COLORADO

Department of Regulatory Agencies

Colorado Office of Policy, Research & Regulatory Reform

2016 Sunrise Review:

Cannabis Growers

October 14, 2016

COLORADO
Department of Regulatory Agencies
Executive Director's Office

October 14, 2016

Members of the Colorado General Assembly
c/o the Office of Legislative Legal Services
State Capitol Building
Denver, Colorado 80203

Dear Members of the General Assembly:

The General Assembly established the sunrise review process in 1985 as a way to determine whether regulation of a certain profession or occupation is necessary before enacting laws for such regulation and to determine the least restrictive regulatory alternative consistent with the public interest. Since that time, Colorado's sunrise process has gained national recognition and is routinely highlighted as a best practice as governments seek to streamline regulation and increase efficiencies.

The Colorado Office of Policy, Research and Regulatory Reform (COPRRR), located within my office, is responsible for fulfilling these statutory mandates. To emphasize the statewide nature and impact of this endeavor, COPRRR recently launched a series of initiatives aimed at encouraging greater public participation in the regulatory reform process, including publication of a new "Citizen's Guide to Rulemaking" (available online at www.dora.colorado.gov/opr).

Section 24-34-104.1, Colorado Revised Statutes, directs the Department of Regulatory Agencies to conduct an analysis and evaluation of proposed regulation to determine whether the public needs, and would benefit from, the regulation.

Accordingly, COPRRR has completed its evaluation of the sunrise application for the regulation of cannabis growers and is pleased to submit this written report.

The report discusses the question of whether there is a need for regulation in order to protect the public from potential harm, whether regulation would serve to mitigate the potential harm, and whether the public can be adequately protected by other means in a more cost-effective manner.

Sincerely,

Joe Neguse
Executive Director

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Background

Consistent, flexible, and fair regulatory oversight assures consumers, professionals and businesses an equitable playing field. All Coloradans share a long-term, common interest in a fair marketplace where consumers are protected. Regulation, if done appropriately, should protect consumers. If consumers are not better protected and competition is hindered, then regulation may not be the answer.

As regulatory programs relate to individual professionals, such programs typically entail the establishment of minimum standards for initial entry and continued participation in a given profession or occupation. This serves to protect the public from incompetent practitioners. Similarly, such programs provide a vehicle for limiting or removing from practice those practitioners deemed to have harmed the public.

From a practitioner perspective, regulation can lead to increased prestige and higher income. Accordingly, regulatory programs are often championed by those who will be the subject of regulation.

On the other hand, by erecting barriers to entry into a given profession or occupation, even when justified, regulation can serve to restrict the supply of practitioners. This not only limits consumer choice, but can also lead to an increase in the cost of services.

There are also several levels of regulation.

Licensure

Licensure is the most restrictive form of regulation, yet it provides the greatest level of public protection. Licensing programs typically involve the completion of a prescribed educational program (usually college level or higher) and the passage of an examination that is designed to measure a minimal level of competency. These types of programs usually entail title protection – only those individuals who are properly licensed may use a particular title(s) – and practice exclusivity – only those individuals who are properly licensed may engage in the particular practice. While these requirements can be viewed as barriers to entry, they also afford the highest level of consumer protection in that they ensure that only those who are deemed competent may practice and the public is alerted to those who may practice by the title(s) used.

Certification

Certification programs offer a level of consumer protection similar to licensing programs, but the barriers to entry are generally lower. The required educational program may be more vocational in nature, but the required examination should still measure a minimal level of competency. Additionally, certification programs typically involve a non-governmental entity that establishes the training requirements and owns and administers the examination. State certification is made conditional upon the individual practitioner obtaining and maintaining the relevant private credential. These types of programs also usually entail title protection and practice exclusivity.

While the aforementioned requirements can still be viewed as barriers to entry, they afford a level of consumer protection that is lower than a licensing program. They ensure that only those who are deemed competent may practice and the public is alerted to those who may practice by the title(s) used.

Registration

Registration programs can serve to protect the public with minimal barriers to entry. A typical registration program involves an individual satisfying certain prescribed requirements – typically non-practice related items, such as insurance or the use of a disclosure form – and the state, in turn, placing that individual on the pertinent registry. These types of programs can entail title protection and practice exclusivity. Since the barriers to entry in registration programs are relatively low, registration programs are generally best suited to those professions and occupations where the risk of public harm is relatively low, but nevertheless present. In short, registration programs serve to notify the state of which individuals are engaging in the relevant practice and to notify the public of those who may practice by the title(s) used.

Title Protection

Finally, title protection programs represent one of the lowest levels of regulation. Only those who satisfy certain prescribed requirements may use the relevant prescribed title(s). Practitioners need not register or otherwise notify the state that they are engaging in the relevant practice, and practice exclusivity does not attach. In other words, anyone may engage in the particular practice, but only those who satisfy the prescribed requirements may use the enumerated title(s). This serves to indirectly ensure a minimal level of competency – depending upon the prescribed preconditions for use of the protected title(s) – and the public is alerted to the qualifications of those who may use the particular title(s).

Licensing, certification and registration programs also typically involve some kind of mechanism for removing individuals from practice when such individuals engage in enumerated proscribed activities. This is generally not the case with title protection programs.

Regulation of Businesses

Regulatory programs involving businesses are typically in place to enhance public safety, as with a salon or pharmacy. These programs also help to ensure financial solvency and reliability of continued service for consumers, such as with a public utility, a bank or an insurance company.

Activities can involve auditing of certain capital, bookkeeping and other recordkeeping requirements, such as filing quarterly financial statements with the regulator. Other programs may require onsite examinations of financial records, safety features or service records.

Although these programs are intended to enhance public protection and reliability of service for consumers, costs of compliance are a factor. These administrative costs, if too burdensome, may be passed on to consumers.

Sunrise Process

Colorado law, section 24-34-104.1, Colorado Revised Statutes (C.R.S.), requires that individuals or groups proposing legislation to regulate any occupation or profession first submit information to the Department of Regulatory Agencies (DORA) for the purposes of a sunrise review. The intent of the law is to impose regulation on occupations and professions only when it is necessary to protect the public health, safety or welfare. DORA's Colorado Office of Policy, Research, and Regulatory Reform (COPRRR) is responsible for preparing a report evaluating the justification for regulation based upon the criteria contained in the sunrise statute:[1]

> (I) Whether the unregulated practice of the occupation or profession clearly harms or endangers the health, safety, or welfare of the public, and whether the potential for the harm is easily recognizable and not remote or dependent upon tenuous argument;
>
> (II) Whether the public needs, and can reasonably be expected to benefit from, an assurance of initial and continuing professional or occupational competence;
>
> (III) Whether the public can be adequately protected by other means in a more cost-effective manner; and
>
> (IV) Whether the imposition of any disqualifications on applicants for licensure, certification, relicensure, or recertification based on criminal history serves public safety or commercial or consumer protection interests.

[1] § 24-34-104.1(4)(b), C.R.S.

Any professional or occupational group or organization, any individual, or any other interested party may submit an application for the regulation of an unregulated occupation or profession. Applications must be accompanied by supporting signatures and must include a description of the proposed regulation and justification for such regulation.

Methodology

COPRRR has completed its evaluation of the proposal for the regulation of cannabis growers. During the sunrise review process, COPRRR performed a literature search; interviewed representatives of the Hydroponic Society of America (Applicant), Colorado-based industry associations, local governments, the Colorado Department of Revenue's Marijuana Enforcement Division (MED), individual MED licensees and medical marijuana caregivers; and reviewed the laws of other states. To better understand the practice of cannabis growers, COPRRR visited MED-licensed marijuana cultivation facilities.

In July 2016, COPRRR conducted three distinct surveys related to this report:

Survey of Caregivers. Due to the confidential nature of the Medical Marijuana Registry, medical marijuana caregivers were notified of the survey by the Colorado Department of Public Health and Environment (CDPHE) by way of email, a link on the CDPHE website and various social media outlets frequently utilized by CDPHE to communicate with this population. As a result, it is not possible to determine an overall response rate because it is not possible to determine the number of individuals who viewed the links to the surveys. Regardless, 20 responses were received. Survey questions and responses may be found in Appendix A.

Survey of Occupational Licensees. Due to the confidential nature of licensee email addresses, MED emailed a link to the survey to all 6,986 individuals holding MED-issued occupational licenses and 315 individuals responded. This represents an overall response rate of 4.5 percent. It should be noted that not all occupational licensees are engaged in cultivation activities, so the response rate as a percentage of such individuals may be higher, but is incalculable. Survey questions and responses may be found in Appendix B.

Survey of Licensed Marijuana Cultivation Facilities. Due to the confidential nature of licensee email addresses, MED emailed a link to the survey to all 1,359 marijuana cultivation facility licensees and 63 facilities responded. This represents a response rate of 4.6 percent. Since a single entity may hold multiple licenses, the response rate as a percentage of all facilities may be higher. Although the survey instrument attempted to account for this variable, the inconsistency of responses rendered that attempt moot. Survey questions and responses may be found in Appendix C.

Profile of the Profession

Between Amendments 20 and 64 to the state's constitution, multiple groups are authorized to grow marijuana in Colorado:

- Medical marijuana patients, for their own use;
- Medical marijuana caregivers, for their patients;
- Medical marijuana cultivation facilities, for their patients;
- Anyone over the age of 21, for his or her own recreational use;
- Anyone over the age of 21, for the recreational use by someone else (but not for sale); and
- Retail marijuana cultivation facilities.

No state law prevents an individual from growing all of the medical marijuana plants to which he or she is entitled, up to six plants for his or her own recreational use *and* up to six plants for any number of other individuals' recreational use. Licensed cultivation facilities may grow up to the limitations placed on their respective licenses and, as of January 1, 2017, medical marijuana caregivers may grow up to 99 plants.

Importantly, the scope of this sunrise report is confined solely to examining whether regulation of the ***occupation*** of cannabis grower is justified. As such, medical marijuana patients growing for their own use, as well as individuals growing recreational marijuana for their own use, fall outside of this scope since they are not engaged in an occupation.

The cultivation of marijuana, or any crop, entails a number of actions. With respect to marijuana cultivation, the Hydroponic Society of America (Applicant) has identified the following:[2]

- Planting;
- Watering;
- Application of fertilizers, pesticides and mold inhibitors;
- Application of lighting;
- Monitoring the environment;
- Monitoring of water and fertilizer; and
- Harvesting.

While no formal education is legally necessary to cultivate marijuana, numerous educational opportunities exist. Many universities offer degrees related to agriculture and plant sciences, though perhaps not specific to marijuana.

[2] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 7.

Additionally, many organizations now offer classes online or in a format that does not necessarily lead to a degree. Some examples include:

Cannabis Training University

The Cannabis Training University (CTU) offers three online programs, two of which are relevant to this sunrise review. At a cost of $149,[3] the **Marijuana Growing & Cooking Program** includes 12 months of online access and covers:[4]

- How to Grow Marijuana (62 minutes of video instruction),
- Hydroponic Equipment Set Up & Use (60 minutes of video instruction), and
- Marijuana Cooking & Extractions (68 minutes of video instruction).

At a cost of $199,[5] the **Marijuana Master Certificate Program** includes a 250-question certification examination and 12 months of online access covering:[6]

- How to Grow Marijuana (62 minutes of video instruction),
- Hydroponic Equipment Set Up & Use (60 minutes of video instruction),
- Marijuana Cooking & Extractions (68 minutes of video instruction),
- Marijuana Law (112 minutes of video instruction),
- How To Open & Manage a Medical Marijuana Dispensary (46 minutes of video instruction),
- How To Be a Budtender in a Medical Marijuana Dispensary (33 minutes of video instruction), and
- Marijuana as Medicine (60 minutes of video instruction).

Additionally, CTU makes available to its students downloadable digital e-books, including:

- *How to Grow Marijuana: The Easiest Step By Step Guide Ever Made;*
- *How to Grow Pounds Per Plant! No More Ounces!;*
- *Happy Healthy Plants Pests, Diseases & Nutrient Disorders Guide;*
- *Top 10 Tips for Growing Medical Grade Marijuana;*
- *Top 10 Common Mistakes Made by Growers;*
- *How to Breed Cannabis;*
- *40 Must Haves for Indoor Cannabis Growing;* and
- *How to Clone Cannabis.*

[3] Cannabis Training University School Catalog Volume 1-2015, p. 16.
[4] Cannabis Training University School Catalog Volume 1-2015, pp. 6-8.
[5] Cannabis Training University School Catalog Volume 1-2015, p. 16.
[6] Cannabis Training University School Catalog Volume 1-2015, pp. 11-14.

Cloverleaf University

Cloverleaf University (CLU) offers several cannabis-related courses, two of which are particularly relevant to this sunrise review.

At a cost of $399, CLU offers the four-hour **Responsible Cultivator Certification**, which addresses the following broad subjects:

- Cultivator law compliance;
- Designing and operating a safe grow environment;
- Safe handling of product from harvest to packaging; and
- Problem control: pests and more.

By January 2017, CLU plans to offer an 18-hour **Cultivation Worker Training Program**, at a cost of $1,800, which will cover subjects such as:

- Department of Agriculture pesticide application training,
- Microbial and pest management training,
- Unlawful acts,
- State and local rules, and
- Applicable safety guidelines.

CLU is the only cannabis-related educational institution in the state approved and regulated by the Colorado Department of Higher Education's Division of Private Occupational Schools.

GreenCulturED

GreenCulturED offers several online courses, programs and certifications relevant to this sunrise review:[7]

- **Greenhouse Grower Certification** - $347 covers 24 course videos consisting of over seven hours of instruction in harvesting marijuana; greenhouses and outdoor frames; electricity; soil and containers; water and nutrients; and pests, fungi and diseases.[8]
- **Indoor Hydroponic Grower Certification** - $447 covers 31 course videos consisting of almost 10 hours of instruction in harvesting marijuana; grow rooms; light, lamps and electricity; water and nutrients; hydroponic gardening; marijuana air; and pests, fungi and diseases.[9]

[7] GreenCulturED. *Certifications*. Retrieved on August 11, 2016, from www.greencultured.co/product-category/online-cannabis-college-certifications.
[8] GreenCultureED. *Greenhouse Grower Certification*. Retrieved on August 11, 2016, from www.greencultured.co/shop/greenhouse-grower-certification/.
[9] GreenCulturED. *Indoor Hydroponic Grower Certification*. Retrieved on August 11, 2016, from www.greencultured.co/shop/indoor-hydroponic-marijuana-grower-certification/.

- **Indoor Soil Grower Certification** - $447 covers 34 course videos consisting of almost 11 hours of instruction in grow rooms; light, lamps and electricity; soil and containers; water and nutrients; marijuana air; and pests, fungi and diseases.[10]
- **Master Grower Certification** - $597 covers 41 course videos consisting of over 13 hours of instruction in harvesting marijuana; grow rooms and greenhouses; outdoors; lights, lamps and electricity; soil and containers; water and nutrients; hydroponic gardening; marijuana air; pests, fungi and diseases; hash and medicine; and breeding marijuana.[11]
- **Master Indoor Grower Certification** - $497 covers 34 course videos consisting of almost 11 hours of instruction in harvesting marijuana; grow rooms; lights, lamps and electricity; soil and containers; water and nutrients; hydroponic gardening; marijuana air; and pests, fungi and diseases.[12]
- **Outdoor Grower Certification** - $397 covers 27 course videos consisting of almost eight hours of video instruction in growing outdoors; electricity; soil and containers; water and nutrients; and pests, fungi and diseases.[13]

In addition, all of the aforementioned courses include instruction in:

- Garden safety and security,
- Calendar and checklist,
- Marijuana horticulture,
- Seeds and seedlings,
- Vegetative growth, and
- Flowering marijuana.

All certifications include supplemental videos, ebooks and assessments.

Hydroponic Society of America

The Applicant offers numerous cannabis-related courses, three of which are relevant to this sunrise review. The courses are of varying lengths and costs:

- **Home/Hobby Crash Course** - $240 includes 4 hours of in-person instruction.
- **Home/Hobby Course** - $450 includes 8 hours of in-person instruction.

[10] GreenCulturED. *Indoor Soil Grower Certification*. Retrieved on August 11, 2016, from www.greencultured.co/shop/indoor-soil-grower-certification/.
[11] GreenCulturED. *Master Grower Certification.* Retrieved on August 11, 2016, from www.greencultured.co/shop/master-grower-certification/.
[12] GreenCulturED. *Master Indoor Grower Certification*. Retrieved on August 11, 2016, from www.greencultured.co/shop/master-marijuana-growing-indoors/.
[13] GreenCulturED. *Outdoor Grower Certification.* Retrieved on August 11, 2016, from www.greencultured.co/shop/outdoor-grower-marijuana-certification/.

- **Small Commercial Course** - $780 includes 12 hours of in-person instruction.
- **Large Commercial Course** - $1,240 includes 16 hours of in-person instruction.
- **Advanced Growing Sciences Course** - $2,020 includes 20 hours of in-person instruction.

The Home/Hobby Crash Course and the Home/Hobby Course are offered on a sliding scale payment option for eligible students.

Some pertinent course subjects include:

- Cannabis grower mythology versus science;
- Plant sciences;
- Plant lighting;
- Hydroponic systems;
- Water and water maintenance;
- Nutrients and nutrient maintenance;
- Environmental control and control systems;
- Stages of plant growth: vegetative, flowering;
- Plant propogation;
- Harvesting/curing;
- Plant disease: prevention, identification and management;
- Pests: prevention, identification and management; and
- Risk management.

All course costs and descriptions pertain to the Applicant's current offerings in California.

The Grow School

The Grow School offers two primary courses, in live online and self-paced on-demand formats:[14]

- **GROW-101** ($99 for self-paced format) is a six-hour course covering proper grow equipment selection; correct grow room setup and safety; electrical theory and safety requirements; ventilation options and solutions; odor mitigation and elimination; soil mixing; simple and effective grow room environment modifications; cannabis grow theory; determining a cannabis plant's sex; watering, fertilizing and problem solving; using organics for control and prevention of bugs, mold and mildew; cannabis reproduction by cloning; and trimming, harvesting and curing cannabis.

[14] The Grow School. Self-Paced Classes. Retrieved on August 11, 2016, from www.thegrowschool.org/self-paced-grow-classes/.

- **GROW-101-E** ($149 for self-paced format) is a 12-hour course covering electrical theory and safety; lighting theory; lighting equipment options and proper lighting selection; grow room ventilation theory and techniques; grow room air circulation theory and techniques; proper grow equipment selection; proper grow room setup; soil mixing; indoor cannabis growing 101-from seedling/clone to harvest; determining a plant's sex; pruning methods for a larger harvest; trellising cannabis plants; harvesting and trimming; drying and curing cannabis; advanced problem solving techniques and using organics; simple cloning in water; advanced cloning techniques; seed-making and reproduction techniques; introduction to genetics and selective breeding techniques; advanced grow techniques; introduction to hash-making using the water/ice extraction method; introduction to the butane extraction method and its safety precautions; and making cannabis oil.

This list of schools and course offerings is not exhaustive of what is available. Further, no qualitative analysis of any of these schools was performed as part of this sunrise review. These summaries are included here simply to provide a broad overview of the types of educational programs available today.

To ascertain the extent to which individuals involved in marijuana cultivation have acquired any training, the Colorado Office of Policy, Research and Regulatory Reform conducted three distinct surveys as part of this sunrise review. Although response rates were low, they provide some useful insights:

Survey of Licensed Marijuana Cultivation Facilities.

The majority of facilities that responded (65.1 percent) require employees involved in cultivation to have relevant experience or training at the time of hire and 96.8 percent of respondents indicated that they provide such employees with on-the-job training and 47.5 percent indicated that they provide, or contract with a vendor to provide classroom, online or other structured training in marijuana cultivation. Approximately one-third (33.9 percent) of that training consists of more than 20 hours. Finally, 68.3 percent of respondents indicated that more than 25 percent of their workforce is directly involved in the cultivation of marijuana. Survey results may be found in Appendix C.

Survey of Occupational Licensees.

The majority (62.4 percent) of occupational licensees who responded to the survey and who are involved in the cultivation of marijuana indicated that they had not received any classroom, online or structured training in the cultivation of marijuana. Only 35.6 percent of respondents indicated that they received their training from their employer. Most respondents (55.4 percent) indicated having less than five years of experience when they began cultivating marijuana at a licensed cultivation facility, 10.8 percent indicated having completed an online or other private training course, 26.4 percent indicated possession of a bachelor's or master's degree and 9.7 percent indicated possession of a bachelor's or master's degree in plant science, agriculture or other similar area. Survey results may be found in Appendix B.

Survey of Medical Marijuana Caregivers.

Almost half of those caregivers responding to the survey (42.9 percent) indicated having received some classroom, online or structured training in the cultivation of marijuana, while 42.9 percent indicated having had less than five years' of experience growing marijuana in any setting prior to cultivating marijuana for patients. Finally, 42.9 percent of respondents indicated possession of a bachelor's degree, but none indicated the possession of any degree in plant science, agriculture or similar area. Survey results may be found in Appendix A.

Although the results of these surveys do not provide any definitive data, they indicate that at least some of the individuals who cultivate marijuana in Colorado today have received some level of structured or on-the-job training.

Proposal for Regulation

The Hydroponic Society of America (Applicant) has submitted a sunrise application to the Department of Regulatory Agencies, Colorado Office of Policy, Research and Regulatory Reform (COPRRR) for review in accordance with the provisions of section 24-34-104.1, Colorado Revised Statutes (C.R.S.). The application identifies state licensure and/or certification of cannabis growers as the appropriate level of regulation to protect the public, though licensure is preferred.

The Applicant defines cannabis growers as:[15]

> Those persons who are responsible for the growing of cannabis plants from seed planting or propagation to the final stages of flowering and harvesting. The growers are not responsible for the packaging or processing of cannabis, just the growing process.

In discussions between the Applicant and COPRRR staff, this definition was clarified to include those who grow cannabis that will be consumed by someone else. While this would include those individuals involved in cannabis cultivation at Marijuana Enforcement Division (MED)-licensed cultivation facilities, it would also include those individuals considered assistants under Amendment 64 to the state's constitution, as well as medical marijuana caregivers who cultivate marijuana for their patients.

Importantly, the Applicant's proposal would not apply to medical marijuana patients growing for themselves or to individuals growing their own marijuana under Amendment 64. Indeed, such individuals are not engaged in an occupation. Therefore, occupational regulation of these individuals is not part of this analysis.

The Applicant maintains that licensure or certification will:[16]

- Provide a level of accountability to growers,
- Enable growers to demonstrate commitment to their profession,
- Build leadership and management skills,
- Enable growers to demonstrate that they are capable of increased levels of authority and responsibility,
- Provide more qualified growers,
- Expand the career options for growers, and
- Enable growers to earn higher pay.

[15] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 4.
[16] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 11.

The sunrise application places consistent emphasis on the need for education. Several references are made to education regarding scientific disciplines:

> Without proper understandings of the scientific disciplines that make up controlled environment agriculture, the growers' failure is inevitable.[17]

# # # # #

> The [Applicant] would prefer to see mandatory licensure for the growers of cannabis, because a greater education is necessary to understand all of the scientific disciplines. These sciences [cannot] all be learned quickly.[18]

In discussions between the Applicant and COPRRR staff, these scientific disciplines, as well as minimum competencies, were further clarified to include:

- Agriculture and the study of crop production;
- Biochemistry and the study of chemical reactions in living things;
- Botany and the study of plants;
- Genetics and the understanding of genes and heredity;
- Environmental Science, including soil science (growing media) and atmospheric science;
- Mathematics and the use of dilution charts for additives, conversion charts for light and air-handling calculations;
- Meters and the use of sensors and calibrating equipment;
- Photo-biology and the study of light and living things;
- Nursery Management and the differences between large- and small-scale cultivation operations;
- Plant Nutrition and the study of how plants use nutrients;
- Phytopathology and the study of plant diseases; and
- Computer Science and the importance of data-logging and systems monitoring.

Although the Applicant currently offers several courses in California (as described in *Profile of the Profession*), they do not necessarily reflect what it would offer in Colorado if regulation were imposed.

Finally, the Applicant requests the imposition of mandatory continuing education once an individual is certified or licensed.[19]

[17] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 11.
[18] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 12.
[19] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 12.

Summary of Current Regulation

Federal Law

The federal Controlled Substances Act classifies marijuana and the cannabinoid tetrahydrocannabinol (THC) in Schedule I,[20] which means that they have a high potential for abuse, they have no currently accepted medical use in treatment in the United States, and there is a lack of accepted safety for use of them under medical supervision.[21] As such, both substances are illegal under federal law.

It is not surprising, therefore, that there are no federal regulations regarding the cultivation of marijuana. Similarly, there are no federal regulations specific to the use of pesticides on marijuana.

The Colorado Regulatory Environment

Colorado's current regulation of cannabis growers can be divided into three general segments:

- Employees of marijuana cultivation facilities licensed by the Marijuana Enforcement Division (MED),
- Medical marijuana caregivers who cultivate marijuana for their patients, and
- Assistants under Amendment 64 to the state's constitution.

MED issues licenses under both the Colorado Medical Marijuana Code (Medical Code) and the Colorado Retail Marijuana Code (Retail Code). Although both codes regulate many aspects of the commercial marijuana industry, pertinent to the discussion surrounding cannabis growers are the licenses pertaining to cultivation facilities and the individuals who work in them.

The two codes define cultivation facilities in slightly different ways. For the purposes of this sunrise review the term "cultivation facility" is used to refer to retail marijuana cultivation facilities and medical marijuana optional premises cultivation operations.

Under the Retail Code, a retail marijuana cultivation facility is,

> an entity licensed to cultivate, prepare and package marijuana and to sell marijuana to retail marijuana stores, to marijuana manufacturing facilities and to other cultivation facilities, but not to consumers.[22]

Under the Medical Code, an optional premises cultivation operation is one where a licensee grows or cultivates medical marijuana.[23]

[20] 21 U.S.C. §§ 812(c)(c)(10 and 17).
[21] 21 U.S.C. § 812(b)(1).
[22] Colo. Const. Art. 18, § 16(2)(h) and § 12-43.4-103(16), C.R.S.

Additionally, the State Licensing Authority, defined as the Executive Director of the Department of Revenue,[24] is authorized to issue occupational licenses to owners, managers and employees employed by, working in or having access to restricted areas of licensed cultivation facilities.[25] Such an individual must be a resident of Colorado,[26] and must:[27]

- Not have a criminal history indicating that he or she is not of good moral character;
- Be at least 21 years old;
- Not have had discharged, within the previous five years, a felony conviction;
- Not have had discharged, within the previous 10 years (or five years from May 28, 2013, whichever is longer), a felony conviction related to controlled substances other than marijuana; or
- Not be a sheriff, deputy sheriff, police officer, prosecuting officer or an officer or employee of the State Licensing Authority or any local licensing authority.

Finally, pesticides, mites, mold and mildew in marijuana grown in licensed cultivation facilities are addressed in a number of ways. First, the Medical Code and the Retail Code authorize the State Licensing Authority to test marijuana for,

> microbial and residual solvents and chemical and biological contaminants deemed to be public health hazards by the Colorado Department of Public Health and Environment . . .[28]

Should test results indicate the presence of quantities of any substance determined to be injurious to health, the licensee is required to quarantine the product and notify the State Licensing Authority.[29]

Further, licensees must comply with Colorado's Pesticide Act and Pesticide Applicators's Act,[30] as well as all applicable federal, state and local laws, and they must establish written standard operating procedures that include when and the manner in which all pesticides and other agricultural chemicals will be applied during the cultivation process.[31] Indeed, these provisions apply to anyone growing cannabis, not just those growing in licensed facilities.

[23] §§ 12-43.3-104(12) and 12-43.3-403(1), C.R.S.
[24] §§ 12-43.3-201(1) and 12-43.4-103(24), C.R.S.
[25] §§ 12-43.3-401(1)(d) and 12-43.4-401(1)(e), C.R.S.
[26] §§ 12-43.3-310(6) and 12-43.4-309(5), C.R.S.
[27] §§ 12-43.3-307(1) and 12-43.4-306(1), C.R.S.
[28] §§ 12-43.3-202(2.5)(a)(I)(B) and 12-43.4-202(3)(a)(IV)(B) C.R.S.
[29] §§ 12-43.3-202(2.5)(a)(I)(C) and 12-43.4-202(3)(a)(IV)(C), C.R.S.
[30] 1 CCR § 212-1, Rule M504(D). Sales, Manufacturing, and Dispensing of Medical Marijuana. 1 CCR § 212-2, Rule R504(C). Retail Marijuana Code.
[31] 1 CCR § 212-1, Rule M504(E). Sales, Manufacturing, and Dispensing of Medical Marijuana. 1 CCR § 212-2, Rule R504(E)(1). Retail Marijuana Code.

The State Licensing Authority has also promulgated a list of prohibited chemicals[32] and the Colorado Department of Agriculture has developed a list of pesticides that can be used on marijuana.[33]

A medical marijuana caregiver, or primary caregiver, is,

> a natural person, other than the patient or the patient's physician, who is 18 years of age or older and has significant responsibility for managing the wellbeing of a patient who has a debilitating medical condition . . .[34]

Among the allowable functions of a caregiver is cultivating marijuana for a patient.[35] A medical marijuana patient is generally limited to six plants but may grow more if the patient's physician recommends an extended plant count. As a result, a caregiver, in general, may grow all of the plants to which the patient is entitled,[36] but effective January 1, 2017, a caregiver may grow no more than a total of 99 plants.[37]

Also effective January 1, 2017, caregivers are prohibited from joining together for the purpose of cultivating marijuana[38] and any caregiver who grows marijuana for a patient must register the location of the cultivation with the State Licensing Authority.[39] Failure to register can result in law enforcement reporting the caregiver to the State Licensing Authority and subjects the caregiver to possible criminal charges.[40]

No similar provisions apply to individual medical marijuana patients growing for their own use.

Finally, under the terms of Amendment 64, it is not unlawful to assist another person who is at least 21 years old in growing no more than six marijuana plants, provided the growing takes place in an enclosed, locked space, is not conducted openly or publicly, and the marijuana is not made available for sale.[41]

In addition to these state statutory and constitutional provisions, many of the state's local governments have passed their own laws on similar topics.

Thus, while marijuana is tightly regulated in terms of where it can be grown and who can grow it when it will be consumed by others, it is relatively unregulated in terms of how it is cultivated.

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[32] 1 CCR § 212-1, Rule M504(F). Sales, Manufacturing, and Dispensing of Medical Marijuana. 1 CCR § 212-2, Rule R504(F). Retail Marijuana Code.
[33] Colorado Department of Agriculture. *Pesticide Use in Cannabis Production Information.* Retrieved on August 17, 2016, from www.colorado.gov/pacific/agplants/pesticie-use-cannabis-production-information.
[34] § 25-1.5-106(2)(d.5), C.R.S.
[35] § 25-1.5-106(2)(d.5)(IV), C.R.S.
[36] Colo. Const. Art. 18, § 14(4).
[37] § 25-1.5-106(8.6)(b), C.R.S.
[38] § 25-1.5-106(7)(b), C.R.S.
[39] §§ 25-1.5-106(7)(e)(I)(A and B), C.R.S.
[40] § 25-1.5-106(7)(e)(I)(E), C.R.S.
[41] Colo. Const. Art. 18, §§16(3)(b and e).

Regulation in Other States

While an increasing number of states have legalized medical marijuana, and a few have legalized recreational marijuana, the regulatory environment remains fluid. Many states regulate cultivation operations, just as Colorado does under the Medical Code and Retail Code. However, COPRRR researched the laws of a sampling of states and found none that regulate the occupation of cannabis growers as the Applicant proposes.

Analysis and Recommendations

Public Harm

The first sunrise criterion asks:

> Whether the unregulated practice of the occupation or profession clearly harms or endangers the health, safety or welfare of the public, and whether the potential for harm is easily recognizable and not remote or dependent on tenuous argument.

Given the importance of harm to the sunrise analysis, it is necessary to determine what constitutes harm in any given context. In the case of the growing of cannabis, several possibilities exist:

- Physical harm to individual consumers from poorly grown cannabis;
- Physical harm in the form of fires resulting from overloaded electrical systems;
- Societal harm from increased energy usage;
- Societal harm from the use of carbon dioxide, thereby increasing the carbon footprint of a cultivation operation;
- Societal harm from the discharge of pollutants, such as nutrients and pesticides, into the wastewater stream; and
- Societal harm resulting from illegal cultivation operations.

Worth repeating, however, this report is focused exclusively on the proposed regulation of cannabis growing as a professional occupation. Hence, while some of the areas of potential harm identified above may in fact necessitate further state and/or local laws to remedy, such issues are outside the scope of this report to the extent they do not implicate occupational regulation of commercial cannabis growers.

To determine the existence and extent of harm in Colorado resulting from cannabis growers, the Colorado Office of Policy, Research and Regulatory Reform (COPRRR) solicited input from a wide array of sources, including:

- Colorado Department of Revenue, Marijuana Enforcement Division (MED);
- Firefighters;
- Hydroponic Society of America (Applicant);
- Individual stakeholders;
- Law enforcement;
- Survey participants; and
- Utilities.

The pages that follow contain assertions of harm along with COPRRR analysis.

Physical harm to individual consumers from poorly grown cannabis.

The Applicant asserts that exposure to pesticides, excessive amounts of plant fertilizers, excessive amounts of plant hormones or molds represent threats of physical harm when marijuana is handled, ingested or combusted and inhaled. Worth noting, however, the Applicant acknowledges,

> The long-term effects of smoking molds, excessive fertilizers and other plant growth products are not known because the appropriate studies have never been done.[42]

Nonetheless, to support this assertion, the Applicant points to multiple media reports regarding the discovery of illegal pesticides being used on marijuana, marijuana product recalls and the Governor's issuance of an executive order pertaining to pesticides.

On November 12, 2015, the Governor issued Executive Order D2015-015 (Executive Order), finding that,

> When a pesticide is applied to a crop in a manner that is inconsistent with the pesticide's label (an "Off-Label Pesticide"), and the crop is contaminated by that pesticide, it constitutes a threat to the public safety.

The Executive Order directs MED, the Colorado Department of Public Health and Environment (CDPHE) and the Colorado Department of Agriculture (CDA) to utilize all investigatory and enforcement authority to protect against these public safety threats.

Finally, the Executive Order arguably applies to all marijuana, by stating:

> [CDPHE] shall hereby deem all marijuana contaminated by an Off-Label Pesticide a risk to public health, and the [MED] is authorized to find such contaminated marijuana a threat to public safety.

In implementing the Executive Order, between February and May 2016, MED, in cooperation with CDA and CDPHE, issued no fewer than 27 Public Health and Safety Advisories due to the identification of "potentially unsafe pesticide residues" on marijuana. These advisories typically contained language stating that the state agencies,

> deem it a threat to public health and safety when pesticides that are not on the list of approved pesticides . . . are applied in a manner inconsistent with the pesticide's label.

[42] Hydroponic Society of America, *Sunrise Application: Cannabis Grower Education*, December 1, 2015, p. 17.

These advisories amount to recalls of affected product, since no licensee is allowed to sell marijuana that contains unapproved pesticides.

As part of this sunrise review, COPRRR staff conducted three distinct surveys: one of licensed cultivation facilities; one of individuals possessing MED-issued occupational licenses; and one distributed to CDPHE's network of caregivers, patients and physicians. Each survey asked whether the respondent had direct and personal knowledge of anyone who has become ill, died from or has otherwise been harmed from consuming poorly grown marijuana:

- 14.3 percent of respondents to the caregiver survey responded "yes."
- 7.9 percent of respondents to the occupational licensee survey responded "yes."
- 3.2 percent of respondents to the facility survey responded "yes."

Many, though certainly not all, of the comments in the above surveys acknowledged that it is difficult to definitively attribute the negative reaction to the consumption of the marijuana. For example, a medical marijuana patient's condition might have deteriorated in conjunction with consuming the marijuana.

Regardless, however, when discussing pesticides, it must be remembered that the state has taken steps to address their use, including the Executive Order and the Public Health and Safety Advisories.

Additionally, the MED is in the process of implementing a testing regime for marijuana grown in licensed facilities. Thus, there will be an increasingly stringent safeguard for such marijuana. Admittedly, unlicensed cultivators are not able to participate in the MED's testing regime. So these safeguards, such as they are, are not available to caregivers or assistants under Amendment 64.

Finally, pesticides are legally applied to a wide variety of agricultural products, yet COPRRR was unable to identify a single crop for which an occupational license is required in order to grow.

Physical harm in the form of fires resulting from overloaded electrical systems.

Electrical fires associated with marijuana cultivation tend to be concentrated more on residential-based growing operations. The average home in Colorado is wired to accommodate 200 amps. While many of the lights used in marijuana grow rooms have become increasingly energy efficient, problems can arise from running too many lights on a single circuit, operating fans and other heating, ventilation and air conditioning (HVAC) equipment on the same service, as well as the normal electrical load of the household.

Problems can also arise from using extension cords that are not rated high enough to accommodate the electrical demand placed on the cord.

Fire officials contacted for this sunrise review reported the following as examples of the fire dangers associated with inadequate electrical infrastructure:

> Nederland (2009) – An electrical fire started in the grow light section of a home. The fire burned through a gas line, causing an explosion.
>
> Boulder Heights (2013) – An electrical fire started because the residents strung together between 80 and 100 extension cords to power marijuana grow lights. The over-loaded extension cords caused the fire.

While these are only two examples, they highlight a concern that is raised on a fairly consistent basis—residential marijuana growers place too much electrical demand on the infrastructure available to them. What is unknown is whether the individuals involved knew they were creating fire hazards and disregarded that risk, or whether they were ignorant of the risks they created.

If their actions were intentional, then it is difficult to see how occupational regulation, in the form of mandated education, could mitigate these types of events.

However, even if their actions were unintentional, one can reasonably assume that at least some (if not most) of these individuals were growing marijuana for their own use, meaning occupational regulation as the Applicant proposes would not apply to them.

Further, even if that were not the case, it is reasonable to question whether this type of harm is attributable to the competency of the individual grower—which occupational regulation may help to mitigate—or to the physical cultivation itself—which occupational regulation is unlikely to mitigate.

<u>Societal harm from increased energy usage.</u>

The Applicant asserts that consumers are harmed by cannabis growers through their excessive energy use, which increases stress on the electrical grid, burdening the utility and eventually causing electrical rates to rise due to higher cost of operations. Presumably, properly trained cannabis growers would use less energy.

Few would argue that indoor commercial cultivation operations use a considerable amount of energy to run their lighting and environmental control systems. Such operations run high wattage lights on 24-hour cycles to stimulate and control plant growth. Similarly, they must maintain constant and ideal humidity and temperature levels. All of these endeavors consume energy.

To determine the extent of this energy usage, COPRRR staff contacted the state's two largest electrical utilities, as well as an association representing rural electrical cooperatives. While all acknowledged that commercial-scale cultivation operations represent an increase in demand, it is difficult to characterize that increase as particularly different from any other economic development effort or mid-size user. Grocery stores, too, use a lot of energy to maintain their freezers, refrigerators and lighting systems.

This matter is further complicated when discussing energy usage on a smaller, residential scale. This is, presumably, where many caregivers and Amendment 64 assistants would be cultivating their marijuana. Because they are so scattered, it is impossible to determine whether and the extent to which they have a significant impact on the state's overall energy consumption.

Additionally, if individuals grow marijuana for their own use, occupational regulation would not apply.

Therefore, it is difficult to conclude that unregulated cannabis growers have a significant impact on the state's energy consumption or that their usage is resulting in an increase in electricity rates.

Societal harm from the use of carbon dioxide, thereby increasing the carbon footprint of a cultivation operation.

The Applicant asserts that some cannabis growers charge their grow rooms with 1,200 to 1,500 parts per million of the greenhouse gas carbon dioxide, which is three to five times the normal atmospheric level. Several times each day, the Applicant alleges, these growers pump this carbon dioxide-laden air into the outside atmosphere and then recharge the room. This, they believe, will help their plants.

While this may be a common practice, its impact on the overall atmosphere is impossible to calculate. Therefore, it is not clear that this practice harms consumers or that occupational regulation would have any meaningful impact.

Societal harm from the discharge of pollutants, such as nutrients and pesticides, into the wastewater stream.

The Applicant asserts that one way in which cannabis growers can cause harm is by flushing fertilizers, and presumably pesticides, down the drain and into wastewater systems where it could cause algae blooms at water treatment plants and/or contaminated water tables.

To ascertain whether any algae blooms have been detected at the state's water treatment plants, COPRRR staff contacted the state's largest wastewater reclamation district. No algae blooms have been detected and no elevated levels of nutrients or pesticides have been detected, although national discussions on these topics are just beginning.

Additionally, one smaller wastewater treatment plant in the state reported having detected elevated nutrient levels that were originally attributed to a commercial cultivation facility. Further investigation revealed that the elevated nutrient levels were attributable to residential cultivations, and once residents were asked to pour their wastewater on their lawns, rather than down the drain, levels returned to normal. This would seem to bolster the Applicant's assertion, and the fact that levels returned to normal after the public was informed tends to support the idea that growers were unaware of the consequences of their actions. Some level of education could help to alleviate similar problems in the future.

Regardless, water, like electricity, is a cost input for a commercial cultivation. As such, it is in the grower's own economic interest to conserve and minimize waste.

Additionally, if individuals grow marijuana for their own use, occupational regulation would not apply.

As such, it is difficult, at this point, to conclude that the public is harmed by wastewater tainted with excessive amounts of pesticides or fertilizers or that occupational regulation would have any impact. Moreover, a simple public awareness campaign may help to mitigate any harm that might exist.

Societal harm resulting from illegal cultivation operations.

Many in law enforcement argue that Amendments 20 and 64 have made it difficult to identify illegal cultivations because both amendments have legalized the cultivation of marijuana under certain circumstances.

Complicating this is the fact that medical marijuana patients may receive recommendations for extended plant counts. This, in turn, can lead to larger residential cultivations that are operated by allegedly fraudulent medical marijuana patients.

However, the problem here lies in the patient's ability to obtain a recommendation for an extended plant count, not in that individual's ability to competently grow cannabis. Only the latter is the focus of this sunrise review, as the former is not a subject that can be remedied through occupational regulation. Indeed, the Applicant's proposal for occupational regulation would not apply to medical marijuana patients growing for themselves under Amendment 20, irrespective of whether they are violating either or both amendments.

Importantly, this report does not suggest that further regulation of the above areas is not necessary, but rather, is beyond the scope of an occupational regulation framework. Other state and/or local laws could be pursued (as detailed below), and by way of an example, effective January 1, 2017, caregivers will be prohibited from joining together to cultivate marijuana, each will be limited to growing no more than 99 plants and they will have to register their cultivations with MED. Additional consideration regarding similar types of activity-based regulatory requirements to address illegal cultivation of marijuana may very well be warranted, but again, are outside the scope of this report.

Need for Regulation

The second sunrise criterion asks:

> Whether the public needs and can reasonably be expected to benefit from an assurance of initial and continuing professional or occupational competence.

This criterion asks whether the harm identified during the course of the review can be attributed to a lack of competency and whether an assurance of competency can adequately address that harm.

In the case of cannabis growers, the answer is less than clear. If there are means by which marijuana can be grown without mold, mildew or pest infestations, then perhaps competency is an issue. If growers can learn to cultivate marijuana without these problems, then perhaps fewer—or no—pesticides would be necessary. Such practices could spare consumers the unknown risks associated with consuming or inhaling mold, mildew, pesticides and fertilizers.

However, the state has taken steps to address the issue of pesticides. Although, the testing regimes required of state-licensed cultivation facilities are not available to Amendment 64 assistants or caregivers, thereby denying them of this safeguard, the Executive Order and its reiteration of the applicability of the Pesticide Applicator's Act is applicable to all marijuana.

Further, assertions of criminal and intentional behavior are unlikely to be mitigated by any assurances of competency. Occupational regulation is an inherently weak response to intentional conduct. The threat of administrative action pales in comparison to the threat of criminal enforcement.

As a result, it is not possible to definitively conclude that the public will be protected by the assured competency of marijuana growers.

Alternatives to Regulation

The third sunrise criterion asks:

> Whether the public can be adequately protected by other means in a more cost-effective manner.

Given the broad scope of the discussion surrounding cannabis and cannabis growers, it is not surprising that a number of alternatives to the Applicant's proposal present themselves. Some examples include:

Ban pesticides in the cultivation of marijuana.

Throughout the course of this sunrise review, pesticides remained a primary focus—both in terms of their application and their use in general. Pesticides are, by their very nature, poisons. Therefore, it is only natural to deem them dangerous. Banning their use seems a natural conclusion.

However, the state has taken steps to address the issue of pesticide use on marijuana, and should continue to evaluate ways to adjust and/or strengthen such efforts as the various initiatives in progress continue to take effect.

Promote voluntary training.

The Colorado Medical Marijuana Code (Medical Code) provides for the creation of responsible vendor server and seller training programs for the retail and medical marijuana industries.[43] These training programs are voluntary, but having taken them can serve as mitigating factors for licensees that later violate either the Medical Code or the Colorado Retail Marijuana Code (Retail Code).

An alternative to requiring cannabis growers to obtain education, as the Applicant suggests, is to statutorily authorize the creation of responsible cultivator courses. While the current offerings are, understandably, tailored towards those individuals working in licensed facilities, the proposed offerings could be designed to address cultivators in a variety of settings.

A state-authorized (but not required) and state-approved training program may encourage more individuals to participate.

[43] § 12-43.3-1101, C.R.S.

However, numerous training programs, of various costs, duration, formats and, no doubt, quality exist today. State encouragement for cannabis growers to take them would likely have little impact in addressing the limited types of competency-based harm, and no impact in addressing the intentional criminal behaviors identified in this review.

Register all marijuana cultivations.

Finally, this sunrise review has, necessarily, focused on whether and to what extent the state should regulate the occupation of cannabis growers—sunrise is required to assess the need for occupational (i.e., individual) regulation. However, cannabis growers require a space—a field, a grow room or a warehouse—within which to cultivate their marijuana. It is therefore reasonable to explore the extent to which regulation of the space might present an alternative to regulating the individuals.

To be sure, licensed cultivation facilities under the Medical Code and the Retail Code are already regulated. As such, this discussion focuses primarily on caregivers who cultivate marijuana and Amendment 64 assistants. Worth noting, the cultivations of caregivers will have to be registered with MED effective January 1, 2017, and as of that date they will be limited to growing no more than 99 plants. Policy-makers and regulators might consider whether such registration requirements should be expanded further, perhaps to include Amendment 64 assistants, by way of an example.

Other alternatives to the Applicant's proposal likely exist. These are but examples of actions the state could take, should it deem some action necessary, but not necessarily the licensure of cannabis growers.

Collateral Consequences

The fourth sunrise criterion asks:

> Whether the imposition of any disqualifications on applicants for licensure, certification, relicensure, or recertification based on criminal history serves public safety or commercial or consumer protection interests.

The Applicant proposes no disqualifiers based on criminal history. While disqualifiers based on criminal history may be necessary in the context of alternative state and/or local laws concerning the activity of cannabis growing, it bears repeating that this report evaluates only whether occupational regulation is appropriate.

Conclusion

This sunrise review identified several types of harm caused, in general, by the growth of cannabis. While a few of these were relatively specific, such as overloaded electrical systems and nutrients entering the wastewater stream, most were more general in nature, such as the use of pesticides, increased electricity usage and increased carbon footprint.

Regardless, the primary question in any sunrise review is whether the ***occupation*** under review poses a clear threat to the public health, safety and welfare such that occupational regulation—in this case through the imposition of initial and continuing education requirements—would serve to mitigate that threat. This analysis necessitates a finding of specific instances in which the public has been harmed by the unregulated practice of the occupation under review. Such specifics are presently lacking.

Importantly, this report does not opine on whether further regulation concerning the growing of cannabis is needed—a much larger question that very well may be answered in the affirmative. Rather, this report analyzes whether cannabis growers should be regulated as a professional occupation. To that very point, COPRRR could identify no other crop that requires a state occupational license to grow. Though an educational requirement could assist cultivators in avoiding infestations or in dealing with them in a safe manner as it relates to pesticides, the state has already taken steps outside of occupational regulation to address those impacts.

Therefore, the General Assembly should not regulate cannabis growers.

Recommendation – Do not regulate cannabis growers.

Appendix A – Survey of Caregivers

In July 2016, the Colorado Office of Policy, Research, and Regulatory Reform conducted a survey of caregivers. Due to the confidential nature of the Medical Marijuana Registry, medical marijuana caregivers were notified of the survey by the Colorado Department of Public Health and Environment (CDPHE) by way of email, a link on the CDPHE website and various social media outlets frequently utilized by CDPHE to communicate with this population. As a result, it is not possible to determine an overall response rate because it is not possible to determine the number of individuals who viewed the links to the surveys. Regardless, only 20 responses were received.

1. For approximately how long have you been cultivating medical marijuana as a caregiver?

Less than five years	**3**	15%
5 to 10 years	**4**	20%
More than 10 years	**0**	0%
I do not cultivate medical marijuana as a caregiver	**13**	65%

2. For approximately how many medical marijuana patients do you grow medical marijuana?

Less than five	**3**	42.9%
5 to 10	**1**	14.3%
More than 10	**3**	42.9%

3. Approximately how many marijuana plants are you growing at any given time?

Less than 25	**2**	28.6%
25 to 50	**1**	14.3%
51 to 100	**2**	28.6%
More than 100	**2**	28.6%

4. Which of the following best describes your experience or training when you first began cultivating medical marijuana as a caregiver?

Less than five years' experience growing marijuana in any setting	**3**	42.9%
More than five years' experience growing marijuana in any setting	**3**	42.9%
Less than five years' experience growing marijuana at a commercial/licensed facility	**2**	28.6%
More than five years' experience growing marijuana at a commercial/licensed facility	**0**	0%
Completion of an online or other private training program	**0**	0%
Completion of a bachelor's degree in any major	**3**	42.9%

Completion of a bachelor's degree in plant science, agriculture or similar area	**0**	0%
Completion of a master's degree in any major	**0**	0%
Completion of a master's degree in plant science, agriculture or similar area	**0**	0%

5. Have you obtained any classroom, online or structured training in the cultivation of marijuana?

Yes	**3**	42.9%
No	**4**	57.1%

6. If you completed classroom, online or other structured training, which of the following subjects were covered in your training program?

Agriculture and the study of crop production	**0**	0%
Biochemistry and the study of chemical reactions on living organisms	**0**	0%
Botany and the study of plants	**2**	40%
Environmental science and the study of soil and atmospheric sciences	**2**	40%
Genetics and the study of genes and heredity	**0**	0%
Mathematics and, for example, the use of dilution charts for additives	**2**	40%
Metering and, for example, the use of sensors, calibration, maintenance, etc.	**1**	20%
Nursery management	**1**	20%
Photo-biology and the study of light and living organisms	**0**	0%
Plant nutrition and the study of how plants utilize nutrients	**2**	40%
Does not apply	**2**	40%
Other	**1**	20%

7. Do you have direct and personal knowledge of anyone who has become ill, died from or has otherwise been harmed from consuming poorly grown marijuana?

Yes	**1**	14.3%
No	**6**	85.7%

Appendix B – Survey of Occupational Licensees

In July 2016, the Colorado Office of Policy, Research, and Regulatory Reform conducted a survey of occupational licensees. Due to the confidential nature of licensee email addresses, the Marijuana Enforcement Division (MED) emailed a link to the survey to all 6,986 individuals holding MED-issued occupational licenses and 315 individuals responded. This represents an overall response rate of 4.5 percent. It should be noted that not all occupational licensees are engaged in cultivation activities, so the response rate as a percentage of such individuals may be higher, but is incalculable.

1. Do you currently work at a licensed medical or retail marijuana cultivation facility?

Yes	**218**	69.9%
No	**94**	30.1%

2. Does your work at a licensed medical or retail marijuana cultivation facility directly involve the cultivation of marijuana?

Yes	**188**	86.2%
No	**30**	13.8%

3. Which of the following Marijuana Enforcement Division-issued badges do you currently hold?

Associated Key	**10**	5.3%
Key	**86**	45.5%
Support	**93**	49.2%

4. For approximately how long have you been cultivating marijuana as an employee of a licensed marijuana grow facility?

Less than two years	**77**	40.7%
Three to five years	**83**	43.9%
More than 5 years	**29**	15.3%

5. Have you obtained any classroom, online or structured training in the cultivation of marijuana?

Yes	**71**	37.6%
No	**118**	62.4%

6. Was any of this training provided by your employer?

Yes	**67**	35.6%
No	**121**	64.4%

7. Which of the following best describes your level of experience or training when you first began cultivating marijuana at a licensed facility?

Less than five years' experience growing marijuana in any setting	**103**	55.4%
More than five years' experience growing marijuana in any setting	**70**	37.6%
Completion of an online or other private training program	**20**	10.8%
Completion of a bachelor's degree in any major	**39**	21%
Completion of a bachelor's degree in plant science, agriculture or similar area	**13**	7%
Completion of a master's degree in any major	**10**	5.4%
Completion of a master's degree in plant science, agriculture or similar area	**5**	2.7%

8. If you completed classroom, online or other structured training, which of the following subjects were covered in your training program?

Agriculture and the study of crop production	**42**	26.3%
Biochemistry and the study of chemical reactions on living organisms	**32**	20%
Botany and the study of plants	**43**	26.9%
Environmental science and the study of soil and atmospheric sciences	**38**	23.8%
Genetics and the study of genes and heredity	**37**	23.1%
Mathematics and, for example, the use of dilution charts for additives	**41**	25.6%
Metering and, for example, the use of sensors, calibration, maintenance, etc.	**33**	20.6%
Nursery management	**33**	20.6%
Pest management	**49**	30.6%
Photo-biology and the study of light and living organisms	**23**	14.4%
Phytopathology and the study of plant diseases	**26**	16.3%
Plant nutrition and the study of how plants utilize nutrients	**45**	28.1%
Does not apply	**77**	48.1%
Other	**17**	10.6%

9. For each of the following topics, please indicate your personal level of decision making authority/control:

Transferring clones into a growing medium

I have complete control	**83**	43.9%
I have input in the decision making process, but someone else makes the decision	**52**	27.5%
My employer or supervising employee has complete control	**54**	28.6%

Watering plants

I have complete control	**90**	47.9%
I have input in the decision making process, but someone else makes the decision	**49**	26.1%
My employer or supervising employee has complete control	**49**	26.1%

Applying fertilizer to plants

I have complete control	**74**	39.4%
I have input in the decision making process, but someone else makes the decision	**53**	28.2%
My employer or supervising employee has complete control	**61**	32.4%

Applying pesticides to plants

I have complete control	**71**	38.4%
I have input in the decision making process, but someone else makes the decision	**50**	27%
My employer or supervising employee has complete control	**64**	34.6%

Moving plants to various grow rooms

I have complete control	**79**	42.2%
I have input in the decision making process, but someone else makes the decision	**57**	30.5%
My employer or supervising employee has complete control	**51**	27.3%

Managing light cycles

I have complete control	**67**	35.6%
I have input in the decision making process, but someone else makes the decision	**51**	27.1%
My employer or supervising employee has complete control	**70**	37.2%

Managing ventilation, temperature, humidity, etcetera

I have complete control	**62**	33.2%
I have input in the decision making process, but someone else makes the decision	**64**	34.2%
My employer or supervising employee has complete control	**61**	32.6%

Trimming plants

I have complete control	**80**	42.6%
I have input in the decision making process, but someone else makes the decision	**67**	35.6%
My employer or supervising employee has complete control	**41**	21.8%

Harvesting plants

I have complete control	**65**	34.4%
I have input in the decision making process, but someone else makes the decision	**78**	41.3%
My employer or supervising employee has complete control	**46**	24.3%

10. Do you have direct and personal knowledge of anyone who has become ill, died from or has otherwise been harmed from consuming poorly grown marijuana?

Yes	**15**	7.9%
No	**174**	92.1%

Appendix C – Survey of Licensed Marijuana Cultivation Facilities

In July 2016, the Colorado Office of Policy, Research, and Regulatory Reform conducted a survey of licensed marijuana cultivation facilities. Due to the confidential nature of licensee email addresses, the Marijuana Enforcement Division (MED) emailed a link to the survey to all 1,359 marijuana cultivation facility licensees and 63 facilities responded. This represents a response rate of 4.6 percent. Since a single entity may hold multiple licensees, the response rate as a percentage of all facilities may be higher. Although the survey instrument attempted to account for this variable, the inconsistency of responses rendered that attempt moot.

1. For each of the facilities described below, please indicate the number of each for which you are responding to this survey.

Tier 1 Retail Marijuana Cultivation Facility: 1,800 or fewer plants	**36**	57.1%
Tier 2 Retail Marijuana Cultivation Facility: 1,801 to 3,600 plants	**12**	19.0%
Tier 3 Retail Marijuana Cultivation Facility: 3,601 to 6,000 plants	**6**	9.5%
Tier 4 Retail Marijuana Cultivation Facility: 6,001 to 10,200 plants	**0**	0.0%
Tier 5 Retail Marijuana Cultivation Facility: 10,201 to 13,800 plants	**1**	1.6%
Tier 5+ Retail Marijuana Cultivation Facility: more than 13,800 plants	**0**	0.0%
Type 1 Medical Marijuana Optional Premises Cultivation: up to 300 patients	**26**	41.3%
Type 2 Medical Marijuana Optional Premises Cultivation: 301 to 500 patients	**5**	7.9%
Type 3 Medical Marijuana Optional Premises Cultivation: 501 or more patients	**2**	3.2%

2. Approximately what percentage of your MED-badged workforce is directly involved in marijuana cultivation[44]?

Less than 5%	**2**	3%
5% to 9%	**6**	10%
10% to 25%	**12**	19%
26% to 50%	**17**	27%
More than 50%	**26**	41%

[44] For purposes of this survey, "cultivation" includes, but may not be limited to, transferring clones into a growing medium, tending plants, watering plants, fertilizing plants, applying pesticides to plants, moving plants to various grow rooms, managing light cycles, managing HVAC, trimming plants and harvesting plants.

3. Do you require those employees involved in cultivation to have relevant experience or training at the time of hire?

Yes	**41**	65.1%
No	**22**	34.9%

4. If you require those employees involved in cultivation to possess relevant experience or training at the time of hire, which of the following best describes your requirements? (check all that apply)

Less than 5 years' experience growing marijuana in any setting	**22**	34.9%
More than 5 years' experience growing marijuana in any setting	**11**	17.5%
Less than 5 years' experience growing marijuana at a commercial facility	**18**	28.6%
More than 5 years' experience growing marijuana at a commercial facility	**7**	11.1%
Completion of an online or other private training program	**10**	15.9%
Completion of a bachelor's degree in any major	**6**	9.5%
Completion of a bachelor's degree in plant science, agriculture or similar area	**8**	12.7%
Completion of a master's degree in any major	**1**	1.6%
Completion of a master's degree in plant science, agriculture or similar area	**1**	1.6%
We do not require any previous training or experience	**18**	28.6%

5. Do you provide those employees involved in cultivation with on-the-job training?

Yes	**61**	96.8%
No	**2**	3.2%

6. Do you provide, or contract with a vendor to provide, those employees involved in cultivation with classroom, online or other structured training?

Yes	**29**	46.0%
No	**32**	50.8%
No response	**2**	3.2%

7. If you provide, or contract with a vendor to provide, classroom, online or other structured training, which of the following best describes this training?

Less than 5 hours of training directly related to cultivation	**9**	14.3%
5 to 10 hours of training directly related to cultivation	**8**	12.7%
11 to 15 hours of training directly related to cultivation	**1**	1.6%
16 to 20 hours of training directly related to cultivation	**5**	7.9%

More than 20 hours of training directly related to cultivation	**20**	31.7%
No training is provided	**16**	25.4%
No response	**4**	6.3%

8. If you provide, or contract with a vendor to provide, classroom, online or other structured training, which of the following subjects are covered in this training?

Agriculture and the study of crop production	**25**	39.7%
Biochemistry and the study of chemical reactions on living organisms	**11**	17.5%
Botany and the study of plants	**23**	36.5%
Environmental science and the study of soil and atmospheric sciences	**20**	31.7%
Genetics and the study of genes and heredity	**17**	27.0%
Mathematics and, for example, the use of dilution charts for additives	**20**	31.7%
Metering and, for example, the use of sensors, calibration, maintenance, etc.	**27**	42.9%
Nursery management	**28**	44.4%
Pest management	**37**	58.7%
Photo-biology and the study of light and living organisms	**14**	22.2%
Phytopathology and the study of plant diseases	**19**	30.2%
Plant nutrition and the study of how plants utilize nutrients	**34**	54.0%
Other	**5**	7.9%

9. Do you have direct and personal knowledge of anyone who has become ill, died from or has otherwise been harmed from consuming poorly grown marijuana?

Yes	**2**	3.2%
No	**61**	96.8%