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PLANNING COMMISSION WORKSHOP AGENDA
VIRTUAL MEETING

THURSDAY, JANUARY 21, 2021 @ 12:00 PM

This meeting will be conducted as a VIRTUAL MEETING

View the meeting live or later at www.GJSpeaks.org

Call to Order - 12:00 PM

1. Discuss Marijuana Business Regulations

Other Business

Adjournment

Grand Junction Planning Commission

Workshop Session

Item #1.

Meeting Date: January 21, 2021

Presented By: Lance Gloss, Senior Planner

Department: Community Development

Submitted By: Lance Gloss, Senior Planner

Information

SUBJECT:

Discuss Marijuana Business Regulations

RECOMMENDATION:

EXECUTIVE SUMMARY:

At the January 7, 2021 Planning Commission Workshop, members discussed the regulation of marijuana businesses. That discussion emphasized on marijuana cultivations, their relative suitability and desirability in Grand Junction City limits, and regulatory mechanisms that could protect the public welfare in the case that cultivations are permitted to some degree. Planning Commission will continue its discussion on marijuana business types including cultivations, stores and products manufacturers.

BACKGROUND OR DETAILED INFORMATION:

SUGGESTED MOTION:

Attachments

1. Excerpts _ Odor _ ICMA _ Local Impacts of Commercial Cannabis Report
2. Excerpts _ Odor _ DPHE _ Best Practices Management Guide
3. PHO_Odours from Cannabis Production

4. DDEH _ FAQ Denver Odor Control Plan

Local Impacts of COMMERCIAL CANNABIS

ICMA, the International City/County Management Association, advances professional local government management worldwide through leadership, management, innovation, and ethics. Through expansive partnerships with local governments, federal agencies, nonprofits, and philanthropic funders, the organization gathers information on topics such as sustainability, health care, aging communities, economic development, cybersecurity, and performance measurement and management data on a variety of local government services—all of which support related training, education, and technical assistance.

ICMA provides support, publications, data and information, peer and results-oriented assistance, and training and professional development to more than 12,000 city, town, and county experts and other individuals and organizations throughout the world.

Published September, 2018

trigger allergies or asthma, for others it may simply trigger a reaction based on one's personal views about an historically taboo substance. It is possible for local regulations permitting cannabis uses to be a recourse for those most opposed to its odor, though there are some complicating factors.

In addition to siting activities in appropriate locations relative to other uses, land use regulations permitting activities along the cannabis supply chain will almost certainly include stipulations about odor control, aiming to reduce the likelihood of a nuisance issue. Regulations provide a means for enforcement; a neighbor can complain if aggrieved. Formal litigation of odor nuisance cases has had mixed outcomes, as it can be difficult to determine the nuisance threshold or to pinpoint the precise source. However, local governments recently authorizing commercial cannabis activities conceded that while odor issues may be more common at the onset, they tended to dissipate as businesses became "more professional" and are given a chance to improve their odor mitigation systems.

From a consumption perspective and as mentioned in the earlier discussion on tourism impacts, many local governments already have bans in place regarding smoking indoors and/or in public places. Land use regulations for commercial cannabis retail can and typically do prohibit onsite consumption.

Resource Impacts

Cannabis cultivation (and to some extent processing) also raises concerns about water, soil, and light/energy use, the specifics of which will vary depending on the local capacity (climate, infrastructure, etc.) for commercial cultivation. Some regulations, whether specific to cannabis or generally applicable to agriculture, will be set at the state level, and state departments of agriculture and natural resources have developed answers to frequently asked questions about regulations governing cannabis as an agricultural activity and water use.[28] Local governments may wish to direct prospective local growers to pertinent recommendations and regulations and clarify where additional local requirements (related to permitting siting, fencing, etc.) may apply, as Jackson County, Oregon has done.[29]

The Department of Environmental Health for the City and County of Denver, Colorado developed a comprehensive guide to best practices on energy, water, and waste management for indoor growing facilities.[30] Though specifically developed in context of Denver's sustainability goals, climate, and infrastructure, it provides useful overviews and metrics for the resource systems involved in cultivation.

Local governments will likely apply building and fire safety codes to regulate potential environmental nuisances and safety concerns related to lighting and compliance. Light pollution from outdoor cultivation, volatile extraction processes in manufacturing facilities, and the extent of personal cultivation allowed in multifamily facilities are all issues that local governments have dealt with using local codes.

Aesthetics

Finally, local governments will want to consider cannabis' implications on aesthetics of the natural and built environment. Jackson County, home to a significant share of Oregon's cannabis production, provides an aerial view of the use's significant impact on its landscape.[31] Illegal, and to a lesser extent legal, grow operations there pose challenges to maintaining government survey corners, riparian buffers, and drainage. Municipalities may be more concerned about signage, fencing, and generally ensuring that the cannabis industry not overtake the character of an urban or suburban environment. Fort Collins, Colorado prohibited the use of cannabis-affiliated phrases and images in signs for cannabis businesses. Many municipalities prevent the creation of a cannabis district through clustering by including some method of business-to-business setbacks in their regulations. Alternatively, others intend to cluster all cannabis businesses in one or few districts, in order to prevent siting in the majority of the municipality while ceding only part.

Summary and Recommendations

Based on our research, ICMA offers the following recommendations to local governments considering whether and/or how to allow commercial cannabis activities.

1. **Assess the federal, state, regional, and local contexts for your decision(s).** While the letter of federal cannabis law has not changed for some time, interpretation and enforcement priorities continue to shift. But more urgent are conditions at the state level and below. Some sample questions to consider:
    a. Does current or pending state law prescribe any decision points? *Must you opt in or out of default situations?*
    b. How did your community vote on past cannabis ballot measures? *Do those results entitle*

ing cannabis cultivation industry could potentially take over the Carpinteria Valley's available greenhouses and increase the demand for the construction of even more greenhouses.

At this point in its lifecycle, the cannabis cultivation industry has different effects on local economic activity than the cut flower industry. Observations from Carpinteria show that cannabis cultivation generates less intensive industrial traffic than cut flowers. However, that may be offset by increased traffic from laborers. Greenhouse cannabis cultivation uses approximately 595 square feet per worker (FTE), compared to (conservatively) 38,314 square feet per worker for cut flower growing.[4] This discrepancy is confirmed anecdotally in Carpinteria, with far more cars parked outside the greenhouses that have moved to cannabis cultivation as opposed to those growing flowers or vegetables.

Odor

Medical cannabis has been growing and generating odor just outside Carpinteria city limits for the past few years, but the problem worsened when recreational cannabis was authorized. Agriculture is typically not subject to odor complaints under Right to Farm protections, and Santa Barbara County regulated medical cannabis cultivation in this manner as well.[5] This led to an underenforcement of nuisances like odor and the lack of a regulatory infrastructure at the onset of recreational cannabis, with many residents voicing their complaints. Carpinteria High School, across the street from several greenhouses that cultivate cannabis, was forced to air out classrooms and send home students who were negatively impacted by the odor.[6]

The odor situation has improved in Carpinteria over the past year as some of the greenhouse cannabis cultivators have started to take steps to prevent odors, investing significantly in odor mitigation technology. Santa Barbara County cited evidence from San Diego and established Carpinteria cultivators showing this technology, called a Vapor-Phase System, to be effective in mitigating odors from greenhouse cannabis cultivation facilities.[7] There are limited number of greenhouses continuing to emit strong odors and operate without the preventative measures. Those greenhouses will either be required to mitigate odors in order to become compliant or will be shut down once Santa Barbara County begins to regulate cultivators within the Coastal Zone following the review by the California Coastal Commission.

Key Observations

The City of Carpinteria prohibited all commercial activity in the previous medical cannabis regulatory regime, but the city will potentially allow some commercial cannabis operations once their new regulations are developed and adopted. Those operations will likely be limited to manufacturing and testing to complement the already existing cultivation in the Carpinteria Valley. The Carpinteria City Council is not currently inclined to allow recreational cannabis retail stores and believes they would cause neighborhood problems, an assumption based on observing the previous iteration of medical cannabis stores that existed under the earlier state regulations. The council's preferred approach is to watch the results of recreational cannabis storefronts in other cities before deciding whether to allow them in Carpinteria.

Although Carpinteria's long-term priorities are clear, City Manager David Durflinger notes that it is challenging for a small local government to develop the expertise necessary to both interact in a regulatory process with an adjoining county and to develop its own regulations.

Interviewee:

David Durflinger, City Manager

Endnotes

1 Brooke Staggs, "So far, California has 6,000 licensed cannabis businesses. Here's what that looks like," The Orange County Register. April 27, 2018. https://www.ocregister.com/2018/04/27/so-far-california-has-6000-licensed-cannabis-businesses-heres-what-that-looks-like/

2 Bozanich, Dennis, email to Will Fricke, July 9, 2018.

3 County of Santa Barbara, "Cannabis Amendments to County Ordinance Now in Effect," June 7, 2018. http://cannabis.countyofsb.org/news-events.sbc

4 William A. Matthews, Daniel A. Sumner, Josué Medellín-Azuara, and Tristan Hanon, "Economics of the California Cut Flower Industry and Potential Impacts of Legal Cannabis," University of California Agricultural Issues Center, August 30, 2017.

5 County of Santa Barbara, "Final Environmental Impact Report (EIR) for the Cannabis Land Use Ordinance and Licensing Program," Page 8-13, December 2017

6 David Durflinger, interviewed by Laura Goddeeris and Will Fricke, June 26, 2018

7 County of Santa Barbara, "Final Environmental Impact Report (EIR) for the Cannabis Land Use Ordinance and Licensing Program," Page 8-7, December 2017

AIR QUALITY

INTRODUCTION

The cannabis industry directly impacts air quality in two predominant operations; plant growth cultivation and Marijuana Infused Product (MIP) facilities. At cultivation facilities, the natural growth of cannabis plants and other processes emit terpenes which are VOCs known for their strong odors. At MIP facilities, the evaporation of solvents and other processes in the production cycle result in Volatile Organic Compound (VOC) emissions. VOC's alone do not typically pose a direct threat to human health or the environment. However, they do contribute to ground-level ozone by chemically reacting with other types of pollution, specifically, nitrogen oxides (NOx) in the presence of sunlight. Ozone is an air pollutant that is harmful to human health and negatively impacts the environment, therefore it is important that the cannabis industry mitigate VOCs in their processes. This chapter provides recommended best management practices to improve air quality impacts and reduce VOC emissions from cannabis industry operations.

In Colorado's Front Range, cultivation and MIP facilities are generally in dense urban areas near heavily trafficked highways and other industrial sources of NOx pollution. Because VOCs require the presence of NOx and sunlight to form harmful ozone, VOCs from these facilities have a greater impact on ozone formation than facilities in rural areas. This makes mitigating VOC emissions from the cannabis industry especially important in these regions. Fortunately, most odor control practices at cultivation and MIP facilities also substantially reduce VOC emissions. The correct operation and maintenance of odor control systems at cultivation and MIP facilities is a best management practice for reducing air quality impacts from the cannabis industry.

CULTIVATION FACILITIES

As cannabis plants grow, they release a distinctive range of odors which are made up of different types of VOCs called terpenes. Activities during the cultivation or production cycle that release significant odors also release elevated VOCs during that time. Installing control technologies can reduce the amount of VOC emissions released from the cultivation process *and* control odors in compliance with the Denver city and county odor ordinance. Highly reactive, ozone forming terpenes commonly emitted from cannabis cultivation include: isoprene, pinene, carene, limonene, myrcene, and terpinolene.

REGULATORY DRIVERS

The State of Colorado designates cultivation facilities as an agricultural activity. State regulation, 25- 7- 109(8)(a), C.R.S. provides the Colorado Air Quality Control Commission the authority to regulate certain agricultural production. Cannabis cultivation may be exempt from both state Air Pollution Emission Notice (APEN) and Permitting requirements, unless they are considered a "major source" of air emissions.

In the City and County of Denver, an odor ordinance requires that cultivation facilities control the odor impacts of their growing operations. Denver Revised Municipal Code, Chapter 4 – Air Pollution Control, Section 4-10.

Sustainability Aspects and Impacts

- Odor control
- Regulatory compliance
- Indoor air quality
- Community relations
- Employee well-being
- Regional stakeholder alignment
- Operational and compliance budgets

CARBON FILTRATION - BEST OPTION FOR CONTROLLING ODORS AND VOCS

Carbon filtration is currently the best control technology for reducing VOC emissions from cannabis cultivation facilities. Carbon filters are simple to install, inexpensive, effective, and reliable when properly maintained and replaced. These filters work by using an absorption process where porous carbon surfaces chemically attract and trap VOCs along with other gas phase contaminants. Depending on the filter system, carbon filtration can remove 50% - 98% of VOCs. As the filter ages, less carbon surface area is available to trap VOCs; at this point the filter will need to be replaced. Depending on the filter load, most carbon filters will last 6-12 months in a commercial cultivation environment and should be replaced according to the manufacturer's recommendations.

Carbon filters can operate as stand-alone units that clean and recirculate the air, or can be integrated into the HVAC system. Typically, carbon filters are at their peak performance when positioned at the highest point in your grow space where heat accumulates. High humidity levels hinder filter performance so this control technology is better suited for facilities with environmental controls. An effective filtration system must be properly sized according to the space needed for volume and air-flow requirements. Maintaining an optimal environment can require multiple filters. Carbon filters can be used in combination with other odor control technologies.

Benefits:

- Improve indoor air quality by capturing airborne gas phase contaminants and odors.
- Control the odor impacts of the facility: a properly installed and maintained carbon filtration system is highly effective at controlling odors. This satisfies the requirements of the odor ordinance in Denver and improves community relations as well as business reputation.
- Control VOC emissions: a carbon filtration system can remove 50 - 98% of VOC emissions. This improves public health and the environmental impacts of the facility.

Recommended best practices:

- Design and invest in a carbon filtration system that meets the specific needs of your facility. It is recommended that you work with an HVAC consultant with cannabis industry experience.
- Get information from the manufacturer about the effectiveness of the filter at removing VOCs and choose a filter with a high efficiency rate.
- Do not exceed the maximum rated cubic feet per minute rating for air circulation through the filter. If you exceed this max flow rate, the passing air will not have enough "contact time" with the carbon, and the filter will not be effective at removing VOCs.
- Regularly inspect your filter and replace the filter if it is releasing a smell near the filter effluent, or has reached its lifespan according to the manufacturer's specifications.
- Time your filter replacement schedule so that filters are replaced in early May, the beginning of the ozone season. This ensures that the filter is at peak performance for VOC removal during the high ozone season resulting in the greatest public health benefits.
- Using a pre-filter can help preserve the life span of your carbon filter because it can capture particles before they take-up surface area on the filter. Pre-filters should be replaced about every 6-8 months for proper air flow.

ADDITIONAL ODOR CONTROL METHODS -
BIOFILTERS AND CHEMICAL ODOR TECHNOLOGY

Biofilters are an emerging odor technology that could prove to be more cost effective and less resource intensive than carbon filtration once it is refined in the future. These filters use an organic medium such as wood chips that are inoculated with bacteria and consume odorous molecules. Research is currently being conducted on biofilters that contain bacteria which will consume terpenes and will not harm the cannabis plants. Biofiltration is successful at treating biodegradable VOCs, but it requires a large footprint and careful operation control.

Odor absorbing neutralizers: use oils and liquids from plant compounds and mist them into the exhaust air at cultivation facilities to neutralize odorous VOCs. Contact your odor control supplier about the effectiveness of VOC reduction as it will vary (20%-90%) by product and contact time.

Masking and counteractive agents: use chemical odor control technologies that are misted at the cultivation facility's exhaust. The use of these agents is subject to Colorado's air quality regulations. Higher VOCs are associated with this technology which lead to more severe impacts of air quality and are not recommended in urban areas.

Ozone generators: are mostly used for sanitization purposes and have also been used in industrial settings to control strong odors. These generators are harmful to humans and can damage or destroy crops because they are a direct emission source of ozone pollution, therefore ozone generators are not recommended as a best practice for odor control.

Recommended best practices:

- Regularly inspect and perform maintenance checks on your HVAC system and ducting to ensure it is operating optimally and that the airflow is properly controlled. Keep windows and doors closed in cultivation areas, and inspect the infrastructure for potential leaks.
- For greenhouses, "sealing" the grow space and circulating inside air for one week's time is a common practice that allows the VOC concentration to build up within the greenhouse. When it is time to "purge" the greenhouse by bringing in fresh air, do this at a time when the potential for ozone formation is lowest (i.e. evenings, windy days, and cloudy days). Avoid purging air during times that have the highest risk of ozone formation (i.e. mornings, sunny and hot days, and stagnant weather).
- Make sure that the temperature and relative humidity are under control within tolerance levels of the cultivation room. High temperature and humidity will perpetuate any odor issues that facility is producing; this is especially true during the flowering phase of cultivation. Proper air circulation is critical for maintaining temperature and humidity control.
- Have a documented system in place for recording and responding to odor complaints in compliance with Denver's Odor Ordinance.
- Purchase a "scentometer" or Nasal Ranger to be able to quantify odors and record "defensible data" from self-testing. This can be used to determine if your operation is meeting local odor regulations.
- The harvesting phase results in a higher emission of VOCs than other cultivation phases. Time the harvesting phase to minimize its ozone impact, with respect to time of day, time of year and periods with high forecasted ozone. Minimize emissions during the morning and early afternoon, and during the summer.
- Develop training and allocate responsibilities for staff members to ensure best practices are being implemented consistently and continually as a part of the routine facility operating procedure.
- Communicate and coordinate with other cannabis cultivators to learn what solutions are the most practical and effective.

MIP FACILITIES AND EXTRACTION PROCESS

MIP facilities manufacture marijuana concentrates and infused products such as edibles, ointments, and tinctures. These methods can be divided into two main categories: solvent and solventless extractions. Solvent extraction methods apply a chemical to remove terpenes and cannabinoids from the plant which results in a variety of different products. Solventless extraction methods involve the use of physical methods to create concentrates.

The processing of plants where solvents are used to extract cannabis concentrates is considered a manufacturing process that is subject to state air quality regulations. The applicability of the air quality regulations will depend on the annual amount of VOC emissions quantified in tons emitted per year. It is the responsibility of the business to calculate an estimate of their VOC emissions from solvent extraction. For specific guidance on air quality requirements for MIP facilities and how to calculate emissions, visit: www.colorado.gov/cdphe/greencannabis. The Colorado Small Business Assistance Program can also help you calculate your annual air emissions for free by calling 303-692-3175.

Regulatory Applicability

- CCR 212-1 M 605 D4 requires a professional grade, closed-loop extraction system capable of recovering the solvent, with the exception of ethanol and isopropanol solvent based systems (CCR 212-1 M 605 E). The disposal of VOCs by evaporation or spillage is prohibited under 5 CCR 1001-9 Regulation 7 V.A.
- CCR 212-2 R 605 A2 delineates the solvents that are permitted for use. The rule states: "A Retail Marijuana Products Manufacturing Facility may also produce Solvent-Based Retail Marijuana Concentrate using only the following solvents: butane, propane, CO2, ethanol, isopropanol, acetone, heptane and pentane. The use of any other solvent is expressly prohibited unless and until it is approved by the Division."
- All permitted solvents besides CO2 are VOC based and result in direct VOC emissions when evaporated. The law is the same for medical marijuana concentrate production and is provided in CCR 212-1 M 605 A2. This list of solvents was formulated with the health and safety of workers in mind and using any other solvent is a violation of the law and could also lead to negative air quality impacts. CCR 212-1 M 605 D5 requires that all solvents used are food grade or at least 99% pure.

Recommended best practices:

- Regularly inspect and maintain all storage devices of solvents to prevent leaks.
- Conduct regular maintenance and inspection of the extraction system to ensure that it is functioning properly without direct leaks of the solvent.
- Take caution to prevent leaks during the transfer of solvents between containers and systems at all stages of the production processes.
- Never dispose of a solvent through direct evaporation or spillage; ensure that the solvent is always recovered and kept in a closed-loop extraction system or designated container.

- Maintain an inventory of all solvent liquids and ensure that the facility operating procedure allocates responsibility to keep an updated list.
- Develop training and allocate responsibilities for staff members to ensure best practices are being implemented consistently and continually as a part of the routine facility operating procedure

Sustainability Aspects and Impacts

- Effluent discharge
- Regulatory compliance
- Indoor air quality
- Energy consumption
- GHG emissions
- Water quality
- Community relations
- Employee well-being
- Operational and compliance budgets
- Climate

CONCLUSION

Limiting activities that emit VOCs and making sure that odor control systems are optimally operating during high ozone periods can substantially improve the air quality impacts of cannabis facilities. It is recommended that an employee committee is designated to develop and implement a BMP plan specific to the facility needs. Establishing and communicating BMPs through adequate training can help ensure that this becomes an integrated part of the routine operation in cannabis facilities. Colorado's cannabis industry can adopt BMPs which improve their air quality impacts, bolster their reputations as stewards of the environment, and control their odor as well as air quality emissions.

Public Health Ontario | Santé publique Ontario

EVIDENCE BRIEF

Odours from cannabis production

April 2018

Key Messages

- No studies on health effects associated with exposure to cannabis odours were identified in the scientific or grey literature.
- Odours can result in annoyance and complaints from nearby residents. Current practices recommend the use of appropriate ventilation and filtration systems at cannabis production/cultivation facilities to mitigate the release of substances that may result in odours.
- A system to report and track odours could help inform on timing and extent of the occurrence of odour to assist local authorities to remedy potential problems.

Issue and Research Question

Although medical cannabis production facilities already exist, the legalization of recreational cannabis will likely result in an increase in the number of facilities, or the scale of existing cannabis production facilities. Under the *Proposed Approach to the Regulation of Cannabis*, the production of cannabis will be permitted at both large- and small-scale commercial facilities (cultivators and processors) as well as

in private residences in smaller amounts. These facilities may produce emissions that result in odour complaints from neighbours. Based on inquiries from multiple health units, Public Health Ontario conducted a search of the scientific and grey literature to assess potential health effects related to odour producing emissions associated with cannabis production facilities. Health effects from cannabis smoke inhalation, cannabis consumption and other potential environmental hazards identified in cannabis cultivation (such as biological pathogens, pesticides and other chemicals) were not considered within the scope of this evaluation.

Methods

A literature search was conducted by PHO Library Services using relevant databases (MEDLINE, Embase, Environment Complete, and Scopus), with a combination of pre-defined search terms related to cannabis production and odours. A total of 334 records were returned and reviewed for relevance, with a focus on articles with information about the health effects of these odours. In addition, a grey literature search in Google with a focus on the health effects of odours related to cannabis production was conducted. The detailed search strategy and complete results are available upon request.

Main Findings

Cannabis odours

The characteristic odour associated with cannabis is attributed to the release of chemical compounds into the air known as volatile organic compounds (VOCs). A study by Rice *et al.* identified over 200 different VOCs from packaged cannabis samples.[1]

An important consideration when sampling for odorous compounds is the possibility that compounds emitted at higher concentrations may not necessarily be responsible for the overall characteristic of the odour.[1] In addition, the overall odour of cannabis can be time dependent as chemical volatilization occurs at different rates for different compounds. While both fresh and dry cannabis can be associated with odours it is possible that the VOCs responsible for the aroma profiles may be different due to different rates of chemical volatilization.[1] As a result, it is difficult to identify one or a select number of chemicals to measure from a facility to potentially monitor odour on a continuous basis. One approach used for characterizing odour mixtures is the use of the odour unit, which is the ratio between the amount of odourant present in a volume of a neutral (odourless) gas at the odour detection threshold of the odour evaluation panelists. The odour unit is used by the Ontario Ministry of Agriculture, Food and Rural Affairs to categorize odours under the *Nutrient Management Act* and by the Ontario Ministry of the Environment and Climate Change to determine the compliance of industrial facilities with regulations under the *Environmental Protection Act.*[2,3] Guidance and procedures for determining odour emissions from industrial facilities are provided under the Ontario Source Testing Code.[3]

The processing of cannabis and production of cannabis products can also result in odour emissions. Activities such as cannabis oil extraction/concentration can involve the use of chemical solvents such as butane or distillation using alcohol which can also contribute to the overall odour emitted from a production facility.[4] Disposal of cannabis waste products is not expected to contribute to odour as proper disposal involves rendering the waste unusable by grinding and combining with other waste products (food, yard, paper, or plastic wastes, or soil) which will mask or dilute odour producing compounds. This waste is then disposed of according to local ordinances, which can include landfills or municipal waste incinerators which themselves are operated under licenses that specify engineering controls for odour.[5-7] In Canada, personal cannabis producers are advised to dispose of excess cannabis by mixing with water and kitty litter to mask odour prior to disposal in household garbage.[8]

Health effects from odours

No studies on health effects associated with exposure to cannabis odours were identified in the scientific or grey literature. The perception of odour is not a reliable way to determine the risk of health effects. Some odorous compounds are noticeable at low concentrations where the risk for health effects is very low (e.g. odourants added to natural gas to aid in leak detection), while other chemical compounds (e.g., carbon monoxide) do not result in odours at any concentration, even when there is the potential for people to be exposed at dangerous levels.[9]

In general, most substances responsible for odours in the outdoor air are not present at levels that can cause long-term health effects.[10] However, exposure to unpleasant odours may affect an individual's quality of life and sense of well-being. Exposure to odorous compounds can potentially trigger physical symptoms, depending on the type of substance responsible for the odour, the intensity of the odour, the frequency of the odour, the duration of the exposure, and the sensitivity of the individual detecting the odour.[11,12]

Odour mitigation guidelines

In Canada, Health Canada regulates medical cannabis producers and requires that facilities are equipped with an air filtration system to prevent the escape of odours under Provision 61 of the *Access to Cannabis for Medical Purposes Regulations*.[13] An air filtration system using a H13 high-efficiency particle air (HEPA) filter is given as an example of such a system by Health Canada.[14]

Other jurisdictions have gone through the process of cannabis legalization and implemented guidelines and procedures to address potential odour issues from production facilities. The following is a summary of the existing guidelines gathered from various agencies in Colorado, Alaska and California.

The Colorado Springs Fire Department provides guidance to licensed cannabis production facilities based on the recommendations in the Cannabis Facility Guidance document from the Fire Marshals Association of Colorado.[15] The guidance recommends that appropriate ventilation and filtration systems be implemented and maintained to satisfy applicable local odour nuisance standards. In addition, the

adoption of best practices and state-of-the-art technologies in odour mitigation are strongly encouraged.[16] In situations where odour is inadequately mitigated and is perceived to be excessive, residents in Denver, Colorado are asked to file a nuisance odour complaint with the Denver Department of Environmental Health.[17]

The city of Denver, Colorado has released a Best Management Practices document for commercial medical cannabis producers, wherein a number of odour control technologies are described.[18] Carbon filtration has been recommended as the best control technology for cannabis cultivation facilities and producers of cannabis-infused products.[18] Other recommended technologies include negative ion generators/electrostatic precipitators, air scrubbers, masking agents, and the use of negative pressure to keep odours within the facility.[15,20,21] Regardless of which technologies are used to control odour, it is important that these systems are properly maintained according to specifications to provide optimal performance.

Applications for cannabis cultivation facilities in Alaska must submit an operating plan that includes odour control to ensure that cultivated cannabis does not emit odour detectable by the public from outside the facility.[22] Similarly, regulatory permit applications for medical cannabis facilities in Hollister, California are evaluated based on an adequate odour management plan which must include a detailed description of the ventilation system that will be used in the facility.[21] In Sacramento, California, permitted cannabis producers are required to prevent all odours generated from the cultivation and storage of cannabis from escaping from the buildings on the cultivation site, such that the odour cannot be detected by a reasonable person of normal sensitivity outside the buildings.[23]

Discussion and Conclusions

The upcoming legalization of cannabis in Canada is expected to result in an increase in cannabis production or cultivation in both large- and small-scale commercial facilities, and private residences. There is a potential that operation of these facilities will result in the release of odour and odorous compounds into the surrounding environment. However, environmental odours are regularly encountered from agricultural and industrial operations and odour control technologies are both readily available and widely used in these industries.

Although regulations and guidelines are still being developed for the province of Ontario, other jurisdictions have already legalized cannabis production and developed best practices and procedures to address odour issues. In general, cannabis production facilities can implement and maintain appropriate ventilation and filtration systems to satisfy applicable local odour nuisance standards. A formal system for residents to document and report nuisance odours can facilitate the enforcement of these standards or municipal bylaws. As part of the permitting process, odour control plans can be reviewed to determine whether emissions are adequately treated such that cannabis odours are not perceptible outside the exterior of the building.

Studies linking health effects to neighbourhood exposure to emissions from cannabis production facilities were not found through the literature search. Detection of unpleasant odours may affect an individual's sense of well-being by triggering a physiological response.

Implications for Practice

Although studies on health effects from neighbourhood exposure to emissions from cannabis production have not been published, these emissions of volatile organic compounds would be broadly comparable to those produced by other agricultural operations. In general, the substances responsible for odours may result in reports of responses such as headaches or irritation depending on individual tolerance of particular odours.

Based on existing guidance from Health Canada and elsewhere, odour control technologies are available for production facilities to prevent the release of odours from site buildings.

Following other jurisdictions, a system to report and track nuisance odours could be implemented in the event that the odour control at a cannabis production facility is not effective. Such a system can help to inform local authorities on timing and extent of the occurrence of odour, and inform decisions through which authorities can intervene to remedy potential problems. Health Canada, through the regional Controlled Substances Program, conducts inspections of licenced producers to verify their ongoing compliance with the *Access to Cannabis for Medical Purposes Regulations* (ACMPR).[24] A similar inspection system may be useful to encourage and monitor compliance with the requirement for air filtration and odour control under the ACMPR.

References

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Specifications and Limitations of Evidence Brief

The purpose of this Evidence Brief is to investigate a research question in a timely manner to help inform decision making. The Evidence Brief presents key findings, based on a systematic search of the best available evidence near the time of publication, as well as systematic screening and extraction of the data from that evidence. It does not report the same level of detail as a full systematic review. Every attempt has been made to incorporate the highest level of evidence on the topic. There may be relevant individual studies that are not included; however, it is important to consider at the time of use of this brief whether individual studies would alter the conclusions drawn from the document.

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For Further Information

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Public Health Ontario

Public Health Ontario is a Crown corporation dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, front-line health workers and researchers to the best scientific intelligence and knowledge from around the world.
For more information about PHO, visit publichealthontario.ca.

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DENVER
THE MILE HIGH CITY

Denver's Odor Control Plan Frequently Asked Questions

Denver's Department of Environmental Health (DEH) is responsible for regulating odors.
For more information, visit www.denvergov.org/OdorOrdinance.

Getting Started

1. **Who is required to submit an Odor Control Plan (OCP)?**

   Any facility that:

   a. Receives five or more complaints from separate households or businesses *within* the City/County of Denver in a 30-day period
   b. Exceeds the one-to-seven dilution threshold
   c. Engages in any of the following activities:
      a. pet food manufacturing
      b. marijuana growing, processing, or manufacturing
      c. rendering and meat byproduct processing
      d. asphalt shingle and coating materials manufacturing
      e. petroleum refining
      f. sewage treatment
      g. wood preservation
   d. Is required to submit an OCP pursuant to an Odor of the Manager of DEH.

2. **Is an OCP template available on the web?**

   Yes, you can view the templates here.

3. **Do the floor plans required to be submitted as part of OCPs need to be stamped and approved by Zoning of the Department of Community Planning and Development (CPD)?**

   No.

311 for City Services
Denver gets it done!

4. **Do a facility's administrative and engineering controls need to address activities in every single area of the facility's premises?**

   No, odor-mitigating controls may be focused to areas of the facility where odor-generating activities take place, so long as such controls effectively mitigate odors for all odor sources.

5. **Are engineering controls required by all businesses?**

   Most facilities will need engineering controls to effectively mitigate odors for all odor sources. However, some facilities may need only administrative controls to do so. If a facility owner or operator reasonably believes that engineering controls are not necessary to effectively mitigate odors for all odor sources, and does not intend to install engineering controls, the owner or operator must submit as part of the facility's OCP the basis for such belief. In its review of the facility's OCP, DEH will determine whether the facility may operate without engineering controls.

6. **Does DEH recommend that facilities use specific odor control technologies?**

   The rule encourages the use of industry-specific best control technologies, but allows facilities to utilize other control technologies if it can be demonstrated that such technologies will effectively mitigate odors for all odor sources. The rule recognizes carbon filtration as the current best control technology for marijuana cultivation and marijuana infused product facilities.

7. **Can you provide names of companies who specialize in odor mitigation?**

   The City is not in a position to endorse private businesses, and consequently cannot provide a list of odor mitigation companies.

   Is an OCP review checklist used by DEH available to the public?

   Yes, you can view the checklist at www.denvergov.org/OdorOrdinance.

8. **Is OCP submission and approval a one-time process? Will renewals be required?**

   The rule contains no renewal requirement. However, the owner or operator of a facility must submit a modified OCP if:

a. DEH determines that the facility's existing plan does not effectively mitigate odors for all odor sources
b. A modification is made to the facility, or a facility process, that has the potential to impact the nature or degree of odor, or affects the control of odor

Licensing and Permitting

9. **Must a business with multiple marijuana-impacted licenses co-located at the same facility submit a separate OCP for each license?**
   No. If appropriate, a business may submit one OCP applicable to multiple marijuana-impacted licenses co-located on the same premises. Marijuana-impacted licenses may include: medical marijuana optional premises cultivation licenses, retail cultivation facility licenses, medical marijuana infused product manufacturer licenses, and retail marijuana infused product manufacturer licenses. The OCP must list all marijuana-impacted license numbers co-located on the premises. For example, a marijuana business that has a license for both marijuana-infused products and cultivation co-located on the same premises may elect to submit one OCP for the entire facility. However, where multiple businesses are co-located on the same premises, each business must submit a separate OCP, even if the OCP content is similar and uses the same odor control technology.

10. **If I already have a building or zoning permit under review with the CPD, and I must now submit a new permit application to satisfy the installation of new odor mitigation technologies, can I submit a second permit application while the first is pending?**
    Yes, a facility owner or operator may submit an additional building or zoning permit with CPD even if an existing permit application is currently pending for that facility. Learn more about zoning or building permit requirements at: www.denvergov.org/ds.

11. **If I already have a modification of premises application under review with the Department of Excise and Licenses (EXL), and I must now modify it to include installation of new odor mitigation technologies, can I submit a second modification of premises application while the first is pending?**
    No, a facility owner or operator must either complete its first modification application and then

submit a second application to EXL, or withdraw its existing modification application and then submit a new application to EXL including all changes.

12. **Must a facility owner or operator submit its OCP with the DEH at the same time it submits its application for a new Cultivation or Marijuana Infused Products (MIPs) license with EXL?**
    No, the owner or operator need not submit its OCP to DEH at the same time it submits its license application to EXL. However, EXL will not approve the license application until DEH has approved the facility's OCP. In other words, the OCP can be submitted to DEH at any time during the EXL license application process, with the understanding that the business will not be granted a new license until DEH approves its OCP. New license applicants should submit OCPs to DEH as early in the licensing process as possible, as DEH will sign off on the license application only after it has approved the facility's OCP and subsequently conducted a site visit.

13. **Do OCPs need to be submitted to EXL and DEH?**
    No, OCPs should be submitted to DEH only. Once an OCP is approved, DEH will forward a copy to EXL. OCPs may be submitted in the following ways:
    a. by postal mail or hand delivery of a printed copy or CD to Denver Department of Environmental Health at 200 West 14th Avenue, Suite 300, Denver CO 80204
    b. by email to EQcomments@denvergov.org.

14. **Will facilities planning to relocate soon after OCPs are due be required to submit a new OCP for the new location?**
    Yes.

15. **Does a facility that is relocating need to wait for its new OCP to be approved by DEH before submitting its transfer of location license application to EXL?**
    No, a facility may submit a transfer of location license application with EXL before DEH has approved its OCP. However, the facility will not receive its license until DEH has approved its OCP.

Review and Operations

16. **Who can complain about odors to the City and County of Denver?**

    Any person from any geographical area can submit a complaint to the City and County of Denver by phone at 311 (720-913-1311), or email at 311@denvergov.org. DEH will investigate as soon as it receives a complaint.

17. **How does the DEH determine whether a complaint counts towards the 5 or more complaints within 30-days threshold that requires a facility to submit an OCP?**

    To be considered an odor complaint, the complainant must provide:

    a. His or her name, address, and phone number
    b. The time and date of observations
    c. A description of nuisance odor, including the estimated location or source of complaint, and if possible, prevailing wind or weather conditions observed

    Upon receiving an odor complaint, DEH will investigate and evaluate the complaint's validity on a case-by-case basis.

18. **How does the DEH determine that odors are coming from one specific facility and not another facility down the street?**

    DEH inspectors investigate each complaint individually. DEH inspectors are certified by the State to make a qualitative assessment of odor intensity and source. Factors that inspectors consider when determining the source of odors include an evaluation of weather conditions at the time of the complaint, the proximity of the suspect facility to the complaint location, and the suspect facility activities at the time of the complaint. DEH reviews any discrepancies between the complaint and its investigation results on a case-by-case basis.

19. **If I have an approved OCP but still receive a complaint about my business, what will happen?**

    DEH will investigate and evaluate the complaint's validity, and will seek to determine whether the facility complies with its OCP. If DEH determines that the facility complies with its OCP, DEH will work with the facility on a case-by-case basis to determine whether mitigation actions are appropriate. If DEH determines that the facility is not in compliance with its OCP, DEH may cite the facility for violating the requirements of D.R.M.C. § 4-10.