



DENVER
THE MILE HIGH CITY



Best Management Practices: Commercial Medical Marijuana Cultivation

The emerging medical marijuana cultivation industry has many opportunities to enhance their public image and protect the environment by incorporating best management practices to reduce or eliminate odors and other adverse environmental impacts from their operations.

1. Ventilation and Odor Control

The pungent odor from marijuana cultivation operations is objectionable to many people. Offensive odors can easily migrate in and around the marijuana cultivation site and some strains produce odors that are detectable in the surrounding neighborhood as well as adjacent tenants. All medical marijuana cultivation operations should employ ventilation and odor control that is adequate for the size of the operation.

- It is imperative to properly design the ventilation system, taking into consideration the square footage and number of plants. A properly sized, installed and maintained ventilation system can help resolve two issues. Firstly, having the grow rooms properly balanced will inhibit odors from escaping. Secondly, the addition of a dehumidifying system to control mold and pathogen growth should be considered. Ideally, humidity to control molds should be set under 50%. Contact a reputable HVAC contractor for assistance with these design elements.
- Three (3) odor control technologies have shown promise with controlling odors from grow operations.
 - **Activated Carbon Filtration** – This technique involves forcing the air circulating within the HVAC system through an activated carbon filter in order to filter out odors and pathogens that may pose a public health risk. This method is highly effective and can be used in combination with other technologies such as an electrostatic precipitator.

The size and layout of the cultivation operation will determine the requirements for the carbon filtration system. Larger scale operations will require the use of larger fans and more carbon and will typically increase the requirements of existing HVAC systems. In addition, as filters age and the activated carbon becomes clogged with impurities, it will be necessary to replace the carbon; filters should typically be replaced per the manufacturers recommendation. In addition, the dust

collector “sock” associated with the carbon filter should be changed out every 6-8 months for proper air flow.

Carbon filtration is the least energy intensive of the three technologies. In most cases, the energy required to run the filtration system is already accounted for in the air handling and exchange system. The excess energy necessary to force air through the filter is negligible and, depending on the size of the discharge and intake, often only slightly alters the speed of the exchange. The use and disposal of the filters creates the most physical waste; however, the carbon can typically be regenerated for reuse.

- **Negative Ion Generation** – These machines, sometimes called electrostatic precipitators, will use a negative charge to attract positively charged particles in the air. The charged particles are attracted to the metal filters, which over time, will become concentrated with particles and require cleaning with water on a regular basis. In some cases this technology has been shown to work

The negative ion generators can improve indoor air quality to a greater degree than some of the other technologies. The environmental impact of this technology is also dependent upon size and use. They are typically powered by a single wall outlet and can run 24 hours a day, 7 days a week. They will also need to be cleaned which usually requires removing the metal panel and washing it to remove the particles. Otherwise, they require very little maintenance and their energy consumption is typically negligible and lower than many fans.

- **Ozone Generators** - Ozone can be extremely effective at breaking down odors and other contaminants. Potential problems with ozone originate with the molecule’s destructive tendencies. Ozone is an effective sterilizer; however, excessive and/or unmonitored use has been shown to damage or even destroy crops and can cause lung irritation.

Although ozone degrades quickly, the output of the gas can be an indoor environmental hazard to both the people and the plants. Release of the gas outside can also have varying local effects depending on the time of day, concentration, and disbursement factors associated with the location and weather. The major impact will come from energy consumption.

- **Masking Agents** – There are also odor masking equipment that can be used for temporary localized odor control. This method is not recommended to control odors alone.

A preventative maintenance and replacement plan should be established for any of these systems to ensure optimum operation and continuous odor control.

2. Energy Consumption

Energy efficient lighting such as compact fluorescent lights (CFLs), may be a great alternative to incandescent bulbs in many applications; however, they may not provide the proper growing spectrum for your plants. High efficiency CFLs or LEDs should be used whenever possible in non-grow spaces, such as offices and restrooms. In addition, when installing new electrical equipment, use products with the Energy Star seal whenever feasible. Always have a licensed electrical contractor install electrical equipment and lighting to ensure safe wiring and adherence to local building code requirements.

Another option to off-set your energy usage is to purchase Windsource from Xcel Energy or carbon off-sets through Climate Trust or The Carbon Fund.

3. Water Quality and Conservation

Although water covers nearly three quarters of the earth, less than one percent is clean fresh water. Therefore, it is critical that we conserve and protect this valuable resource. Never dispose of anything in the outside storm drains. Keep areas surrounding dumpsters free of debris and wastes. Remember, “nothing in the storm drain but stormwater”. To help with water conservation, educate staff on turning off the water while washing hands and equipment, installing low-flow aerators on faucets, and retrofitting toilets to low flow models.

4. Other Standard Practices

- Ensure safe disposal of fertilizers, insecticides, plant growth regulators, and other chemicals. Buy only what you need and store in a safe place and clean-up spills immediately. Refer to the Material Safety Data Sheet for disposal requirements.
- Currently there are no pesticide products that are registered or labeled for use on medical marijuana. The application of a pesticide to a plant that is not on the pesticide label is a violation of federal and state pesticide laws.
- Effective July 1, 2011, section 12-43.3-12.200 of the of the Colorado Revised Statute in part requires that medical marijuana waste must be rendered unusable prior to leaving the facility by grinding and incorporating the material with non-consumable solid wastes such as food waste, soil or other compostable materials. Composting unusable plant material and soils provides a valuable opportunity to create nutrient rich soil to stimulate healthy plant growth. [MMJ Regulation.pdf](#)
- Provide shower facilities to employees to use before and after work to reduce the introduction of potentially harmful molds, mildew and bacteria to the plants, workers and their families.