban areas to small rural communities. While many unlawful operations are found in residential neighborhoods, they have also been discovered in warehouses and commercial buildings. This is the case despite the fact that cannabis has been legalized in many states, both as an agricultural operation and for personal consumption.



Unlawful grow facility operators are becoming increasingly sophisticated. To evade detection, efforts are made to make the residential building appear lived in. Sometimes families live in the homes as “crop sitters”; while in other instances, interior lights are placed on timers as signs of habitation. Grow facilities range in size — from a few plants in a one-room basement to an entire barn or warehouse with more than 10,000 plants.

## Cannabis production

Growing cannabis indoors requires artificial lighting, air conditioning and dehumidification. The intention behind an indoor setup is to facilitate plant growth by mimicking the elements of the outdoors without losing control of the environmental parameters. High upfront costs include the structure, equipment, water, electricity and other utilities, which present the downside of growing indoors.

## Grow facility equipment and extraction methods

Racking stations, trimming tables, grow lights, fans, drying equipment, temperature and humidity controls, vertical racking, grow systems, packaging necessities and high density storage systems are all part of the growing operation.

Extraction, at times referred to as processing, refers to the conversion of target molecules in cannabis into a useable form. The process removes the oil from the plant and collects the most potent compounds. This includes Tetrahydrocannabinol (THC), which is the main psychoactive compound that produces the high sensation, cannabidiol (CBD) which cannot cause a high by itself, and terpenes, the compounds that shape the distinctive aromas and flavors. Companies depend on terpenes for vaping oils, lotions, foods, beverages and other products.

Alcohol, butane, carbon dioxide (CO<sub>2</sub>), water and ethanol are common methods of extraction. In this commentary we will focus on hydrocarbon extraction, also known as butane or butane hash oil (BHO) extraction, simply because it is one of the most popular and effective solvent-based extraction methods, with relatively low equipment and operating costs.

Lune Technologies, a leading cannabis oil equipment extraction manufacturer, describes the risks associated with butane extraction as follows: *“Butane is a highly flammable hydrocarbon — an organic compound consisting of hydrogen and carbon found in crude oil, natural gas, and coal. Fractional distillation, which separates a mixture into its component parts (fractions), purifies the crude oil and compresses the butane into an odorless but flammable liquid. Extractors use butane for its purity and low boiling point, allowing a more complete cannabis extraction compared to other solvents such as carbon dioxide or ethanol.*

*Open-loop butane extraction is a dangerous process. During open-loop extractions, users place raw cannabis material and butane inside a metal or glass tube, in order to separate cannabinoids from the plant material. In the open-loop method, the butane used for extraction is released into the atmosphere. Because butane is extremely flammable, a flame or spark can easily cause a deadly explosion.*



*Closed-loop butane extraction removes the possibility of gas leaks, by containing all flammable solvents within a piece of commercial-grade extraction equipment. Closed-loop extraction is performed using third-party approved equipment at professional facilities with city government approval.”*

This means that if you're trying to grow and extract while staying under the radar, in many cases you are resorting to a dangerous explosion prone method.

## Loss examples

### **Diane Spinner, principal consultant, EFI Global**

Diane is a veteran fire services expert with experience investigating grow house losses, particularly in California. Diane noted that most fires involved a connection to the incoming utility just below the electric panel/meter which was done to steal power. Whomever performed these illegal connections was exposed to a great deal of danger because the electric lines were live. That's typically where failure would occur. Diane investigated a few of the honey oil butane explosions as well. Those losses were located in apartment buildings, where unfortunately the neighbor was not aware of the dangerous activities taking place next door — and found themselves in the middle of an explosion.

### **Robert Rullan, senior fire investigator, EFI Global**

Robert responded to a fire in a single-family residence on a quiet street. Upon arrival it quickly became clear that the loss involved a clandestine marijuana grow operation. The odor saturated the entire block and leafy material started flowing down the driveway as the garage was doused with water. A safety officer advised that a firefighter was transported to the hospital after suffering an electric shock while shutting down utilities.

The firefighter approached the exterior electrical panel, grabbed the cover, held it open with one hand and flipped the disconnect switch off with the other hand. He was immediately shocked and fell back. The investigation revealed that the tenant had bypassed the meter and incorrectly wired the electrical panel. The bypass was done to steal electricity and not alert meter readers to the high consumption. Additionally, the panel was installed upside down, which resulted in the firefighter flipping the switch “on” instead of “off”, as is customary when flipping the switch down. The tenant did attempt to stop the spread of fire, by flipping the switch “up” to the “off” position prior to the arrival of the fire department.

### **February 2022**

A fire rescue team received a call regarding a barn fire. It didn't take long based on the amount of the smoke and the smell to determine the barn was a marijuana grow operation that had gone awry. It looked like up to 600 plants were being grown. 35 standalone air conditioners were onsite. Investigators noted that the growers pirated the power.

### **November 2021**

Investigators inspected an illegal growing operation that was discovered after a fire spread through an industrial building. Electric extension cords were found strung throughout the building and they also found a large amount of butane. Investigators advised that if the butane had been in the fire any longer, it would have exploded and damaged property in the surrounding area.



### **October 2021**

150 firefighters battled a blaze at an apparent illegal growing operation that was housed in a legal business. Witnesses described hearing multiple explosions and seeing a man on fire as he emerged from the building. A fire department representative said extraction, in which oils are harvested from a cannabis plant, involves combustible chemicals as well as heat and pressure.

## August 2017

Following the explosion of a marijuana processing facility, it was found that a butane-based, closed-loop extraction system was initially used, which keeps the combustible gas contained. When the system didn't work properly, workers abandoned the closed-loop system and switched to an open-loop extraction method that allowed butane to fill the room.

## Loss considerations

On May 4, 2021, the National Fire Protection Association (NFPA) announced approval to develop NFPA 420, a standard titled "Fire Protection of Cannabis Growing and Processing Facilities". The new standard was proposed in response to serious fires at cannabis facilities in recent years, in order to provide clear guidance on fire protection standards for facilities that produce, process and extract cannabis. As of July 2022, the NFPA site still displays the following, "NFPA 420 is in the early developmental stages prior to beginning full public review and initial revision cycle. The NFPA Standards Council's approval is necessary before entering revision cycle." While NFPA has no rulemaking authority on its own, its guidance is generally accepted as an industry standard and referenced by state and local governments.

The losses detailed above are relatively recent. Unfortunately, fire and explosions have occurred in grow and extraction facilities for years, even decades. Let's explore common hazards found in growing and processing operations.

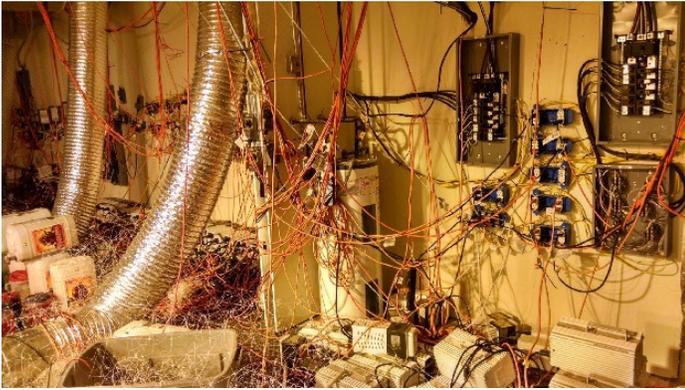
- Underwriters Laboratories (UL) is an independent safety testing and certification organization. UL operates laboratories to investigate materials, systems and equipment with respect to hazards affecting life and property. Grow facilities that attempt to keep cost down tend to purchase non-UL listed equipment. UL certification is required by local and state electrical codes in most installations.
- Growers that overindulge in THC-infused products tend to find solutions to problems that they later regret. One such solution to a circuit breaker that seems to trip too often is to replace it with a higher rated one. Most households incorporate circuit breakers rated between 15A (amps) and 50A. If many electrical devices are connected to a circuit such that their current draw exceeds the rating of the breaker, or perhaps a device like an air conditioner is malfunctioning with a failing compressor, the breaker is supposed to trip for your safety. Growers tend to replace the breaker with a higher rated one rather than locate the problem and fix it.
- Electrical systems incorporate wire nuts (slang for twist-on connectors) as a safe way to splice rigid wiring. Twisting and taping connections instead of using wire nuts is a frequently encountered problem. Splicing too many electrical conductors together is another problem. Wires are also spliced and left hanging outside of junction boxes.

- Here is another way to save money and increase the odds of a fire. As growers expand their operations, they need to install new circuits to power more lamps, fans, pumps, etc. A licensed electrician would recommend installing additional circuit breakers to an existing panel or add another panel. Bypassing the second panel idea by connecting additional circuits directly to the main panel lugs presents a safety hazard to the installer and a fire hazard because of the likelihood of a poor connection.



- Cannabis growing operations use high-power, high-intensity discharge (HID) lighting. This lighting presents a hazard when combustible materials come in contact with the hot glass lamp. Mechanical damage that breaks the glass will cause hot debris to spread on plants, pots and potting material. Fluorescent light fixtures are also utilized in grow facilities. Hazards include installation or manufacturing defects, improper connection to building wiring, incorrect voltage supply, and cheap, failure-prone, ballasts or power supplies. Lastly, misalignment of lamps during installation cause a poor connection.
- Some operators believe that paying utility bills should be avoided all together. That is when bypassing the electric meter seem like a great idea. In addition to being illegal, this practice exposes the operator to a lethal shock hazard and a potential fire hazard because of poor connections.

We've discussed poor connections multiple times. This hazard is incredibly important to appreciate. The NFPA describes a glowing connection as follows: "When a circuit has a poor connection such as a loose screw at a terminal, increased resistance causes increased heating at the contact, which promotes the formation of an oxide interface. The oxide conducts current and keeps the circuit functional, but the resistance of the oxide at that point is significantly greater than in the metals. A spot of heating develops at that oxide interface which then becomes hot enough to glow. If combustible materials are close enough to the hot spot, they can be ignited".



Examples of electrical connections include wire splices, terminal connections, switch contacts and power cords plugged into electrical outlets. Worn extension cords or receptacle plugs can lose their internal grip force over time — leading to a loose connection.

Even licensed cannabis production facilities have experienced fires and explosions. Investigations of these events have found that common risks include (a) overloaded electrical circuits, and (b) explosions in extraction rooms due to rupture of uncertified pressure vessels. The losses in these events could have been prevented by conducting a risk assessment with technical experts who can identify the hazards and provide risk mitigation options.

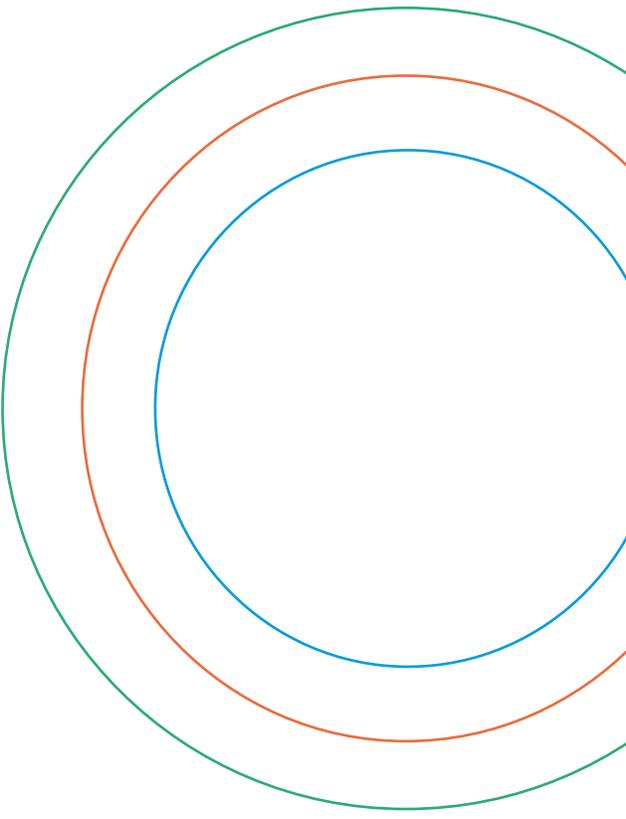
### Summary

- According to BDSA, a Denver-based research firm with expertise in the cannabinoid market, global cannabis sales for 2022 will reach over \$35 billion. This is an increase of about 22% compared to 2021 sales of \$29 billion. By 2026, BDSA forecasts that global cannabis sales will surpass \$61 billion.
- Grow facilities operate in virtually every state — from large urban areas to small rural communities. While many unlawful operations are found in residential neighborhoods, they have also been discovered in warehouses and commercial buildings.
- Growing cannabis indoors requires artificial lighting, air conditioning and dehumidification. The intention of an indoor setup is to facilitate plant growth by mimicking the elements of the outdoors, although doing so while maintaining full control over every environmental parameter.
- NFPA 420 is in the early developmental stages prior to beginning full public review and initial revision cycle. The new standard was proposed in response to serious fires at cannabis facilities in recent years, will provide clear guidance on fire protection standards for facilities that produce, process and extract cannabis.

- Many grow facilities fail to follow national electrical code (NEC) provisions. Installations should be permitted, inspected and approved by the authority having jurisdiction, usually the local, county, or state electrical inspector.
- Improper installation methods, inadequate housekeeping practices, the use of non UL certified equipment and lack of appropriate maintenance procedures, will all increase the possibility of poor connections and eventual fires.

### About EFI Global

EFI Global, part of Sedgwick, is a well-established brand with an excellent reputation in the Americas, Africa, Asia-Pacific and Europe as a market leader in environmental consulting, engineering failure analysis and origin-and-cause investigations. Each year, EFI Global completes more than 45,000 projects worldwide for a wide range of clients, such as commercial, industrial, institutional, insurance, government, risk managers, public and private entities. EFI Global is one of the world's most respected emergency response firms, capable of providing practical solutions to the most complex problems. Our multidisciplinary team of first responders, project managers, engineers, geologists and scientists are selected for their technical proficiency and in-depth industry knowledge to aid clients in resolving technical problems. For more, see [efiglobal.com](http://efiglobal.com).



## Get in touch with an expert



### **Robert Rullan, MA, CFEI, CVFI – senior fire investigator**

Robert Rullan is a senior fire investigator based in Central Florida with nearly two decades of experience in law enforcement and fire services. Mr. Rullan has served as a police officer, firefighter and EMT with specialty positions in the areas of fire investigations, fire prevention, crime scene investigations, hazardous materials, ladder truck operations and heavy rescue. Mr. Rullan is a certified fire and explosion investigator, certified vehicle fire investigator and instructor. For more information, contact [robert.rullan@efiglobal.com](mailto:robert.rullan@efiglobal.com).



### **Randy St. Clair, CFEI – senior fire investigator**

Randy St. Clair has nearly 30 years of experience in fire and explosion investigations. Before joining EFI Global as a senior fire investigator, Mr. St. Clair served as a firefighter, paramedic, fire inspector and detective. Following advanced training, he's worked a variety of cases including homicides, suicide by fire, insurance fraud, multi-state racketeering, fire death and injuries, serial arsonists, and related fire and explosive cases. Mr. St. Clair has investigated over 1,600 fires and has accumulated over 2,500 hours in fire and explosion-related training. For more information, contact [randy.stclair@efiglobal.com](mailto:randy.stclair@efiglobal.com).



### **Diane Spinner, IAAI-CFI, IAAI-CFI (V), NAFI-CFEI, IAMI-CMI, ECT – principal consultant, fire services**

Based in South Florida, Diane Spinner is a fire investigator with 22 years of experience in fire service/investigations and law enforcement. Mrs. Spinner has conducted over 4,000 investigations in her career, including qualifying as an expert witness in arson related judicial proceedings. She has more than 600 hours of training specific to fire origin and cause investigation including classes from the National Fire Academy, Criminal Justice Training Institute and Michigan State Police. Mrs. Spinner is a certified fire investigator through the International Association of Arson Investigators, a certified marine investigator through the International Association of Marine Investigators and a certified fire and explosion investigator. For more information, contact [diane.spinner@efiglobal.com](mailto:diane.spinner@efiglobal.com).

## Resources and references

- Palm Beach County Substance Awareness Coalition. "Grow houses and their effect on your neighborhood". April 2013
- TCPalm. "Multi-million dollar operation' marijuana grow house burns down in Martin County". February 2022
- Charles E. Ramirez. Firehouse. "MI commercial fire reveals illegal marijuana grow". November 2021
- ABC7 Eyewitness News. "3 men badly burned in explosion, fire at Canoga Park marijuana grow operation". October 2021
- Chris Barclay. BuildingMetrix. "Explosions and fires at cannabis facility: How they impact insurers". June 2021
- JC Younger. JC Younger Company. "Top 5 cannabis extraction methods". February 2020
- Luna Technologies. "BHO 101 – A guide to butane hash oil extraction".
- Sebastian Krawiec. Nutritional Outlook. "BDSA projects global cannabis sales to reach \$61 billion by 2026". March 2022



*caring counts* | [efiglobal.com](http://efiglobal.com)