

ODOR CONTROL PLANS THAT WORK:

Essential Strategies for Cannabis Growers, Processors, Merchants, and Regulators

Odor control is a top concern for the cannabis industry, requiring proactive, science-driven solutions to navigate regulatory complexities, mitigate high operational costs, and foster positive community relations.

INTRODUCTION

Odor control remains one of the cannabis industry's most pressing, and often underestimated, challenges. Left unmanaged, complaints from surrounding communities can prompt regulators to tighten oversight and levy costly penalties. Beyond compliance, unresolved odor issues can threaten business continuity and a company's reputation. For cannabis businesses of all types (operators), success depends on understanding the science behind odor, identifying its chemical drivers, and implementing robust strategies that address both technical and community concerns.

CANNABIS ODOR CHALLENGES

Odor issues span the entire cannabis supply chain, from cultivation and processing to retail and even laboratory environments. Cannabis operators need to have a basic understanding of the science of odor and olfactometry, be aware of the chemical drivers of cannabis odor, anticipate and plan for odor impacts, meet regulatory expectations, and engage surrounding communities in a proactive way.

The scale of the challenge is evident in several states. In Denver, Colorado, 80% of commercial facility odor complaints are tied to cannabis operations.¹ Santa Barbara County, California, has logged more than 3,900 complaints since 2018, leading to lawsuits and stricter ordinances.² In Oregon, 62% of residents living near cannabis facilities cite odor as their primary concern.³



CHRISTOPHER PETRO, MSCE, EIT
Project Manager
SCS Engineers



PAUL SCHAFER, CIEC, VETC
Vice President, Project
Director
SCS Engineers

Sponsored by

SCS
ENGINEERS
www.scsengineers.com

cannabis
science and technology 

The financial burden on operators is equally significant. In California, large cultivation facilities' annual odor control costs can range from \$100,000 to \$500,000 per facility, not including capital expenses.⁴ Penalties for non-compliance range from \$1,000 to \$10,000 per day, while Oregon has imposed fines of up to \$24,000 per day for severe violations.³⁻⁴ Beyond fines, operators risk license revocation and lawsuits, which can ultimately harm a company's reputation and bottom line.

OLFACTOMETRY AND EFFECTIVE ODOR CONTROL

When properly implemented, odor control measures offer tangible benefits. Facilities that invest in odor management systems report a 50–75% reduction in odor-related complaints.⁵ Community engagement alone can reduce complaint levels by as much as 30% within six months.⁵ In some jurisdictions, operators may also qualify for tax incentives when they install odor control systems, helping offset the cost of these investments.

The advantages extend beyond compliance and community goodwill. Better odor management has been linked to improved crop yields, a reduced risk of microbial contamination, and healthier work environments for employees. Reflecting this trend, more than 70% of licensed facilities in regulated states have already adopted some form of odor mitigation technology, and that percentage continues to rise as technologies evolve.⁶

Odor is the perceptual experience triggered when airborne compounds interact with olfactory receptors. It is unique among the senses because of its direct connection to memory. Although the

U.S. Environmental Protection Agency (EPA) does not classify odor as a pollutant, odor complaints represent more than 50% of all air quality complaints in the United States.⁷

Cannabis odor is particularly complex. Terpenes such as myrcene, limonene, pinene, and caryophyllene contribute to distinctive aromatic notes but tend to dissipate quickly downwind. The more persistent “skunky” odor most often cited in community complaints is caused primarily by volatile sulfur compounds (VSCs), including 3-methyl-2-butene-1-thiol and related thiols and mercaptans. These compounds are especially challenging because they can be detected at sub-parts per billion (ppb) concentrations and remain detectable long after terpenes have dissipated.

Because odor is inherently subjective, olfactometry provides a structured and defensible way to measure and quantify it. Four key dimensions are used: concentration, intensity, persistence, and character. Concentration is typically expressed as dilutions-to-threshold (D/T), which indicates the level at which an odor becomes detectable. Intensity refers to the perceived strength of an odor at a given concentration, while persistence reflects how long the odor lingers. Character describes the quality of the odor itself—for example, whether it is skunky, citrus-like, or sulfurous.

ASTM methods, such as ASTM E679, guide how trained human panels detect odors by being exposed to increasingly concentrated air samples until thresholds are reached. While instruments can measure the presence of volatile organic compounds (VOCs), the human nose remains irreplaceable for assessing odor character.

ODOR CONTROL PLANNING AND REGULATORY COMPLIANCE

Planning for odor control begins with location. Facility siting is consistently identified as the most important factor. Operations should be located away from sensitive receptors such as residences, schools, and public gathering spaces. Even when facilities are placed in properly zoned industrial or agricultural areas, being too close to neighborhoods often leads to complaints and, in certain cases, civil action.

Proactive community engagement is equally critical. Operators that establish clear communication with neighbors early on build trust and reduce the likelihood of escalated conflicts. Many successful facilities designate an odor point-of-contact, who logs complaints, communicates directly with residents, and monitors meteorological data to determine whether odor events align with wind direction and other environmental conditions.

Establishing a complaint tracking system—whether digital or as simple as a binder administratively updated and logged on-site—provides a record of trends over time and demonstrates improvements. Third-party odor audits are also valuable because employees can become desensitized or “nose blind” to odors from their own facility.

Regulatory frameworks vary, but most include requirements such as setbacks, zoning restrictions, and limits on odor at property boundaries. For example, regulators may set a limit of no more than seven dilutions-to-threshold above background because, at that level, cannabis odors can be specifically characterized. Regulations may also

include restrictions on canopy size, cultivation density, and standards specific to facility type (indoor, greenhouse, or outdoor).

It is essential that facilities are consistent in their enforcement of odor control. Regulators are encouraged to standardize instruments, data collection methods, and reporting protocols across inspections. Many jurisdictions also require operators to maintain complaint management systems and may provide hotlines for residents to file odor complaints.

Digital monitoring tools, such as odor heat maps, are increasingly utilized to identify hotspots and track complaint patterns over time. Visibility also plays a role. Research shows that people are more likely to complain about odors when they can see the cannabis facility producing them. Screening facilities from public view is, therefore, a simple but effective mitigation measure.

PROVEN ODOR ABATEMENT TECHNOLOGIES

Different facility types require different odor abatement strategies. For indoor facilities, carbon filtration is the industry standard, often used in combination with negative pressure building envelopes. Additional options include photocatalytic oxidation using ultraviolet light, electrostatic precipitation, and controlled ozone treatment within HVAC systems. Vestibules and air curtains help prevent odor from escaping through doors, while MERV-rated pleated carbon filters can be effective for laboratories and dispensaries.

Greenhouse and outdoor facilities present a more difficult challenge. While misting systems have been used to bind or mask odors, they are falling out of favor due to public complaints, potential

residue, and higher operating costs. Instead, many operators are turning to recirculating multi-stage scrubbers, which have been shown to reduce odors by at least 90% per pass. Vegetative buffers, such as rows of conifer trees, are another low-tech solution that filter air, alter odor character through biofiltration, and provide visual screening.

Monitoring and maintenance are essential regardless of the technology deployed. On-site meteorological stations with data logging, detailed complaint records, and regular inspections ensure and document that odor mitigation systems continue to function effectively.

CONCLUSION

For cannabis operators, odor control is not optional—it is fundamental to sustainable operations. Success depends on a combination of proper facility siting, scientific measurement, proactive community engagement, and proven abatement technologies, all supported by quantifiable monitoring systems. By taking a proactive, science-based approach, cannabis businesses can maintain compliance, manage costs, and strengthen their social license to operate within increasingly regulated and scrutinized markets.

References:

1. Denver Department of Public Health & Environment (DDPHE). (2020). *Odor Control and Cannabis Cultivation: Public Complaints Data*. Denver, CO. <https://denvergov.org>
2. Santa Barbara County Planning & Development. (2021). *Cannabis Cultivation Odor Complaint Report*. Santa Barbara, CA. <https://countyofsb.org>
3. Oregon Cannabis Commission. (2020). *Community Survey on Cannabis Odor Impacts*. Oregon. <https://oregon.gov>
4. California Bureau of Cannabis Control (BCC). (2021). *Odor Mitigation and Compliance Costs in Commercial Cannabis Operations*. <https://cannabis.ca.gov>
5. Journal of Air Quality Research. (2018). Volatile Organic Compound Emissions from Cannabis Cultivation: A Quantitative Study. DOI: 10.1007/s11869-018-0063
6. Canadian Cannabis Research Institute. (2022). *Community Engagement and Odor Complaints in Legal Cannabis Markets*. Canada. Retrieved from <https://ccri.ca>
7. California Air Resources Board. *Odor Complaints, Health Impacts and Monitoring Methods*. CARB research white paper. Sacramento, CA; September 3, 2019:2.

Watch the full on-demand webcast:
Odor Control Plans That Work:
Essential Strategies for Cannabis Growers, Processors,
Merchants, and Regulators

CLICK HERE

